Innovations in education and training to enable development of pharmacists as clinicians.

RUSHWORTH, G.F.

2023

List of Constituent Public Outputs

This file contains just the document that was produced to contextualise the public outputs (which form the main body of this thesis). The public outputs are listed in several parts of the document and the list below is simply intended to provide them in accordance with OpenAIR's citation style:

1. INNES, C., RUSHWORTH, G., ADDISON, B., WEDEKIND, Y., WATSON, E., RUDD, I., POWER, A. and CUNNINGHAM, S. 2022. An innovative general practice based pharmacy longitudinal clerkship: using theory to characterise its development, implementation and initial evaluation. *Education in primary care* [online], 33(3), pages 173-179. Available from: https://doi.org/10.1080/14739879.2021.1996275

2. INNES, C., CUNNINGHAM, S., ADDISON, B., WEDEKIND, Y., WATSON, E., RUDD, I., POWER, A., KARIM, L. and RUSHWORTH, G.F. 2022. General practice-based pharmacy longitudinal clerkship: a theoretically underpinned qualitative evaluation. *International journal of clinical pharmacy* [online], 44(5), pages 1123-1131. Available from: https://doi.org/10.1007/s11096-022-01429-0

3. JEBARA, T., THOMAS, I., CUNNINGHAM, S. and RUSHWORTH, G. 2022. Pharmacy and medical student interprofessional education placement week. *Clinical teacher* [online], 19(2), pages 143-149. https://doi.org/10.1111/tct.13450

4. RUSHWORTH, G.F., INNES, C., MACDONALD, A., MACDONALD, C., MCAULEY, L., MCDAVITT, A., STEWART, F. and BRUCE, R. 2021. Development of innovative simulation teaching for advanced general practice clinical pharmacists. *International journal of clinical pharmacy* [online], 43(4), pages 817-824. Available from: https://doi.org/10.1007/s11096-021-01305-3

5. FORSYTH, P. and RUSHWORTH, G.F. 2021. Advanced pharmacist practice: where is the United Kingdom in pursuit of this "Brave New World"? *International journal of clinical pharmacy* [online], 43(5), pages 1426-1430. Available from: https://doi.org/10.1007/s11096-021-01276-5

6. RUSHWORTH, G.F., JEBARA, T., TONNA, A.P., RUDD, I., STEWART, F., MACVICAR, R. and CUNNINGHAM, S. 2022. General practice pharmacists' implementation of advanced clinical assessment skills: a qualitative study of behavioural determinants. *International journal of clinical pharmacy* [online], 44(6), pages 1417-1424. Available from: https://doi.org/10.1007/s11096-022-01484-7

INNOVATIONS IN EDUCATION AND TRAINING TO ENABLE DEVELOPMENT OF PHARMACISTS AS CLINICIANS

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PhDPO 2023

INNOVATIONS IN EDUCATION AND TRAINING TO ENABLE DEVELOPMENT OF PHARMACISTS AS CLINICIANS

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MPharm MSc FFRPS FRPharmS (Consultant)

A thesis submitted in partial fulfilment of the

requirements of

Robert Gordon University

for the degree of Doctor of Philosophy

October 2023

DECLARATION

This thesis has been written by Gordon Rushworth and has not been submitted elsewhere for a higher degree award. Gordon Rushworth has undertaken the research with the assistance of a wider research team (details of co-authorship are given in Appendix 1). All quotations have been identified by quotation marks and sources of information have been specifically acknowledged.

Signed Date October 2023

‘In times of change, learners inherit the earth; while the learned find themselves beautifully equipped to deal with a world that no longer exists.’

Eric Hoffer

American Philosopher

ABSTRACT

The NHS is in urgent need of clinical healthcare capacity in terms of front-line clinician staff to deal with the burgeoning complexity and volume of care being delivered. These clinicians need to be accountable for the delivery of direct clinical care to patients meeting the demands of clinical services and patients. In the UK from 2026 onwards, all new pharmacists will be independent prescribers at point of registration. There is an opportunity for pharmacists to evolve their traditional role from that of medicines governance, supply, and ancillary advice - to one in which they have a central role within the NHS as a clinician.

The aim of this programme of research was to explore innovations in education and training that would enable development of pharmacists as clinicians. The programme is comprised of six public outputs investigating four separate educational interventions including: a pharmacy longitudinal clerkship (PLC) and interprofessional education (IPE) placements at undergraduate level, and the use of simulation-based education (SBE) and an Advanced Clinical Examination & Assessment (ACE) course within the advanced pharmacist space.

Output 1 used Donabedian's conceptual model to characterise the development and implementation of the first cohort of a PLC model for student pharmacists (SPs). It used interpretivist philosophy and qualitative semi-structured interviews of SPs and tutors, informed by the Theoretical Domains Framework (TDF), to undertake an initial evaluation. Seven themes were identified and mapped to seven TDF domains. These reported increased levels of student confidence, enthusiasm for a pharmacy career, and general practitioner (GP) positivity about the PLC.

Output 2 reported on two further cohorts of the PLC model. Qualitative semi-structured interviews of SP and GP tutors were used to explore stakeholder perceptions of influences of behavioural determinants on SP development. Interview design and analysis were informed by the TDF. Seven SPs and five GPs were interviewed. Key themes included: knowledge – utilisation and practical application; skills – triangulation of skills under supervision; beliefs about capabilities – confidence building with clinical and patient contact; professional role and identify. The evaluation showed the benefits of the PLC model by embedding SPs in clinical teams and the clinical environment over a prolonged period. It was expected that this training would translate into a more confident transition to postgraduate professional practice.

Output 3 reported on the evaluation of a separate week-long innovative hospital-based IPE placement involving SPs and medical students. Evaluation focused on level 1 and 2 of the Kirkpatrick Four-Level Training Evaluation Model. Focus groups were used to explore the student's views and experiences. Thematic analysis was

undertaken using the TDF. Three key categories with multiple sub-themes were identified: Category 1 overall perception of experience; Category 2 student interactions; Category 3 suggestions for improvement. Overall, students valued their participation in the week and reported many benefits of learning with and from other students.

Output 4 was a commentary giving some critical thought on the current state of advanced pharmacist practice within the UK, as well as giving primary thinking on how UK pharmacists, service models, and pharmacist education systems need to adapt to meet the demands of advanced pharmacist practice. It challenges pharmacy's historic dogma, discusses a requirement for teaching to transcend simplistic concepts of medicines-harm, considers the need for the standardisation of clinical skills and discusses the necessity for formal advanced practice programmes and preceptorship models. It finally proposes a model for Advanced Pharmacist Practitioners and the ultimate future vision of autonomous practice.

Output 5 reported on the implementation of innovative SBE to support the development of advanced general practice clinical pharmacists (GPCPs). An interpretivist philosophy was applied where pre and post simulation questionnaires were used to support an evaluation focused on level 1 and 2 of the Kirkpatrick Four-Level Training Evaluation Model. Increased confidence and self-reported competence were reported in all areas pertaining to application of consultation and clinical skills. Qualitative comments from the participants regarding the training course were also favourable, highlighting the value of the training in developing clinical competence and confidence when dealing with a variety of general practice scenarios.

Output 6 explores the potential behavioural determinants influencing the implementation of skills gained from ACE courses by GPCPs. The work used an interpretivist philosophy and qualitative methodology with theoretical underpinning using the TDF. Seven dyadic (paired) interviews were conducted. Three main themes were identified: 1. Factors influencing implementation of advanced clinical skills by pharmacists; 2. Social and environmental influences affecting opportunities for pharmacists in advanced clinical roles; 3. Perceptions of pharmacist professional identify for advance practice roles. The work identified numerous behavioural determinants related to the implementation of advanced clinical skills including: the course supporting clinically autonomous practice; frustration around social and environmental factors limiting implementation causing alienation; need for clarification of professional identity/roles.

This programme of research identified numerous innovations in education and training which would allow pharmacists to develop as clinicians over a variety of career stages and healthcare settings. There is commonality between PLC and IPE placements in terms of affording SPs exposure to clinical environments as part of

undergraduate education. The benefits observed during individual placements are also likely to be synergistic if combined into a longitudinal IPE placement. SBE was used effectively in both undergraduate and advanced pharmacist education and can be expected to augment clinical teaching at all levels of pharmacist education. ACE courses would make a suitable component of a competency-based training programme for advanced pharmacist practitioners, where skills learned on the course can be integrated into practice in a preceptored and supervised environment. This is similar to how clinical skills were implemented and practiced during PLC placements.

Recommendations included the need to develop education and training across the continuum of pharmacist practice and should be linked to an accepted career structure. Clinically supervised, curriculum-based training programmes delivered in clinical practice, should contain elements of IPE and SBE to augment the learning experience any career level. Review of current education and training pathways are urgently needed such that exposures to the beneficial innovations described in this thesis might be utilised to expeditiously create pharmacist clinicians with these skills to enhance healthcare capacity in support of clinical care delivery to patients.

KEYWORDS (MESH)

CLINICAL CLERKSHIPS

EDUCATION, PHARMACY

GENERAL PRACTICE

INTERPROFESSIONAL EDUCATION

PATIENT SIMULATION

PHARMACISTS

SIMULATION TRAINING

STUDENT, PHARMACY

ACKNOWLEDGEMENTS

To my beautiful children – Thea (9) & Ellis (7) - I have been doing this PhD for most of your lives and it has been tough blending fatherhood with work commitments. You are both such wonderful kids and I thank you for your love, your support, and for just being who you are.

My wife Emma is my biggest supporter. She always has my back. Thank you for your unflinching support and for always believing in me.

To my parents, Eric and Alison Rushworth and my brother Dr Iain Rushworth – after this is all over, let's agree never to speak of PhDs again! Thank you all for your support and love.

Elizabeth Park, my Grandma, who made an indelible mark on me.

I want to give special mention to Professor Scott Cunningham. Scott was my MSc Supervisor 13 years ago and someone whom I have collaborated with ever since. We have worked on multiple other research collaborations and projects beyond what I have selected for inclusion in this PhD. Scott was the main agitator, giving me the much-needed final push to 'get on with it!', and commit to this PhD. Thank you for all the genuine support and care that you have given me as my Principal PhD Supervisor.

To my Second PhD Supervisor, Dr Brian Addison, I thank you for your support and input into this thesis and in particular the PLC research. Over the years, Brian and I have worked on numerous research projects and educational innovations beyond the work presented here, and I always appreciate your insight and guidance – thank you.

Due to the nature of a PhD by Public Output, there are a significant number of collaborators who I will not name here, but whom I have had the pleasure of working with on this exciting project. I thank you all for the time you have given to these projects and for your support with this PhD.

Ian Rudd – has been my line manager for the entirety of my pharmacist career. I have lost count of the number of ideas I have pitched to him over the years and the number of innovations we have worked on together. He has been a stalwart supporter of progress and much of the success of this work is down to him and his advocacy for change and improvement. I am very grateful to have worked with someone who cared personally and professionally for me. I thank you dearly.

To Dr Rod Sampson – a hard working GP and family man, Rod has completed a PhD by Public Output himself and was a font of knowledge when it came to the presentation of such work.

A large professorial thank you goes to - Professor Derek Stewart, Professor Steve Leslie and Professor Ronald MacVicar. Each of you have helped and supported me at various times in my research journey and I am very glad to have been able to work with you all.

Dr Katie Walter – thank you for believing in me. You gave me an opportunity to train clinically without imposing a glass ceiling. You taught me what a privilege it is to work as a clinician within our NHS. I am forever indebted to you. So much of what you taught me has shaped my thinking of how we need to train other pharmacists and has had a significant influence on this programme of research.

I spend two days a week working in Cairn Medical Practice in Inverness where I have been for the last 9 years. I am constantly in awe of the care and dedication that my GP, pharmacist, pharmacy technician, nursing, physiotherapist, healthcare assistant and wider clinical, management and admin team give in support of patients and their families. You make me want to be better at this every day.

To my extremely talented accredited Consultant Pharmacist colleagues in Scotland. You give me sage counsel, inspiration, and critical feedback in the most heartfelt way. I am humbled to be one of you.

To the funders of the various research grants supporting this work including NES, Scottish Government & NHS Highland - thank you for your vital financial support of this research agenda.

Finally, I wish to thank all the research participants for giving of their time to contribute to this endeavour. Without you, this would not have been possible.

LIST OF OUTPUTS

The following publications have been curated for inclusion in this PhD by Public Output thesis:

Innes C, **Rushworth G**, Addison B, Wedekind Y, Watson E, Rudd I, Power A, Cunningham S. An innovative General Practice based Pharmacy Longitudinal Clerkship: using theory to characterise its development, implementation and initial evaluation. *Education in Primary Care*. 2021; 33(3): 173-179. https://doi.org/10.1080/14739879.2021.1996275

Innes C, Cunningham S, Addison B, Wedekind Y, Watson E, Rudd I, Power A, Karim L, **Rushworth GF**. General practice-based pharmacy longitudinal clerkship: a theoretically underpinned qualitative evaluation. *International Journal of Clinical Pharmacy*. 2022; 44: 1123-1131. https://doi.org/10.1007/s11096-022-01429-0

Jebara T, Thomas I, Cunningham S, **Rushworth G**. Pharmacy and medical student interprofessional education placement week. *The Clinical Teacher*. 2022; 19(2): 143-149. https://doi.org/10.1111/tct.13450

Rushworth GF, Innes C, Macdonald A, MacDonald C, McAuley L, McDavitt A, Stewart F, Bruce R. Development of innovative simulation teaching for advanced general practice clinical pharmacists. *International Journal of Clinical Pharmacy*. 2021; 43: 817-824. https://doi.org/10.1007/s11096-021-01305-3

Forsyth P, **Rushworth GF**. Advanced pharmacist practice: where is the United Kingdom in pursuit of this 'Brave New World'? *International Journal of Clinical Pharmacy*. 2021; 43: 1426-1430. https://doi.org/10.1007/s11096-021-01276-5

Rushworth GF, Jebara T, Tonna AP, Rudd I, Stewart F, MacVicar R, Cunningham S. General Practice Pharmacists' implementation of Advanced Clinical Assessment skills: a qualitative study of behavioural determinants. *International Journal of Clinical Pharmacy*. 2022; 44: 1417-1424. https://doi.org/10.1007/s11096-022-01484-7

Beyond the six published papers presented above, I have also included a 7th public output (Appendix 2) within the PhD Thesis. This is the final report of a national group for which I was the lead author. I had a significant role in the Group's commissioning, and was responsible for designing its terms of reference, membership, agenda setting and functioning. The content of the report aligns with the aim of this thesis and is closely linked to the ACE paper presented in this thesis as it is concerned with translation of that research into policy and practice.

Rushworth GF, MacVicar R, Garden S, on behalf of the NHSS APP SLWG. NHS Scotland Advanced Pharmacist Practitioner Short-Life Working Group: Final report & recommendations to the NHS Scotland Pharmacist Post-Registration Strategic Group. 2023.

Since 2010, I have published over 45 journal outputs in a wide variety of international peer reviewed journals and have collaborated extensively with senior researchers from multiple Higher Education Institutions. My research interests are focused around three main areas: education, training & development of pharmacists and student pharmacists; diabetes and cardiovascular science; and access to medication & medication adherence. As the publications which I have not included as part of this PhD are also public outputs, I have included the references for all my publications in Appendix 3 of this thesis, for information and interest.

National and International Conference Plenary Presentations of Note:

Rushworth GF. Progressing Clinical and Diagnostic Skills. Pharmacy Management National Forum for Scotland. 2018.

Rushworth GF, Cunningham S. Developing remote and rural healthcare education initiatives from practice-based research: considerations from the pharmacy. CONVERGE Conference. Augusta, Georgia, USA [remote]. 2021.

Rushworth GF. Advances in Specialist Practice in Primary Care - knowledge, skills and behaviours. Pharmacy Management National Forum for Scotland. 2021.

Rushworth GF. Clinical Pharmacy in a Brave new World. European Society of Clinical Pharmacy Autumn Conference. Aberdeen October 2023 [invited].

TABLE OF CONTENTS

ABBREVIATIONS

Abbreviation	Descriptor
ACE	Advanced Clinical Examination & Assessment Course
ACTp	Additional Cost of Teaching (pharmacy)
ANP	Advanced Nurse Practitioner
APP	Advanced Pharmacist Practitioner
BMA	British Medical Association
BNW	Brave New World
CBA	Competency Based Assessment
CBE	Competency Based Education
CEO	Chief Executive Officer
COPD	Chronic Obstructive Pulmonary Disease
EL	Experiential Learning
ESCP	European Society of Clinical Pharmacy
FIP	International Pharmaceutical Federation
FTY	Foundation Training Year
GMC	General Medical Council
GMS	General Medical Services
GP	General Practitioner or General Practice
GPCP	General Practice Clinical Pharmacist
GPhC	General Pharmaceutical Council
GR	Gordon Rushworth
HCP	Healthcare Professional
HEE	Health Education England
HEI	Higher Educational Institution
HIPER	Highland & Islands Pharmacy Education & Research
HPERC	Highland Pharmacy Education & Research Centre (now HIPER)
IP	Independent Prescribing
IPE	Interprofessional Education
MDT	Multidisciplinary Team
MPharm	Master of Pharmacy
MPharmS	Member of the Royal Pharmaceutical Society
MRC	Medical Research Council

MSc	Master of Science
NES	NHS Education for Scotland
NHS	National Health Service
NHSS	NHS Scotland
NICE	National Institute for Clinical Excellence
OSCE	Observed Structured Clinical Examination
PLC	Pharmacy Longitudinal Clerkship
PLC1	Pharmacy Longitudinal Clerkship - Study 1
PLC2	Pharmacy Longitudinal Clerkship - Study 2
PPRSG	NHS Scotland Pharmacist Post-Registration Strategic Group
PTS	Pharmacotherapy Service
R&D	Research & Development
RCGP	Royal College of General Practitioners
RGU	Robert Gordon University
RPS	Royal Pharmaceutical Society
RPSGB	Royal Pharmaceutical Society of Great Britain
SBE	Simulation Based Education
SC	Scott Cunningham
SIM	Simulation Study
SLEs	Supervised Learning Events
SLWG	Short-Life Working Group
SP	Student Pharmacists
SP3A	Scottish Primary Care Lead Pharmacists
THM	Take Home Message
UK	United Kingdom
UKRI	United Kingdom Research & Innovation

LIST OF TABLES

The public outputs have been included within each chapter, meaning that sequential number of tables and figures throughout the whole thesis has not been possible as the public outputs have their own numbering systems. When table numbers and figures are listed, these relate to that specific chapter, unless otherwise stated.

LIST OF FIGURES

The public outputs have been included within each chapter, meaning that sequential number of tables and figures throughout the whole thesis has not been possible as the public outputs have their own numbering systems. When table numbers and figures are listed, these relate to that specific chapter, unless otherwise stated.

FOREWARD

Personal background and scene setting

I completed the pre-registration pharmacist training year in 2004/5, which was at the same time as pharmacist prescribing was starting within the United Kingdom (UK). Therefore, for the whole of my career it has been possible for pharmacists to prescribe. This presents a generational step-change in professional thinking and attitude – and one which I think has shaped my career to-date. Even in the formative years of my pharmacist career, I knew I wanted to utilise prescribing in support of patient care. I understood quickly from watching senior pharmacists around that time there were some significant differences between making prescribing suggestions, and prescribing yourself. There seemed to be a different model of care emerging for pharmacists – that of the clinician - and I knew I wanted to develop and evolve my practice to enable me to deliver this.

I qualified as an independent prescriber in 2011 and worked to incorporate the clinical pharmacology and therapeutics I obtained from MPharm (2004), MRPharmS (2005), and MSc in Clinical Pharmacy (2010), with the newly acquired prescribing skills. I initially utilised my prescribing rights by working in an outpatient diabetes clinic over a four-year period. This experience augmented my understanding of what it means to be a clinician. Despite my numerous qualifications, the Consultant Diabetologist I worked with wanted me to undertake two further postgraduate modules in Advanced Diabetes Management. At the time, I felt it was an affront to the knowledge and skills my professional peer group equipped me with. On completion, I could see why they asked. I had been ignorant of how to autonomously treat these conditions – none of the qualifications I completed until then were designed to create a clinician-product. All of them were too focused on medicines-only aspects of care and omitted key clinical information. Also, none contained the practical supervision required to develop a clinician i.e. how to consult; clinically assess and examine; investigate; and make decisions in the management of patients (beyond ancillary/peripatetic medication adjustment). This experience also adapted my thinking as to why it is important for pharmacists to have these skills. It is critical to the efficient functioning of a clinic – and indeed the functioning of the wider healthcare team, and system. If your practice is limited to reviewing lists of medicines and making/actioning suggestions, then you cannot do the other central role of the clinician – which is first and foremost to provide excellence in direct holistic clinical care.

I made the transition to General Practice after reading the *Prescription for Excellence* strategy (Scottish Government 2013). It set out a bold vision for the delivery of care by pharmacists which centred on the opportunity for pharmacists to manage ‘a caseload of patients’. Beyond the clinical caseload aspirations, I also now desired much wider clinical variety in my practice. I wanted to develop autonomous clinician experience in the management of multimorbidity, long-term conditions and polypharmacy. The more time I spent consulting, the more I came to realise that patients regularly present with symptoms, rather than a list of medications or

medication related problems (even in single-disease-state clinics). Often during a person-centred consultation patients would ask to discuss a separate symptom or a concern they had which I felt was outwith my scope of practice to assess. It was frustrating for me, and for patients. After a conversation with a General Practitioner (GP), we decided that I ought to develop some autonomous clinical assessment skills. During 2015, I became the first pharmacist in NHS Scotland to be funded by NHS Education for Scotland (NES) to undertake an Advanced Clinical Examination and Assessment (ACE) course. This is the same course Advanced Nurse Practitioners (ANPs) complete as part of their training to give them the prerequisite clinical assessment and decision-making skills suited to their post. The course teaches full clinical history taking and clinical examination of various physiological systems i.e.: cardiovascular; respiratory; gastrointestinal; musculoskeletal; neurological; dermatology; ear, nose & throat; and ophthalmology. On completion of the course, I persuaded the GPs in the practice to clinically supervise and train me in acute, urgent and emergency general practice, such that I could competently and safely autonomously manage clinical presentations across the age and acuity spectrum. I have continued to practice like this over the last seven years in general practice. In turn, this led to me being invited to write multiple national curricula for the postgraduate education and training of other pharmacists including: NES General Practice Clinical Pharmacist Advanced Practice Framework (NHS Education for Scotland 2016); RPS Pre-Registration Foundation Pharmacist Curriculum (Royal Pharmaceutical Society 2021b); and the Core Advanced Pharmacist Curriculum (Royal Pharmaceutical Society 2021a).

Since registering in 2005, I have spent my career working to adapt (rather than usurp) the pharmaceutical care model. Pharmaceutical care is a component of good clinical care. It is critical to keep it. But we need to be realistic as pharmacists about how clinical care is delivered and adapt to meet the need. One of the papers presented in this thesis is a commentary which expounds on these considerations (Forsyth and Rushworth 2021).

In October 2021, I was accredited as a Consultant Pharmacist by the Royal Pharmaceutical Society (RPS) after successfully completing the Consultant Pharmacist Curriculum (Royal Pharmaceutical Society 2020). I was in the first cohort of pharmacists in Scotland to attain this credential and as of January 2023, there are less than 30 pharmacists in the UK who are credentialed.

The rationale for undertaking this research was to build on my own personal experiences using a formal academic approach to explore innovations in education and training to enable pharmacists to develop as clinicians.

1. CHAPTER ONE: INTRODUCTION

This chapter gives a brief overview of the research programme before outlining what is meant by 'clinician' practice. Historical and present-day perspectives are then given on the evolution and development of the pharmacist profession and its education and training. Finally, an overview of educational theory and a contemporary review of the literature used to develop the research programme are also given.

1.1. Overview of research

This thesis presents six public outputs investigating four separate educational interventions including: a pharmacy longitudinal clerkship (PLC) and interprofessional education (IPE) placement at undergraduate level, and the use of simulation-based education (SBE) and Advanced Clinical Examination & Assessment (ACE) course within the advanced pharmacist space. The purpose of this programme of research is to explore the use of these innovations in education and training to enable to development of pharmacists as clinicians.

1.2. Clinician practice

The term clinician is not a reserved title, nor is it restricted to a particular professional group. Marcum outlines a theoretical model of the epistemically virtuous clinician in which he describes the necessary intellectual virtues of the clinician (Marcum 2009). He broke these down to 'reliablist' virtues e.g. 'knowledge, perception and conceptual faculties', and the 'responsibilist' virtues, which are longitudinally acquired through experience and exposure, and include 'honesty, courage, open-mindedness, humility, fairness, curiosity, tenacity, and integrity'. The paper argues that both are required to produce the clinician who is able to function across the two paradoxical cultures of science and humanities.

For the purpose of this research the term 'clinician' will denote the lead healthcare professional (in this case a pharmacist) with whom a patient will consult directly on any given healthcare professional contact. The clinician would be expected to have the prerequisite knowledge, skills and behaviours to autonomously, independently and holistically navigate the clinical episode of care to a satisfactory conclusion. They will have the legal right to prescribe medicines independently; be competent to clinically assess patients using clinical history taking and examination skills; and undertake clinical procedures and investigations as necessary. Ultimately the clinician should be able to formulate a management plan, working with the patient and their carers, which may include reassurance; monitoring; treatment (pharmaceutical or non-pharmaceutical); or onward referral to other healthcare professionals or other care settings, as appropriate.

While the end-product for service from any educational pathway would be the development of clinicians as outlined above, there is an obvious recognition they can only be created by sequential educational exposure and

teaching at various levels of practice. Key to this programme of research is that educational innovations have been tested across multiple levels of practice within pharmacy – from undergraduate student pharmacists to advanced pharmacists. The level to which a clinician would be able to autonomously, independently and holistically assess should be considered to align to the General Pharmaceutical Council (GPhC) regulatory standards for initial education and training (General Pharmaceutical Council 2021) and the various RPS curricula for post-registration training e.g. Post-Registration Foundation, Advanced & Consultant Pharmacist practice (Royal Pharmaceutical Society 2021b, Royal Pharmaceutical Society 2021a, Royal Pharmaceutical Society 2020).

1.3. Historical perspectives on the formation of the pharmacist profession and its education and training

Before trying to understand where the pharmacist profession should evolve, it would be useful to consider where it has come from, and the historical professional identity from which the profession was formed. To do this, there is the need to appreciate the wider context of 'healers' (a generic term denoting an individual who offered advice and treatment for ailments and illness prior to the establishment of formal, regulated healthcare professional groups) who have served the public throughout the ages, starting from a time before pharmacists existed.

The Scottish medical Royal Colleges formed in the 15th and 16th centuries with the formation of what was to become the Royal College of Physicians and Surgeons of Glasgow in 1599, then the Royal College of Physicians of Edinburgh in 1681 (Hamilton 2003). They were the first healthcare professional colleges to be formed and were created centuries prior to the emergence of pharmacists. At that time, physicians were considered the top healers/clinicians of the era – their education was expensive and usually undertaken overseas. Their services were expensive too, but the Charter by which they practiced only allowed them to consult with patients, diagnose, and prescribe medicines/treatments – not compound or dispense them. Apothecaries compounded the prescriptions of physicians for a much smaller fee, dispensing these to patients.

Few in society could afford the cost of consulting with a physician, so apothecaries also offered a cheaper consultation service attending the poor and lower middle classes. These practices were particularly prevalent in rural communities, which the physicians rarely visited. In addition to the smaller consultation fee, they were also able to dispense treatments too. Whether by compounding and dispensing physician's prescriptions, or because they were able to offer consultation and drugs for their own patients, this resulted in considerable income for the apothecaries. The resultant wealth and perceived competition with the physicians led to tensions at that time (Jones 2006). Surgeons emerged in the Middle Ages too, but their healing ability, working in a time before anaesthesia and antibiotics, was limited for understandable reasons, and generally restricted to bloodletting, dressings, occasional amputation, setting of fractures and embalming of the dead. Surgeons were lower in the

healthcare professional pecking order than physicians, but above apothecaries. Like surgical treatments of the era, pharmacological treatments of the 16th Century were more akin to folk medicine than medicine as we know it today. Indeed, given the rudimentary 'treatments' available and the lack of evidence-based medicine, there is limited evidence to suggest that encountering prescribers of the age would improve your health at all (McCartney 2016).

The apothecary is the common ancestor of both modern-day general practitioners (GPs) and pharmacists (Liaw and Peterson 2009). Apothecary practice continually evolved to meet the needs of the population and so from around 1800, many also practiced surgery too – the surgeon apothecaries. Apothecaries would train in apprenticeships to develop their knowledge and skills. The lucrative nature of the apothecary business, and lack of sufficient regulation, became a problem in the late 1700s and early 1800s – particularly from charlatan apothecaries - unqualified individuals looking to exploit the sick for capital gain. These issues were rectified in 1815 by the landmark Apothecaries Act which saw the legal establishment and recognition of apothecaries as general medical practitioners (Holloway 1966) and ultimately led most apothecaries to drop their medicines supply function to focus on their role as a general medical practitioner - consulting, assessing, and treating patients. It would not be until the 1950s before a Royal College of General Practitioners (RCGP) was established (Gray 1992), in part because of the subjugation of previous attempts to establish the RCGP by physicians in the mid-1800s (Loudon 2008).

Significant advances in science, botany, and chemistry around the same time (Zebrowski 2016) drove some apothecaries toward the preparation, compounding, and manufacture of medicines instead – thus developing the role of the pharmaceutical chemist. Another group, the chemists & druggists, were able to manufacture and wholesale drugs, as well as sell and dispense them, thus ensuring the continuity of access to drugs. However, in the early 1800s, drugs were unregulated, and patients could not be assured of quality, provenance, efficacy, or even if the treatments given would be poisonous. In 1841, a prominent chemist & druggist of the time, Jacob Bell, established the Pharmaceutical Society of Great Britain (PSGB) at a meeting in the Crown and Anchor Tavern, London (Anderson 2023). William Allen was elected as the first President. The ambitious purpose of the new Society was '…promoting a uniform system of education…' to advance the skills of the membership and assure the services they provide, as set out in the 1843 Royal Charter from Queen Victoria. Education and training of the members of the Society was key. It was not until 1988 that Queen Elizabeth II granted approval for a name change to 'Royal Pharmaceutical Society of Great Britain' (RSPGB) (Royal Pharmaceutical Society 2023). The first Pharmacy Act of 1852 gave the Society power to establish a register of pharmaceutical chemists – restricted to those who had passed Society entry examinations. Building on this, the Pharmacy and Poisons Act 1868, reserved in law, that only registered qualified persons should be able to retail, dispense or compound

medicines. The PSGB were given powers to set the examinations required for these qualified persons where 'major' examinations would yield a 'pharmaceutical chemist' title, and 'minor' examinations would yield 'chemist & druggist' titles (General Pharmaceutical Council 2023). PSGB then held registers of those attaining these qualifications from 1868-1953 when the later title (and role) was abolished.

The Pharmacy Act 1908 saw the PSGB given new powers to set syllabi for university courses in pharmacy, but it was not until 1924 when the University of London produced the first BPharm degree as an approved route into the profession (General Pharmaceutical Council 2023). It was also around this time that the title 'pharmacist' was conferred to all registrants (Royal Pharmaceutical Society 2023). 1926 saw the first 'pupillage' professional apprentice scheme which would develop into the Foundation Training Year (FTY), as it is known today. The National Health Service (NHS) was established in 1948 and had a profound effect on the role of the pharmacist – it causes prescription numbers to rise from 70 million in 1947, to 250 in 1949 (Anderson 2023). It is also important to consider that upon the establishment of the NHS, most prescriptions were extemporaneously dispensed. Private prescription and counter sales of medicines decreased significantly. Public access to the pharmacist decreased as the pharmacist was required to undertake more dispensing activity in the back of their premises.

There are parallels with the development of apothecary practice in the 1600-1800s and the modern development of pharmacist practice as prescribers and clinicians. There is also commonality between where apothecaries found themselves in the 1800s and where the prescribing pharmacist profession currently finds itself – between dispensing and supply (technical) roles, and clinical assessment and prescribing (clinician) roles.

> 'The emergence of consultant and prescribing pharmacists mirrors the role of apothecaries in the eighteenth and nineteenth century.' (Anderson 2023)

The prescribing and clinical assessment roles undertaken by many contemporary pharmacists are part of a 200-year-plus heritage of providing these clinical services to the public which seems to have slipped from the profession's professional consciousness. Apothecaries were ultimately able to shed dispensing functions to chemist and druggists; whereas today, pharmacy technicians, automation and artificial intelligence can perform increasingly more of this work to enable pharmacists the opportunity to develop as clinicians. This concept is further backed by the dual registers of pharmaceutical chemist and chemist & druggist which existed between 1868-1953, compared to the modern pharmacist and pharmacy technician registers.

1.4. Present day perspectives on pharmacist clinical practice and its education and training

Now to consider what would constitute contemporary clinical pharmacist practice. Modern clinical pharmacy took off once Hepler and Strand described their vision for pharmaceutical care in their seminal paper on the subject which established pharmacists with a clinical role focused around the 'safe and effective use of medicines' (Hepler and Strand 1990). The concept of pharmaceutical care became widely accepted in the UK leading to a departure of pharmacists from dispensaries and other non-patient-facing settings onto wards and into consultation rooms to provide clinical functions. Supporting government policy followed (Scottish Executive 2002, Scottish Government 2013, Scottish Government 2017b) where pharmaceutical care was described as:

> '… the responsible provision of drug therapy to achieve agreed outcomes that improve an individual's quality of life. It involves cooperation with the patient, and if appropriate their carer, and other professionals in designing, implementing and monitoring a pharmaceutical care plan that will produce a specific therapeutic outcome for the patient.' (Scottish Government 2013)

The quote above relates to the pharmacist's role in relation to pharmaceutical care delivery in NHS Scotland and entered Scottish Government strategy 23 years after Hepler and Strand's paper and about eight years after the advent of supplementary prescribing. To deliver pharmaceutical care does not rely on the pharmacist to be a prescriber, and pharmacy strategy was limited in terms of how prescribing functions might be assimilated with adaptive application of pharmaceutical care. As such, in the first decade since the advent of pharmacist prescribing, many pharmacists were cautious of prescribing and slow to integrate this change into their clinical practice (McIntosh, Trudi et al. 2011, McIntosh and Stewart 2016) The new prescribing role, and the more traditional pharmaceutical care role of the pharmacist, often felt at odds.

Pharmacist prescribing was established in the UK as part of a recommendation from the second Crown Report which explored the possibilities of non-medical prescribing practice (Crown 1999). Initially, no consideration was given to non-medical prescribers being able to clinically assess patients or diagnose illness. Pharmacists were given supplementary prescribing rights after undertaking a postgraduate certificate with a Higher Education Institution (HEI). Supplementary prescribing might best be thought of as semi-autonomous. The practice was restricted to predetermined populations of patients within set conditions where prescribers were only being permitted to prescribe within strict accordance with clinical management plans agreed with an independent prescriber (doctor or dentist). These were cumbersome to use and restricted practice (Dawoud et al. 2011). With the introduction of independent prescribing rights for pharmacists, the need or necessity to be clinically supervised or instructed, compared with supplementary prescribing, diminished. Onus was placed on the professional accountability of the independent prescribing pharmacist. Despite this, many of the discussions at

that time were focused on the stipulation that pharmacists should only be prescribing for a condition previously diagnosed by a doctor. Given the additional prescribing responsibilities obtained from independent prescriber status, it became clear that to prescribe for a condition diagnosed by another healthcare professional would not absolve the prescriber from needing to know anything about its diagnosis, or indeed how the clinical presentation would change in the presence of therapeutics prescribed. It was also not backed up by contemporary clinical guidelines of the time e.g. COPD (a typical area for pharmacist prescriber practice) – where NICE stated in their clinical guideline since 2004 that 'all healthcare professionals who care for people with COPD should have access to spirometry and be competent in interpreting the results' (National Institute for Health and Clinical Excellence 2018). A study of 500 community pharmacists in Scotland, undertaken in 2004, asked about self-perceived readiness for independent prescribing practice (George et al. 2006). It found that 'though the majority of respondents perceived themselves to be competent in diagnosing and selecting appropriate drugs for the conditions studied, only a quarter of them were confident about the currency of their knowledge of evidence-based treatment for the conditions'. The two statements seem contradictory. Overall, the pharmacists called for training programmes to include education on diagnostics, assessment as well as evidence-based prescribing.

From 2026 onwards, pharmacists, doctors and dentists will be the only healthcare professionals who are independent prescribers at the point of registration. The main drivers for this are optimisation of pharmacist's skills and knowledge, improvement of capacity issues within the NHS, and evolution of the pharmacist workforce. The General Pharmaceutical Council (GPhC – the Regulator) have announced new standards for the Initial Education and Training of Pharmacists to allow for this (General Pharmaceutical Council 2021). These standards include changes to undergraduate curricula and FTY to cover teaching normally included in the postgraduate certificate in independent prescribing, as well as experiential learning.

Regardless of the ultimate career destination of a pharmacist, and prior to subsequent potential deviation from a clinical career pathway, all registrants will be trained to cover basic 'clinician' functions from registration under the revised GPhC Standards for the Initial Education and Training of Pharmacists (General Pharmaceutical Council 2021). This is a change from previous public expectation of pharmacist roles and requires adaptive thinking within the leadership of the profession to capitalise on the opportunity conferred – as well as a revision of the education and training they will require to succeed in their posts. The ability of the pharmacist profession to survive and thrive, will be fundamentally dependent on its ability to adapt. While pharmacist clinical pharmacology, therapeutics, and prescribing skills at registration offer a significant advantage in terms of healthcare service provision utility within the multidisciplinary team, further professional-cognitive changes are required in this new pharmacist 'clinician' era. Novel thinking is needed, looking beyond the historic pharmacist

roles being solely responsive to the 'safe and effective use of medicines'. The undifferentiated use of 'expert in medicines' has also been unhelpful (Royal Pharmaceutical Society Scotland 2022). Can any profession really say that newly qualified Foundation registrants are experts? Gearing of current pharmacist training enables pharmacists to become 'experts in medicines governance': how to dispense and supply medicines within the law; how to store, stock and transport medicines – including those in the cold chain; and how to control the prescribing choices of medicines within healthcare systems down to individual patient level. This is different from the training that will be required to allow pharmacists to function as 'clinical experts in medicines'.

The profession needs to be realistic about the product of the current training programmes – while undergraduate and FTY will now include the prerequisite teaching to allow for prescribing rights at registration – there is a slow uptake of postgraduate curricula to support development once qualified. HEIs have for decades offered a suite of postgraduate courses and modules, including the eponymous MSc in Clinical Pharmacy (and variations of it). These courses cover a taught 'knowledge' element for pharmaceutical care, pharmaceutical public health and research methods. Many courses now offered align with national postgraduate curricula. Over the last few years, the RPS have produced a suite of competency-based curricula designed to assure the level of practice of pharmacists working in patient-facing roles over Post-registration Foundation (Royal Pharmaceutical Society 2021b), Advanced (Royal Pharmaceutical Society 2021a), and Consultant Pharmacist practice (Royal Pharmaceutical Society 2020). These curricula set the standards to be met at each level of practice, as set out across the four pillars of practice (clinical/leadership/education/research) and can link the taught 'knowledge' elements of training, with their supervised application in practice. When considering the need to develop pharmacists clinically, there is a further need to design innovations in education and training to enable pharmacists to attain the required clinical level in support of these curricula.

Current leadership strategy has exacerbated an identity crisis for the profession – and seems remote from the experiences of front-line clinical pharmacist prescribing clinicians in practice. There is a need to look outward, develop thinking on the evolution of a modern pharmacist workforce, and to articulate what pharmacists will do for patients, the public and the wider NHS in support of the delivery of healthcare capacity and recovery post-COVID.

1.5. Pharmacists as clinicians – the need for change

This section will focus on some of the specific drivers for the need to develop pharmacists as clinicians within the context of the Scottish NHS and recently reported health statistics for the Scottish population.

Since 2020, the NHS has faced an unprecedented test to the delivery of care to the public in response to the

COVID pandemic. At its height, the challenge of service provision during the pandemic was keenly and universally felt by all specialties, disciplines, and sectors of the NHS. To cope with the pressure and demands placed on it, the NHS evolved and adapted in real-time to face up to the clinical need of the age. Now, with the country in a post-pandemic recovery phase, the Scottish Government have called upon all NHS services to rethink how they can contribute to the burgeoning NHS workload, backlog, waiting lists and clinical pressure being exerted on NHS Scotland services. The Scottish Government have set out an NHS Scotland Recovery Plan (Scottish Government, 2021). Within it they call for new ways of working and innovative thinking as to how we deliver services under unprecedented demand. Further to the recovery plan, and in support of it, the Scottish Government has recognised that if the NHS is going to find new ways of working, then it needs to review the workforce it requires for optimal functionality. The National Workforce Strategy (Scottish Government, 2022) will work to install a national workforce forum to consider these new ways of working and what workforce will be required to deliver future clinical care within NHS Scotland to meet current post-pandemic pressures as well as addressing the population health need/inequality agenda.

The Scottish Burden of Disease study (Public Health Scotland, 2022) and the most recent Healthy Life Expectancy (the number of years a person can expect to live healthy, rather than survive) statistics within Scotland (National Records of Scotland, 2022a) make for concerning reading. Figures predict an ageing population, with 21% total increase in the burden of disease across all disease areas. The Burden of Disease is calculated as a disease adjusted life year (DALY) where one DALY is equal to a year adversely affected by a disease e.g. hemiparesis post-stroke, or the difference between the predicted life expectancy for an individual and the actual duration of life in the context of the intercurrent illness. Most of this burden will likely appear in ageing populations residing in primary care due to pressure accumulated from long term conditions. The latest life expectancy figures have also shown a decrease in population life expectancy within Scotland (National Records of Scotland, 2022b). To summarise, the projections for our population in Scotland are that the population will live with increasing morbidity, decreasing years of healthy life, and an overall decrease in life expectancy. There is a need for clinicians at the front-line of service provision to improve treatment pathways and optimise benefits from treatment and screening of disease to reverse these pernicious trends.

1.6. Educational theory relating to programme of research

Understanding educational theory can aid the efficacy of the teaching and learning implementation. A number of educational theories were considered during the design and delivery of the education and training innovations within this thesis. Educational theories have previously been described as ‘a comprehensive, coherent, and internally consistent system of ideas about a set of phenomena’ (Knowles 1973).

1.6.1. Adult learning theory: andragogy

Adult learning (andragogy) differs from other types of learning (e.g. school) as it assumes a reliance on the self-direction of the learner. This is particularly important for each programme of research as laid out in this thesis. There are five main assumptions regarding andragogy (Knowles 1980, Knowles 1984). These are:

- Maturity confers self-direction of the learner and their individual learning needs.
- Pooled personal experience of the learner, gives context to new learning environments and experiences.
- Adult learners place more value on learning which is more relevant to their daily tasks.
- Translational immediacy of learning is coveted by adults who prefer learning to be problem-based relating to real-life scenarios.
- Adult learners are more self-motivated.

Undergraduate and postgraduate pharmacists are adult learners and would be expected to exhibit the assumptions given above. Design of the education and training innovations in this thesis have supported adult learners at all career stages by delivering problem-based learning which is designed to be applicable to the practicalities of delivering pharmacist clinician practice. This aids participants to draw out their own learning needs and formulate plans to address these.

1.6.2. Social cognitive theory

Social cognitive theory (Bandara 1986) draws from two approaches to the understanding of learning. Behaviourist approach – where the learning environment, and repeated exposure to a learning event, will augment the behaviour of the individual who has been exposed. Cognitive approach – where the thought process influences the implementation of learning, particularly around an individual's judgement of their self-efficacy. Central to social cognitive theory is the concept that learning is influenced by a continual and dynamic interaction between three determinant factors – personal (individual learner's values), environmental (learning environment) and behavioural (learning action). In designing the innovations presented in this thesis, care was taken to remain cognisant of the learning environments which could optimise the opportunity for learning. Learners were given clear objectives across all the programmes, and ample opportunity to reflect on feedback given.

1.6.3. Experiential learning theory

Klob's experiential learning theory (Kolb 1984) suggests that learning opportunities are enhanced when both concrete experiences and abstract conceptualisation are utilised. The learning experience can be further enhanced when reflection and active participation are implemented. Experiential learning methods are key links between existing knowledge, understanding and values, with a new adapted set of knowledge, skills and behaviours. Opportunities to increase observed supervised practice with contemporary feedback were considered when designing the experiential learning and simulation research programmes (Chapter Three, Four

and Six).

1.6.4. Situated learning theory

Situated learning is a socio-cultural theory which posits that learning occurs as part of an immersive experience while engaged with the wider community (Swanwick 2010). It was originally developed as a theory to study apprenticeships (Lave and Wenger 1991). While apprenticeships involve paid employment within the experiential learning environment, there are some obvious similarities to the clerkship and placement research presented in Chapter Three and Four, respectively. Key to the concept is that learning takes place beyond structured teaching opportunities as a result of immersion within the community environment. This similarly draws on the experiential learning theory (Kolb 1984) but then extends it to consider that the learning happens within a specific context and that the learning is also not necessarily considered to be restricted to the learners; all participants of the learning experience may be assumed to benefit, including facilitators.

1.7. Contemporary literature relating to programme of research

An overview of the literature relating to each specific part of the programme of work is included in the introduction to each of the research outputs in Chapters Three to Seven. A contemporary review of the literature between 2019 and 2023 will be presented here to account for papers published during and after the publication of work presented in this thesis. The search strategy, inclusion and exclusion criteria, search terms, details of the search, and PRISMA chart, are included in Appendix 4. In total, 2468 studies were identified, 695 duplicates were removed, and 1773 titles and abstracts were reviewed by the PhD candidate (GR). Double screening was completed on 200 of these by the Principal Supervisor (SC) leading to 44 full texts being reviewed. These were reviewed independently by GR and SC against the inclusion and exclusion criteria outlined in Appendix 4. Any disagreements were managed through discussion of the individual papers leading to 17 papers being included in the review, of which three were papers already included as part of the body of work submitted by the PhD candidate in this thesis, and so excluded. The results will be discussed below.

1.7.1. Experiential learning

One study was found which reported a similar experiential learning (EL) activity to the one presented in Chapter Three of this thesis. It reported on the experiences of two summer internship student pharmacists (SPs) on a primary care placement in Tennessee in the United States (Darby et al. 2023). The SPs spent seven consecutive weeks on placement and reported an increase in their readiness and appetite for postgraduate practice. Again, SPs coveted the opportunity to translate skills from the classroom to the clinical environment for real patients. There was also a perception that communication and critical thinking was improved with the EL exposure.

A study from the University of Sunderland, reported general practice placements for third year student pharmacists (Donovan et al. 2019). The duration of the placements was not explicit although there was a suggestion in the text it may only be one-day in duration. Although significant numbers of students were able to experience the placements – 213 in the first cohort and 193 in the second – and the paper reported positive outcomes in terms of student satisfaction, the benefits of this type of short placement remain unclear.

Two further studies based in the UK investigated cross-sector placements within the FTY. After full-text review, the decision was taken to include these studies as their findings complemented the work reported in Chapter Three. The first study reported on the experiences of hospital FTY pharmacists spending four or eight-week placements in GP (Christou et al. 2021). Each FTY pharmacist received a GP clinical supervisor to support them on placement. FTY pharmacists found the placements enhanced understanding of the patient journey overall, as well as increasing understanding of the pressures on primary care. The second study reported on 95 cross-sector FTY placements of 3-6 month duration in GP (Hindi and Willis et al. 2022a). Again, FTYs reported GP placements as valuable, affording participants a good understanding of different care settings. Similar to the previous work and that reported in Chapter Three, the use of a GP supervisor supported a safe transition to more independent clinical practice.

Utilisation of medical staff as preceptors or clinical supervisors has also taken place in the United States within a federally qualified health centre where 32 third year SPs were clinically supervised by eight primary care providers (Gilliam et al. 2020). During the 12-week placement, SPs contributed to the care of 516 patients, earning the trust of their supervisors for clinical activities.

Competency-based assessments (CBA) are being used in some clinical teaching environments to demonstrate competence of learners in the application of clinical tasks. However, due to the increase of EL placement activity, rather than on-campus activity, some universities are exploring in-practice CBAs. One Scottish study explored EL facilitator's views of undertaking CBAs (Jacob et al. 2022). Although there was general support for the role, there was also some concern about the practicalities of the CBA and in particular the impact this would have on students' academic success and facilitator time.

1.7.2. Interprofessional education

Two studies were found that reported on IPE between SPs and medical students. The first study reported on the successful delivery of an online prescribing teaching session (Abdelhakim et al. 2022). However, this was much shorter in duration, and delivered remotely using a structure distinctly different to the prolonged face-to-face placement experience given to the students participating in the research outlined in Chapter Four. The second

study, from Germany, reported the development of an IPE collaborative project where students were repeatedly given IPE opportunities using a variety of modalities in several settings (Gehrke-Beck et al. 2023). Initial IPE was delivered as an online seminar during the pandemic before practical training was delivered in person. Finally, a tandem job shadowing placement in a primary care setting was completed.

1.7.3. Simulation based education

No studies were found that reported simulation activity to support the development of advanced pharmacists working in general practice. One paper reported that SP participation in acute care simulations was a predictor for performance on advanced pharmacy practice experiences (Baumgartner et al. 2021). However, as this was restricted to undergraduate practice the use of the advanced practice term was confusing and likely at odds to the context as set out in Chapter Five and Six. This paper is still of interest because it demonstrates, in a sizable cohort of 394 SPs, that participation in simulation better prepares SPs for clinical practice. In this regard, it supports the inclusion of simulation within the IPE placement reported in Chapter Four. Furthermore, a systematic review of the application of Kirkpatrick's Model in the assessment of IPE simulation involving SPs found 14 studies which met the inclusion criteria (El Nsouli et al. 2023). However, of these studies, only two involved a comparable cohort of SPs and medical students, to the research presented in Chapter Four. Similar to the findings reported in Chapter Four, another study reported perceived student benefit of IPE simulations in hospital setting due to a significant enhancement of communication confidence between the disciplines involved (Kayyali et al. 2019).

1.7.4. Advanced practice

Several papers were found that pertained to the development of General Practice Clinical Pharmacists (GPCPs) or advanced pharmacists in general practice. These focused on education development in three distinct ways. The first reported on the evaluation of educational support given to three cohorts of GPCPs in Scotland (Matheson et al. 2020). Similar to this literature search, Matheson et al. (2020) also noted that the development of educational support for GPCPs was poorly covered in the published literature. The paper goes on to evaluate the learning pathway that was created to support GPCPs including the development of an Advanced Practice Competency Framework for GPCPs, design of bespoke face-to-face training based on a training-needs-analysis, and access to an e-learning platform - in addition to ancillary courses offered in clinical assessment and consultation skills. This paper was conducted on the same Scottish GPCP workforce as the research outlined in Chapter Seven, albeit that the participants in the research presented in this thesis were exposed to more advanced training. Overall, the paper reported the support was well received – and proposed a framework model for this.

The second paper focused on the key role of clinical and educational supervisors as part of a supportive infrastructure to develop advanced pharmacists or pharmacy technicians (Hindi and Willis et al. 2022b). It highlights key pedagogic practices needed within training for both these roles to ensure effective supervision. It puts forward that the clinical supervisor has a role in the day-to-day clinical supervision of a learner's practice, providing observation and feedback, as well as arranging ad hoc and planned face-to-face meetings to discuss clinical matters or experiences. It suggests the educational supervisor role is to help the learner identify their learning needs and help them navigate the learning pathway such that they may achieve them.

The third paper reports the results of a UK-based Delphi study exploring a core set of clinical skills for pharmacist prescribers in general practice (Ibrahim et al. 2023). The authors make no claim for these skills to be considered advanced and their notation as core skills supports that. The paper has been included because it outlines useful consensus statements on the core skills for pharmacists in general practice who will look to be developing as clinicians.

1.8. Summary

Pharmacists are the ideally placed healthcare profession to develop their skills as patient-facing clinicians. They join the register with a sound understanding of medicines governance, clinical therapeutics, physiology and pharmacology, and soon - prescribing rights. They have a historical pedigree and centuries old heritage in the clinical assessment and management of patients which has slipped from our professional consciousness, and one which should be reinvigorated with innovations in education and training enabling pharmacists to develop as clinicians.

2. CHAPTER TWO: THE RESEARCH PROGRAMME

Chapter Two outlines the overarching aim and objectives before expanding on the need for research in this area. Subsequently it gives an overview and justification for the use of the key methodologies, philosophical approach and theories used in this research programme.

2.1. Research aim

To explore innovations in education and training that would enable development of pharmacists as clinicians.

2.2. Research objectives

i. To investigate the development, implementation and initial evaluation of a Pharmacy Longitudinal Clerkship.
ii. To carry out a theoretically underpinned qualitative evaluation of stakeholder perceptions of influences of behavioural determinants on student pharmacist development for clinical practice in general practice.
iii. To explore the views of student pharmacists and medical students to an interprofessional education clinical placement.
iv. To design and deliver an innovative simulation course to support the development of advanced General Practice Clinical Pharmacists in clinical assessment and management of patients in General Practice.
v. To explore potential behavioural determinants influencing the implementation of skills gained from Advanced Clinical Examination and Assessment courses by General Practice Clinical Pharmacists.

2.3. Understanding the need for the research

Modern healthcare systems are asking more of their healthcare professionals to meet the burgeoning demands being placed on them. Part of this demand is for an evolved workforce such that patients are assessed and treated in the right place, at the right time, by an appropriate clinician. The NHS is no different.

There is an expectation that clinical pharmacists will evolve their skillsets such that they will be able to function as independent, prescribing clinicians. Service visioning and modelling is needed in tandem with significant educational reforms to be able to do this impactfully at scale and pace within the UK. These reforms will involve changes to how pharmacists are trained and assessed as competent and safe. This PhD by public output seeks to understand the utility of a variety of innovations to education and training to enable pharmacists to develop as clinicians, from undergraduate level, through to advanced pharmacist level. The innovations that have been explored are: a pharmacy longitudinal clerkship and an interprofessional education clinical placement at undergraduate level; and a simulation course and an advanced clinical assessment course at postgraduate level.

2.4. Justification for the key methodologies used in this programme of research

Detail of the research methods used for each of the studies in this programme of research have been outlined within each of the published papers submitted as part of this PhD by public output. These have been through an independent external peer-review process. This section will justify why the methodologies used were selected.

2.4.1. Justification for the philosophical approach taken to research and approach to theory development

It is important to understand the philosophical approach taken for this programme of research. Philosophy has been described as 'the use of reason in understanding such things as the nature of the real world and existence, the use and limits of knowledge, and the principles of moral judgment' (University of Cambridge 2023). To be able to collect pertinent data, analyse and interpret appropriately - the researcher must first consider their own philosophical position in relation to their own beliefs and assumptions regarding the development of knowledge. Assumptions will influence the researcher's understanding of the research question, the methods selected and the interpretation of the findings (Crotty 1998). The Research Onion (Figure 1) is a useful tool to allow researchers to consider these assumptions in turn, starting with the outermost layer of the 'onion', selecting the most appropriate parameter to meet the demands of the study, including a credible research philosophy, methodological choice, approach to theory development, strategy, and converging on the appropriate technique and procedure for data collection and analysis.

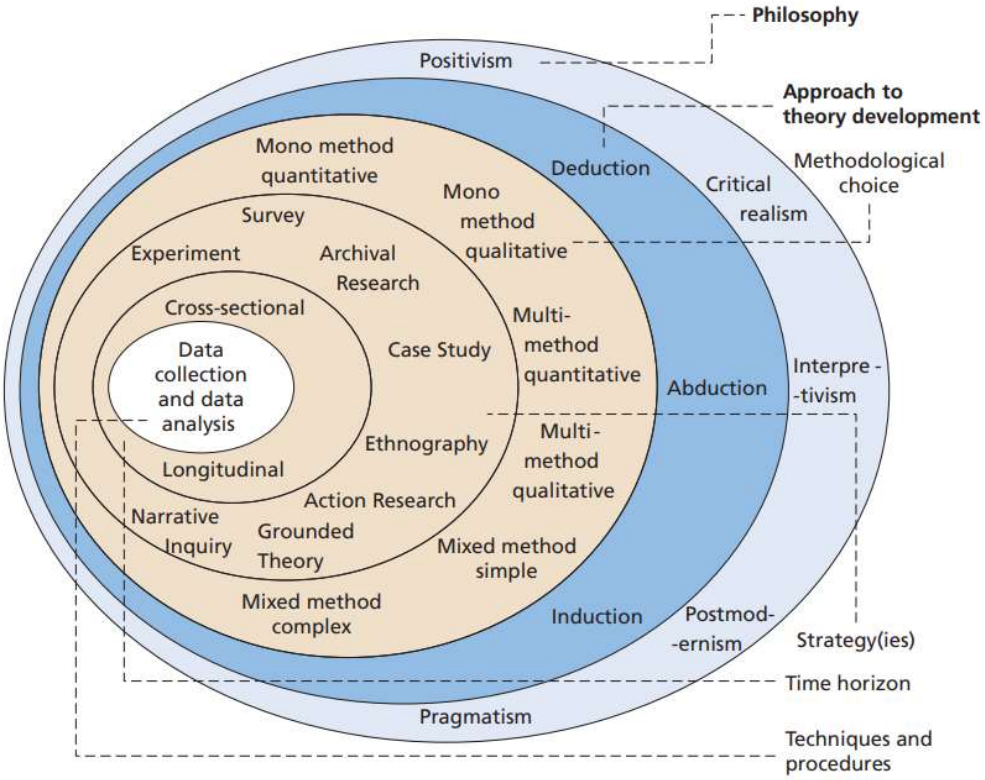

Figure 1 – The Research Onion (Saunders et al. 2019)

There are broadly three categories of research assumptions which will now be discussed briefly. Ontology relates to assumptions which are made about the nature of reality. Epistemology relates to assumptions about what constitutes valid and legitimate knowledge and its formation. Axiology relates to assumptions on the role of values and ethics.

There are several philosophies used in research (e.g. postmodernism, pragmatism, critical realism, positivism, interpretivism), but the two most commonly used philosophies in social science research are interpretivism and positivism (Bowling 2009). Positivism takes the philosophical stance that reality can be measured accurately to gain new knowledge. It is usually used for quantitative studies where a deductive approach to theory is applied. A deductive approach is one where the researchers often start with a theory, informed by searches of the literature, which they would like to test. Interpretivism argues that humans, as sentient beings, will derive different meanings from exposures and experiences. It stands separate from positivism as it is not looking to define universal laws. The purpose therefore is to produce in-depth understanding of relationships and context. It generally uses a qualitative methodology where an inductive approach to theory is applied. An inductive approach is one where the researcher usually starts to collect data to explore a phenomenon, often using a conceptual framework to build theory (Saunders et al. 2019). Differences between the two philosophies, in the context of the three categories of research assumptions, are given in Table 1 below.

Table 1 - Assumptions around positivist vs interpretivist research philosophies – adapted from (Bowling 2009, Saunders et al. 2019)

	Ontology (Nature of reality)	**Epistemology** (Knowledge formation)	**Axiology** (Values and ethics)	**Approach to theory - methodology**
Positivism	One true reality Ordered	Observable and measurable. Reproduceable.	Controlled bias to point of its elimination. Objective. Value-free research	Deductive methods. Quantitative
Interpretivism	Complex and rich. Socially constructed through lived experience.	Focus on narrative. Perceptions and interpretations	Research reflexive Value-bound research	Inductive to work to identify ideas. Qualitative – including interviews, transcription and analysis of text

An interpretivist philosophy with an inductive approach to theory was used for this programme of research for the reasons outlined in Table 2 below.

Table 2 - Justification for use of interpretivist research philosophy in this programme of research

	Ontology (Nature of reality)	**Epistemology** (Knowledge formation)	**Axiology** (Values and ethics)	**Approach to theory - methodology**
Interpretivism	Realities are related to individuals' experience	Reality informed participant experiences and researcher interpretation	Values are bound. Individual values are negotiated between researchers	Inductive. Qualitative Interviews Focus Groups Thematic analysis.
Programme of research	Different professional groups (PLC1/PLC2/IPE); different Health Boards (SBE/ACE); different level of professional practice across research	Data-generated by qualitative methods. Semi-structured interviews (PLC1/PLC2); Focus Groups (IPE); Dyadic Interviews (ACE);	Bracketing of views within the research team to minimize bias.	Inductive methods used. Semi-structured interviews (PLC1/PLC2); Focus Groups (IPE); Dyadic Interviews (ACE); Questionnaire (SBE)
PLC1 = Pharmacy Longitudinal Clerkship 1 study (Chapter 3); PLC2 = Pharmacy Longitudinal Clerkship 2 study (Chapter 3); IPE = Interprofessional Education study (Chapter 4); SBE = Simulation Based Education study (Chapter 6); ACE = Advanced Clinical Examination & Assessment Course study (Chapter 7)				

2.4.2. Justification for the methodological choice, time horizons and techniques in this research

The specific parameters and justification for each of these are given within the individual published papers and will not be repeated here. Table 3 provides a summary of the main research onion parameters.

Table 3 - Methodological choice, strategies, time horizons and techniques in this research

Research Output	**Philosophy**	**Approach to theory**	**Methodological choice**	**Time horizon**	**Techniques and procedures**
PLC1	Interpretivist	Inductive	Qualitative	Cross-sectional	Semi-structured interviews
PLC2	Interpretivist	Inductive	Qualitative	Multicohort – cross sectional	Semi-structured interviews
IPE	Interpretivist	Inductive	Qualitative	Cross-sectional	Focus Groups
SBE	Interpretivist	Inductive	Qualitative	Cross-sectional	Questionnaires
ACE	Interpretivist	Inductive	Qualitative	Cross-sectional	Dyadic Interviews
PLC1 = Pharmacy Longitudinal Clerkship 1 study (Chapter 3); PLC2 = Pharmacy Longitudinal Clerkship 2 study (Chapter 3); IPE = Interprofessional Education study (Chapter 4); SBE = Simulation Based Education study (Chapter 6); ACE = Advanced Clinical Examination & Assessment Course study (Chapter 7)					

A qualitative approach was used in this programme of research. It can be useful to use when individuals share a common experience and data are often collected by in-depth interview or use of open-ended questions.

Quotations can then be extracted which give a context and structure to the exposure. Multiple members of the research team were used to select quotes for each study in this programme to ensure bracketing of views and to minimise bias or reflexive influence.

2.4.3. Justification for the use of data generation methods used

Qualitative data generation methods, as outlined in Table 3 above, were used because they aligned to the research philosophy and approach to research theory. Specific considerations for the choice of qualitative method have been given in the published papers but will be summarised here. Three types of qualitative interview method were used throughout the programme of research. Either individual, dyadic (two participants) or focus groups. The decision of which to use was based on specifics of the subject being investigated – for example, potentially sensitive topics may not be appropriate for focus groups. Semi-structured interviews, dyadic interviews, and focus groups were informed by data generation tools – interview schedules or topic guides respectively. Both would be developed from previous research where available, have theoretical underpinning, and be tested for face and content validity by the research team prior to their use. Data were digitally recorded and transcribed. These were checked for accuracy before themes were identifies using a Framework Approach (Ritchie and Spencer 1994).

2.4.4. Justification for the use of theoretical models and frameworks to underpin research

One of the criticisms of qualitative research can be its lack of rigour (Noble and Smith 2015). The use of theoretical approaches to underpin qualitative research increases its robustness (Stewart and Klein 2016). Therefore, a key strategy used in this programme of research was to underpin it with theoretical-based approaches specific to the research objectives of each output, such that they were used in support of the innovation being implemented. Nilsen proposed that theoretical-based approaches in implementation science fall within three categories: Process Models – 'describing and/or guiding the process of translating research into practice'; Determinant Frameworks – 'understanding and/or explaining what influences implementation outcomes'; Evaluation Frameworks – 'evaluating implementation' (Nilsen 2015). The theoretical models and frameworks used during this research programme were employed during the planning, design, analysis, and reporting for each output and are described below with linkage to the research objectives (see Table 4).

Table 4 - Theoretical approach taken for each output based on research objective

Research Output	Research Objective	Category of Theoretical model/framework	Theoretical model/framework used
PLC1	To investigate the development, implementation and initial evaluation of a Pharmacy Longitudinal Clerkship (PLC).	Process Model	Donabedian Model
		Determinant Framework	Theoretical Domains Framework
PLC2	To carry out a theoretically underpinned qualitative evaluation of stakeholder perceptions of influences of behavioural determinants on student pharmacist development for clinical practice in general practice.	Determinant Framework	Theoretical Domains Framework
IPE	To explore the views of student pharmacists and medical students to an interprofessional education clinical placement.	Evaluation Framework	Kirkpatrick
SBE	To design and deliver an innovative simulation course to support the development of advanced General Practice Clinical Pharmacists in clinical assessment and management of patients in General Practice.	Evaluation Framework	Kirkpatrick
		Determinant Framework	Theoretical Domains Framework
ACE	To explore potential behavioural determinants influencing the implementation of skills gained from Advanced Clinical Examination and Assessment courses by General Practice Clinical Pharmacists.	Determinant Framework	Theoretical Domains Framework
PLC1 = Pharmacy Longitudinal Clerkship 1 study (Chapter Three); PLC2 = Pharmacy Longitudinal Clerkship 2 study (Chapter Three); IPE = Interprofessional Education study (Chapter 4); SBE = Simulation Based Education study (Chapter Six); ACE = Advanced Clinical Examination & Assessment Course study (Chapter Seven)			

The Theoretical Domains Framework (TDF) was used throughout the qualitative studies in this programme of research (Chapter Three, Four, Seven) (Cane et al. 2012). The TDF can be categorised as a 'Determinant Framework' and has been used to identify determinants of behaviour in this programme of research with regards to implementation of these new skills to support clinician development. TDF was used to generate the interview schedule and analyse the results. The methods, results and discussion were written with acknowledgement to this. The TDF summarises key elements of 33 theories and proposes that determinants of behaviour cluster into 14 domains (see Table 5). The use of TDF identifies key behavioural determinants which could lead to behaviour change. It also covers determinants which participants can say they have control of, as well as external factors which participants are subjected to, which may affect their behaviours relevant to implementation.

Transition of pharmacist practice within Scotland, to clinician-type practice as described in Chapter One, is at various stages of implementation. This is further compounded by the participants in this programme of research being drawn from the spectrum of practice – from undergraduate to advanced. However, there is a definitive need to seek to understand more about the factors influencing behaviours affecting the implementation at all levels of practice. Consideration of these behavioural determinants is also important in this context because student pharmacists/pharmacists are expected to develop skills to be innovative autonomous clinicians, looking after complex episodes of care through the development and implementation of novel services. To do this, these individuals need to work to address a range of factors that influence these initiatives including working in clinical teams – something this research supports. There is a critical need for the profession to understand the factors that influence such behaviour in this context, to inform service implementation.

Table 5 - Refined Theoretical Domains Framework - adapted from (Cane et al. 2012)

Domain	**Definition**	**Constructs**
Knowledge	An awareness of the existence of something	• Knowledge • Procedural knowledge • Knowledge of task environment
Skills	An ability or proficiency acquired through practice	• Skills • Skills development • Competence • Ability • Interpersonal skills • Practice • Skill assessment
Social/professional Role & Identity	A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting	• Professional identify • Professional role • Social identify • Identity • Professional boundaries • Professional confidence • Group identity • Leadership • Organisational commitment
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 confidence • Self-efficacy • Perceived behavioural control • Beliefs • Self-esteem • Empowerment • Professional confidence
Optimism	The confidence that things will happen for the best of that desired goals will be attained	• Optimism • Pessimism

		• Unrealistic optimism • Identity
Beliefs about Consequences	Acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation	• Beliefs • Outcome expectancies • Characteristic of outcome expectancies • Anticipated regret • Consequents
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, probably/improbable) • Incentives • Punishment • Consequents • Reinforcement • Continencies • Sanctions
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
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
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 • Decision making • Cognitive overload/tiredness
Environmental context and resources	Any circumstance of a persons' 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
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

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 • Burn-out
Behavioural regulation	Anything aimed at managing or changing objectively	• Self-monitoring • Breaking habit • Action planning

The Donabedian Model (Donabedian 1988) provides a framework for assessing and describing health services and evaluating their quality. It does this by structuring information about the service provided into three principal categories or dimensions of care. 'Structure' – consideration of all the factors that influence service delivery e.g. equipment, personnel, costs, and training. 'Process' – essentially how the service is delivered. 'Outcomes' – effect on the service users, service providers and or their organisations. The model is therefore able to use these dimensions to characterise the development and implementation of the first cohort of a PLC model for student pharmacists as outlined in section 3.2.

The Kirkpatrick Model (Kirkpatrick and Kirkpatrick 2006) is a key framework for the evaluation of education and training interventions, hence its selection within this programme of research. The model describes four levels of evaluation. Level 1 – Reaction: generally captured on a post-learning questionnaire, it is a determination by the learners on the educational intervention as to whether the programme met the learning objectives, the materials were appropriate, the facilitators were knowledgeable, and overall relevance of the programme to their job. Level 2 – Learning: generally captured by pre and post intervention assessments, it determines whether the learners self-report changes in understanding, knowledge, skills and confidence. Level 3 – Behaviour: determines whether skills taught during the intervention have been adopted into practice, or indeed, if they were able to be adopted into practice. Level 4 – Results: measurement of the impact of implementation of the learning in practice. Kirkpatrick was therefore utilised to evaluate the IPE (Chapter 4) and SBE (Chapter 6) research programmes.

2.4.5. Justification of trustworthiness of qualitative research

Amin et al have published a comprehensive overview of trustworthiness in pharmacy qualitative research (Amin et al. 2020). They propose four sub-categories relating to trustworthiness including credibility, transferability, dependability and confirmatibility. Credibility relates to the confidence in the truth of the research findings. Transferability relates to how generalisable are the findings are. Dependability is conferred by showing that the findings are consistent and could be repeated. Confirmability seeks to have neutrality in the research process.

Creswell et al reports that researchers should use more than one in any qualitative study and that it is not necessary (or practicable) to use them all on every research project (Creswell 2012). Specific techniques, relating to these sub-categories, can then be used to ensure the trustworthiness of qualitative research.

Techniques used in this programme of research are as follows. Prolonged engagement (scope) – allows the researcher to spend adequate time to learn about the culture in which the research is conducted. In this programme of research this was conferred by the multiprofessional research team, and especially those with portfolio posts who are embedded in NHS clinical systems and teams where the research took place. Persistent observation (depth) – identifies those characteristics in a system that are most relevant to the problem and focuses on them. Again, as before, this was conferred by those members of the research team who are also embedded in NHS clinical teams. Reflexivity – understanding the impact that your own views and experiences will have on your interpretation of qualitative data. This was mitigated by large multiprofessional research team of academics, educationalists and clinicians (Chapter Three, Four, Seven). The foreword of this thesis gives background of the PhD candidate's experiences and allows insight to beliefs and assumptions. In part this contributes to reflexivity (awareness of the researcher to the potential impact that their own knowledge, beliefs, and assumptions may have on their research and outcomes). Awareness of reflexivity has been discussed in respective published research outputs. By considering reflexivity, the PhD candidate, PhD Supervisors, and research teams which were involved in this programme of research have taken steps to mitigate against potential bias in the qualitative research process. Part of this process involved wider multidisciplinary research teams, where possible. The technique of bracketing has been employed to reach consensus around the interpretation of the qualitative data (Tufford and Newman 2012). Thick Description - of setting, subjects, and other persons involved, quotes, and other data compelling interpretation and synthesis to position the reader to (if deemed applicable) transfer the findings to their own context. Audit trail – where every step of the research process is planned and recorded such that it may be auditable to check for inconsistencies of application.

2.4.6. Ethics and governance

This programme of research has been completed in accordance with the following Robert Gordon University policies for good research practice, ethics, and governance of research including: the Research Governance and Integrity Policy (Robert Gordon University 2016c), Research Ethics Policy (Robert Gordon University 2016b), and the Research Data Management Policy (Robert Gordon University 2016a). As such, RGU School of Pharmacy and Lifesciences Research Ethics Committee approvals were deemed necessary for PLC1 and PLC2 studies (Approval Number: S150; 20/Nov/2018); IPE Study (Approval Number: S184; 20/Feb/2020); ACE study (Approval Number: S283; 23/Nov/2020). NHS Research Ethics Committee and NHS Research & Development (R&D) confirmed that no NHS ethics or NHS R&D Management Approval were required as the programme related to evaluation of

teaching. Written informed consent was obtained from all participants prior to data capture in accordance with the Declaration of Helsinki (1964). The doctoral candidate is trained in research methods and has experience of undertaking and supervising qualitative research and has completed the NHS Highland Good Clinical Practice for researchers course.

2.5. Evaluation of impact

Evaluating the impact of research is complicated. It is appreciated that impacts of research may germinate over prolonged time spans, be nuanced depending on the type or subject of research, and may form a spectrum of impacts across academic, social, political and economic contexts (Wilson et al. 2015). While peer review processes linked with credible scientific journals aide the process of impact development by application of rigour prior to dissemination of results (and by proxy through publication, advocacy of the research programme itself), the impact factor of a publishing journal, or h-index of a researcher, is not enough to determine potential research impact.

Several models have been proposed which relate to determination of impact. Prior to its name change to 'UK Research and Innovation' (UKRI), Research Councils UK outlined their Pathways to Impact typography which characterised impacts over academic, economic and societal impacts (see Figure 2). The following Research Council UK pathways have been utilised to determine impact within the programme of research presented in this thesis:

- improving teaching and learning;
- innovative […] techniques, technologies and cross-disciplinary approaches;
- changing organisational culture and practices;
- attracting R&D investment;
- evidence based policy-making and influencing public policies.

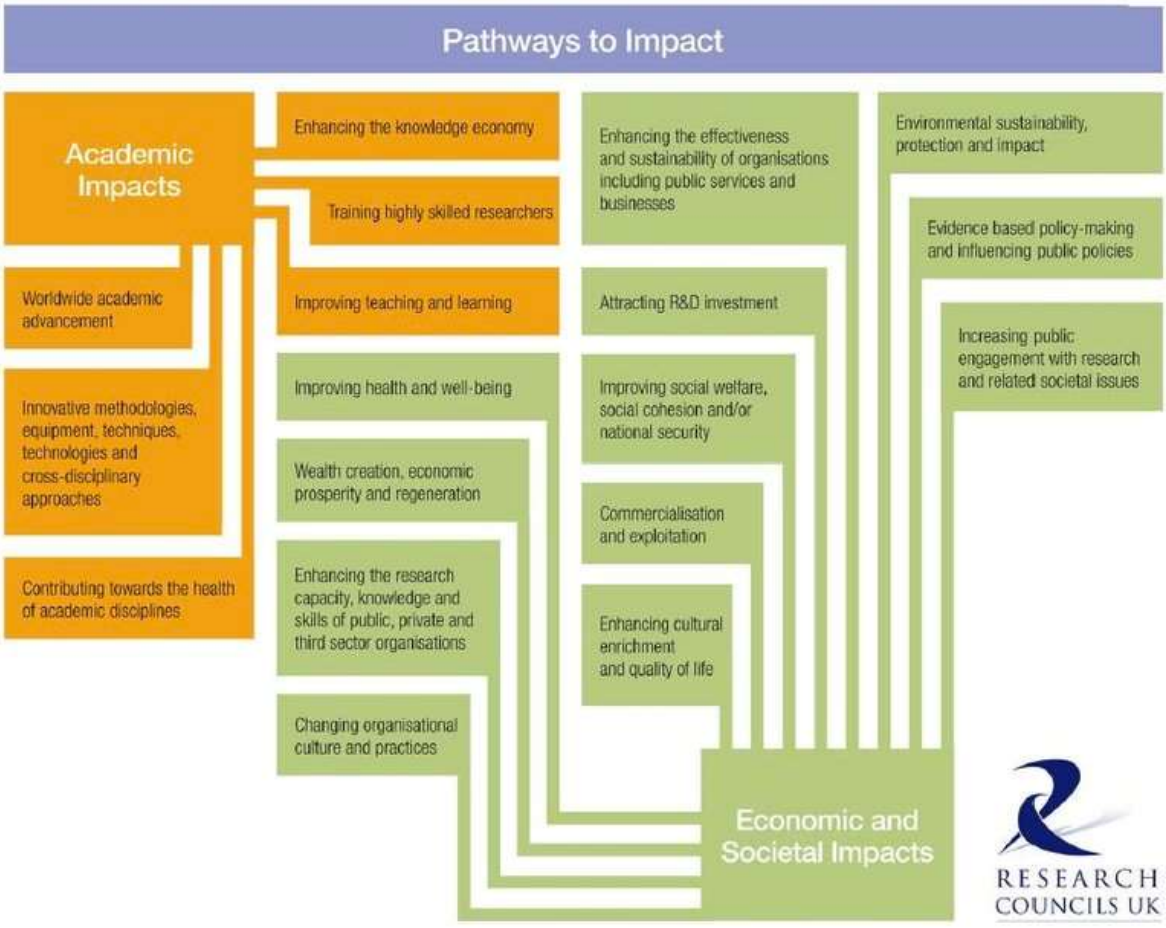

Figure 2 – Taken from Research Councils UK - Pathways to Impact

The Medical Research Council (MRC) has previously looked to examine the impacts of its funding inputs for Research and Training, broken down to the constituent outputs/outcomes and the impacts (academic/economic/social) (see Figure 3). Again, within the programme of research presented in this thesis, the outputs and outcomes which relate to the MRC model are:

- Generation of new knowledge/publication
- Trained people
- Development of collaborative networks
- Influences on policy & practice
- Development of new products/processes
- Dissemination of research

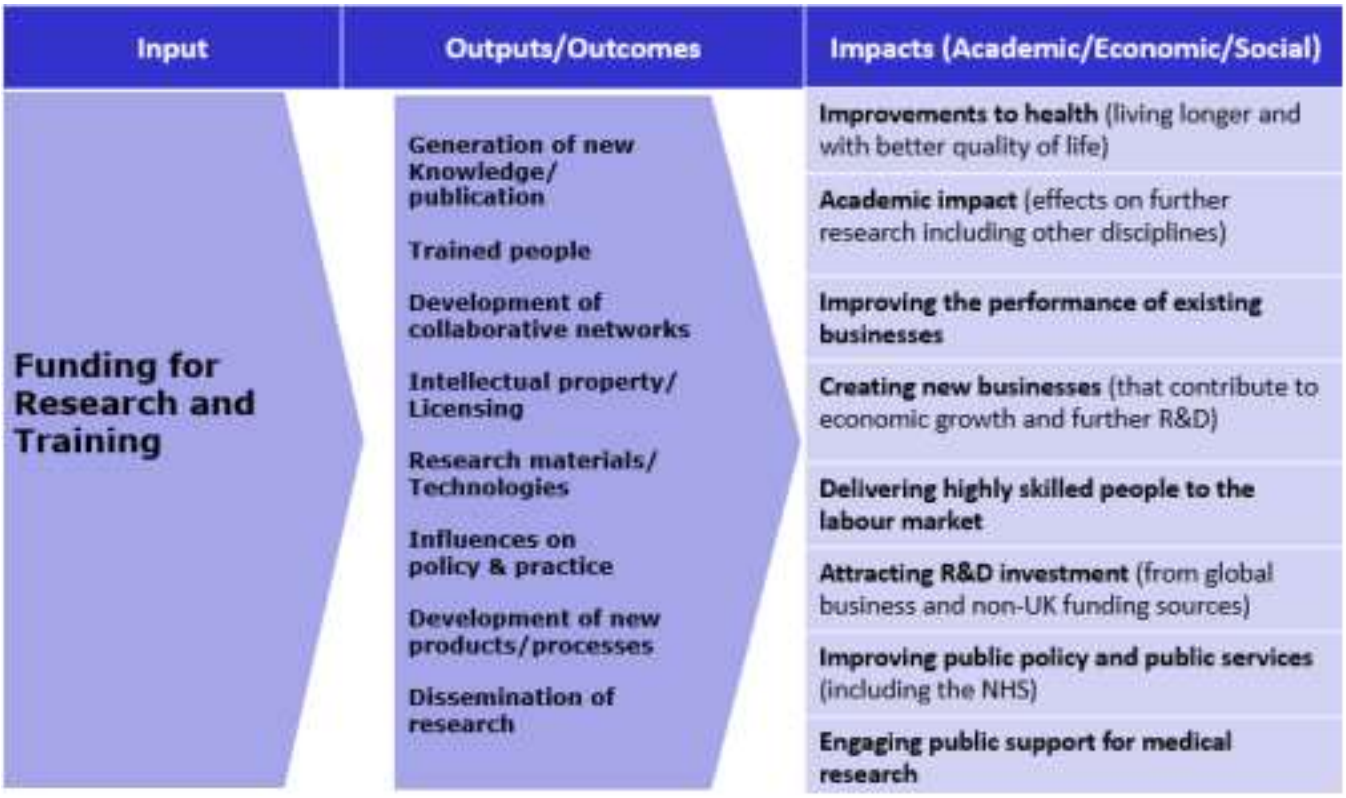

Figure 3 – Taken from Funding for research and training - outputs and impacts. MRC (2011)

These link to the impacts seen within this programme of research:

- Academic impact
- Delivering highly skilled people in the labour market
- Improving public policy and public services

The Economic and Social Research Council (ESRC) defines research impact in the following way (UK Research and Innovation 2022):

- '**Academic impact**, which is the demonstrable contribution that excellent social and economic research makes in shifting understanding and advancing scientific method, theory and application across and within disciplines.
- **Economic and societal impact**, which is the demonstrable contribution that excellent social and economic research has on society and the economy, and its benefits to individuals, organisations or nations.
- **Instrumental impact** – influencing the development of policy, practice or services, shaping legislation and changing behaviour
- **Conceptual impact** – contributing to the understanding of policy issues and reframing debates

- **Capacity building** through technical and personal skill development.'

Chapters Three to Seven will characterise each output in the context of the ESRC definitions above. The ERSC also advocates the positive benefits of co-productive and collaborative research, which aligns researchers and academics with those from the healthcare community and policy settings, ensuring there is representation from user organisations as co-investigators within research. This type of engagement is also supported by the National Institute for Health and Care Research (NIHR) (National Institute for Health and Care Research 2023). Other factors which support the creation of impactful research according to UKRI, and which have been considered during the design, completion, analysis and dissemination of this programme of research are:

- *'*Establishing networks and relationships with research users
- Acknowledging the expertise and active roles played by research users in making impact happen
- Involving users at all stages of the research, including working with user stakeholder and participatory groups
- Having flexible knowledge exchange strategies that recognise the roles that partners and collaborators may play
- Developing good understanding of policy and practice contexts and encouraging users to bring knowledge of context to research
- Committing to portfolios of research activity that build up a strong reputation with research users
- Supporting space and time for collaborative reflection on research design and process, findings and overall progress.'

This ethos is a critical strength of this PhD by Public Output. The impacts for the specific public outputs contained within this programme of research will be discussed at the end of each chapter in relation to the characterisation of impacts as defined by the ERSC (UK Research and Innovation 2022) in the section above.

2.6. Summary

The research programme outputs are presented over Chapters Three to Seven. Outputs are presented starting with the undergraduate research: Pharmacy Longitudinal Clerkship and Interprofessional Education Placement, before introducing the advanced post-registration outputs in Simulation-Based Education, Advanced Practice, and Advanced Clinical Examination & Assessment. The outputs are presented like this to mirror the career progression of an undergraduate to registrant to advanced pharmacist. The research programme has been underpinned by theory and has used various qualitative research methods including questionnaires, semi-structured interviews, dyadic interviews, and focus group.

3. CHAPTER THREE: PHARMACY LONGITUDINAL CLERKSHIP PLACEMENTS

3.1. Chapter introduction

This chapter reports on two published outputs from the novel PLC programme for undergraduate final year SPs at Robert Gordon University (RGU). SPs were based in a general practice for a prolonged clinical placement of up to 11 weeks. They were then given clinical skills equipment and training. Under the supervision of a general practitioner (GP) tutor, they were taught how to consult with patients and undertake some basic clinical examination and assessment for common general practice presentations. They were also given the opportunity to gain exposure to the wider primary care team including pharmacists. Placements were conducted within NHS Highland Health Board between Nov 2018 and Feb 2021.

PLC1 and PLC2 cover two parts of a collaborative three-year project between NHS Highland, RGU (research), RGU (teaching), NHS Education for Scotland (NES)/Scottish Government. Gordon Rushworth (GR) and Scott Cunningham (SC) were the two leads for the research project based at NHS Highland and RGU respectively. It was agreed that SC would take corresponding author of the first paper and GR the second paper. GR designed and directed how PLC would run within NHS Highland. PLC1 was the original pilot study which lead to PLC2.

3.2. Pharmacy Longitudinal Clerkship 1 (PLC1)

3.2.1. Research objective

To investigate the development, implementation and initial evaluation of a Pharmacy Longitudinal Clerkship.

3.2.2. Overview of the research and summary of findings

PLC1 reports on a pilot of a novel longitudinal clerkship for undergraduate final year SPs from RGU which was coordinated within the NHS Highland Health Board between Nov 2018 and Feb 2019. It was funded by the Scottish Government via NES. PLC1 used Donabedian's conceptual model to characterise the development and implementation of the first cohort of a PLC model for SPs. It used interpretivist philosophy and qualitative semi-structured interviews of SPs and tutors, informed by the TDF, to undertake an initial evaluation. Seven themes were identified and mapped to seven TDF domains. These reported increased levels of student confidence, enthusiasm for a pharmacy career, and GP positivity about the PLC in general while asking for more preparedness of SPs prior to coming on placement.

3.2.3. Originality

To our knowledge, it was the first paper of its kind within the UK to present data on a prolonged clinical placement for students within the General Practice setting. This first output from the PLC programme presents descriptive data on the innovative placement in terms of its set up and structure as well as evaluation of student

pharmacist, GP Clinical Supervisor and Regional Medical Tutor experiences. The PhD candidate was the lead for the design of this teaching and was responsible for its delivery.

3.2.4. Impact

Economic Impact - funding was obtained from the Scottish Government/NES by GR and Prof Cunningham to extend this programme into two further years of study leading to the PLC 2 work below.

Academic Impact – the understanding gained from this work was used to guide the delivery of the programme in years 2 and 3.

3.2.5. Conclusions and linkage to programme of research

The result of this pilot demonstrates that the systems and processes developed to support the PLC were effective and satisfactory to both SPs and GPs. Some small changes were made to how PLC2 was run, specifically in relation to comments around preparedness of SPs in PLC1. Therefore, SPs in PLC2 were given additional clinical skills training as part of their placement induction. As PLC1 and PLC2 relate to different cohorts of the same programme of research, summary and linkage of both PLC1 and PLC2 in the context of the wider programme of research presented in this thesis will be given in section 3.3.5.

3.2.6. Output citation

Innes C, **Rushworth G**, Addison B, Wedekind Y, Watson E, Rudd I, Power A, Cunningham S. An innovative General Practice based Pharmacy Longitudinal Clerkship: using theory to characterise its development, implementation and initial evaluation. *Education in Primary Care*. 2021; 33(3): 173-70.
https://doi.org/10.1080/14739879.2021.1996275

EDUCATION FOR PRIMARY CARE
https://doi.org/10.1080/14739879.2021.1996275

An innovative General Practice based Pharmacy Longitudinal Clerkship: using theory to characterise its development, implementation and initial evaluation

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ABSTRACT

Background: Longitudinal Integrated Clerkships exist in undergraduate medicine courses. A pilot Pharmacy Longitudinal Clerkship (pPLC) was funded to investigate delivery of this model of clinical education for student pharmacists.

Objective(s): To investigate the development, implementation and initial evaluation of a pPLC. **Methods:** The 11-week pPLC was delivered to two students in two GP practices in Scotland. Mixed theory-based methods were used to gather information on the pPLC structures and processes required and qualitative semi-structured Theoretical Domains Framework (TDF) based interviews explored outcomes with key stakeholders. Informed written consent was obtained. Interviews were audio-recorded, transcribed verbatim and analysed thematically. University Ethics approval was granted. **Results:** Data were generated on resources and processes required for a pPLC including funds budgeted for and actually spent on staffing, student travel/subsistence and student clinical 'Kit Bags', learning outcomes, curriculum and training timetable, GP Practice/University contracts. Interviews were completed with the two students, three linked GP clinical supervisors and two Regional Tutors involved. The seven themes were identified and mapped to seven TDF domains including: increased levels of student confidence, and increased student enthusiasm for a career in pharmacy, need for definition of the role of the Regional Tutor for the PLC and GP positivity towards the expected outcomes of clerkship model versus traditional placements.

Conclusion: Findings are limited by the small number of participants and settings, but evaluation was positive and the work garnered information on requirements for resources and processes. This will inform 'roll out' of the PLC.

ARTICLE HISTORY
Received 29 March 2021
Revised 11 August 2021
Accepted 17 October 2021

KEYWORDS
Clinical clerkship; pharmacy; interprofessional education; general practice; theoretical models; experiential learning

Introduction

The Scottish Government strategy *Achieving Excellence in Pharmaceutical Care*[1] highlighted difficulties in attracting pharmacists to remote and rural areas and committed to develop a pharmacy longitudinal clerkship (PLC) to help address these. In medicine, improving students' exposure to remote and rural working is one way of achieving recruitment and retention [2,3]. The medical Longitudinal Integrated Clerkship (LIC) is a model of clinical education in which students spend a longer period of time in practice [4–7].

There has been significant governmental support in the UK through funding for the development of clinical pharmacists in General Practice (GP) [8,9] and evidence for their integration to GP teams and benefits of the role [10,11]. However, currently in Scotland within the undergraduate Master of Pharmacy (MPharm) course experiential learning (EL) placements for student pharmacists (SPs) are generally short in duration, have limited focus on General Practice and there are few examples of published work of longitudinal placements in pharmacy [12].

It is therefore essential to ensure that SPs have opportunities to participate in extended EL programmes in GP. In view of this and the success of the Longitudinal Integrated Clerkship model in extending remote and rural undergraduate medical clinical education and in line with Scottish Government strategic commitments, a longitudinal clerkship for student pharmacists was funded to commence from November 2019. However, monies became available to fund two student pharmacists from November 2018 ahead of the official Pharmacy Longitudinal Clerkship commencement date, which enabled an early pilot investigation and evaluation to take place.

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The aim of this work was to carry out a theoretically underpinned initial pilot investigation of the development, implementation, and initial evaluation of the pharmacy longitudinal clerkship.

Methods

Donabedian's conceptual model for the systematic con- sideration of the development and implementation of the Pharmacy longitudinal clerkship was used [13]. The Theoretical Domains Framework (TDF) [14] was used to frame this initial evaluation.

Setting/participants

The Pharmacy longitudinal clerkship occurred collaboratively between staff across academia and practice. It was based in two GP practices in the NHS Highland area. Two students volunteered to participate. Staff included senior university academics, educationalists, and senior health board pharmacists, practising pharmacists and doctors who acted as GP clinical supervisors (GP CS) and Regional Tutors (RTs). The opportunity was promoted to the whole MPharm cohort towards the end of year
3 prior to the Pharmacy longitudinal clerkship taking place in the first half of year 4 (their final year).

Data collection

Development and implementation

The research team identified information needed in terms of structures and processes. This arose from the normal processes of educational development and involved theory, literature, peer review and team discussion. This pilot with two students was used as a context for the development and implementation.

Initial evaluation

All staff and student stakeholders involved were invited to take part either by face-to-face or tele- phone semi-structured interview after informed consent. A draft schedule for the semi-structured interview was developed from several sources; literature review, policy; and TDF. Credibility was enhanced through review of the draft by key expert researchers and practitioners. Piloting was impractical due to the small number of stakeholders involved.

The researchers were trained in semi-structured interviewing. Interview audio was recorded digitally, transcribed verbatim and then checked for accuracy by one of the research team prior to analysis.

Data analysis

All documents and data on structures and processes were collated and reported descriptively. For the qualitative interviews, the Framework Method was used [15], using TDF as a thematic guide.

Results

The Pharmacy longitudinal clerkship was extra-curricular and scheduled when students would be undertaking a 6-week full-time research project. The two student participants agreed to allocate some of their research time to take part in the Pharmacy longitudinal clerkship.
Structures (resources) in the form of documentation included; a contract with NHS Education for Scotland (NES), a Service-Level Agreement between project partners and contracts with individual general practices.
Processes were designed to provide a clear under- standing for all stakeholders of the steps and appropriate quality management arrangements. These included information on project structure, content and timetable within a PLC Student and Tutor Handbook

Costs

The total cost per student pharmacist for the duration of the 11-week placement was approximately £4300. This figure does not include the pharmacist regional tutor or GP regional tutor costs, which were kindly provided gratis for this pilot. This situation largely arose due to the fact that at the time of the pilot there was extra tutoring capacity and a willingness to provide 'goodwill' in support of this pilot from NHS Highland (Pharmacy Regional Tutor) and the University of Dundee (GP regional Tutor). This was therefore not costed in this pilot, but estimated timings of sup- port were collected to inform the costing for any future Pharmacy longitudinal clerkship rollout developments. The breakdown of costs is outlined in Table 1.

Clinical equipment 'kit bag'

To facilitate clinical skill development, student pharma- cists were given a 'kit bag', for the duration of the pPLC containing stethoscope, sphygmomanometer, pulse oximeter, ENT diagnostic set and thermometer.

Table 1. Cost per PLC student pharmacist, 2018–19.

Item	Cost	Comment
Student travel	£200–£400	Dependent on practice site
Student accommodation	£65 per week/ student	Hospital staff accommodation
GP Practice fee	£2640/practice	For 11 weeks training/ 6 sessions per week
Equipment – 'Kit Bag'	£500/bag	One-off cost Range of clinical assessment equipment
Pharmacist regional tutor time	Not costed	Approx. 2 days per week
Medical regional tutor time	Not costed	Approx. 1 session per week

Box 2. Curricular Content.

- Participate in consultations with doctors and the extended healthcare team, i.e. observing, consulting jointly or speaking to the patient prior to their appointment
- Practise skills in taking clinical histories and developing consultation skills such as identifying patient's ideas, concerns and expectations and providing advice
- Practise examination and clinical assessment skills for acute and long-term conditions (BP, pulse, temp, oxygen saturation, respiratory rate, urinalysis, peak flow, examination of the ears, throat and lymph nodes of the neck)
- Learn about the roles of the healthcare team and community partners
- Follow patient journeys, including to and from community pharmacy or hospital, e.g. acute admission
- Work with the practice pharmacist and repeat prescription administration team
- Learn about the medication management interface between primary care, the community and secondary care
- Participate in practice and multi-disciplinary team meetings.

Students were shown how to use the equipment during an induction week where they spent time in a Clinical Skills Centre. During the Pharmacy longitudinal clerkship the equipment was used under supervision and recorded in a clinical skill log book. This allowed students to be signed off by their GP Clinical Supervisor for specific activities once they demonstrated competence.

Student and tutor workbook

A workbook was produced to include salient information on the clerkship. It included sections on learning outcomes, curriculum, an outline timetable, details of planned tutorials and a clinical skill log book.

Learning outcomes

Being extracurricular, this pilot Pharmacy longitudinal clerkship study did not contribute to MPharm curriculum outcomes and was not summatively assessed. Broad learning outcomes were developed for the Pharmacy longitudinal clerkship and are shown in Box 1.

Box 1. PLC Learning Outcomes.

- Develop and demonstrate clinical examination and assessment skills
- Demonstrate appropriate decision-making skills
- Develop an understanding of the management of acute and long- term conditions in primary care, including pharmacological and non- pharmacological management
- Understand the range of medicines management processes in primary care
- demonstrate effective interprofessional teamworking.

Curriculum

Students actively collaborated with the GP practice team to plan to meet defined areas of a curriculum as shown in Box 2.

Placement timetable

Both student pharmacists were placed in a separate practice for six sessions each week. The remaining four sessions were used for their research project, to attend weekly PLC tutorials and to provide self-study/reflection time. The GP practices chosen were accredited teaching practices and had experience of hosting medical longitudinal clerkship students.

The pharmacist Regional Tutor and a GP Regional Tutor were responsible for the initial placement of students, organisation of weekly tutorials and ongoing placement site and student pastoral support.

Activities were chosen to give an immersive experience and included time with the various services involved in delivery of primary care. This included attending a podiatry clinic, patient home visits with the district nursing teams, conducting medication reviews, shadowing advanced nurse and pharmacist practitioners, undertaking own patient consultations jointly with their GP CS. An example timetable and activities can be seen in Table 2.

Student pharmacists met with their GP Clinical Supervisors and separately with the regional pharmacist and regional medical tutors on a weekly basis. GP Clinical Supervisors were able to contact the Regional Tutor as necessary for advice/support.

Tutorials

Tutorials were topic focused and covered common presentations in cardiology, care of the elderly, pain management, diabetes, antimicrobial stewardship, dermatology and respiratory. They also provided an opportunity to share learning, reflection on student

Table 2. PLC example weekly activity timetable.

	Monday	Tuesday	Wednesday	Thursday	Friday
Morning Session	Not in GP practice	Advanced Practitioner	GP surgery	Community nurse	Tutorial HPERC teaching room
09.00–11.30	MPharm Project day	Acute on-the-day (OTD) clinic	Shadowing: DMARD monitoring, Docman®, special prescription requests, visits, medication review	Shadowing: podiatry, physiotherapy, dietician, community pharmacy or nursing home visit or chronic disease clinic.	
11.30–13.00 or Afternoon Session 13.30–16.00		Home visits Practice nurse Chronic disease clinic	Home visits No timetable activities Self-study/Reflection	Practice pharmacist (e.g. repeat prescriptions)	Vaccination clinic Child health clinic or secondary care or GP

pharmacists' experiences and to consolidate learning. They were delivered by both medical and pharmacy professionals from primary and secondary care.

Initial evaluation findings

Table 3 outlines the themes identified with illustrative quotes from participants.

Realisation of rapid development of student knowledge and skills through PLC

Both students had an overwhelmingly positive experience and they particularly enjoyed the extended patient-facing nature of the pilot Pharmacy longitudinal clerkship, and enthused about how they recognised that it had enabled consolidation of current and rapid development of new knowledge and skills.

Greater student understanding of application to real life of knowledge and skills

The students also articulated that they felt that they had learned how to really apply the knowledge learnt in the classroom to 'real life' individual patients. They also commented that the breadth of their clinical skills had developed through the many opportunities offered. They indicated that they did not think they would get such opportunities out with the PLC.

Increased levels of student confidence

The students also reported increased levels of confidence in being able to apply knowledge learned within the MPharm.

Increased student understanding of scope and potential of pharmacists' role in GP setting/ increased student optimism for being a pharmacist

Spending a prolonged period in practice also seemed to help the students consolidate aspects of their professionalism and optimism for being a pharmacist

Positivity towards the expected outcomes of clerkship model versus traditional placements

The three GP Clinical Supervisors were positive about longitudinal clerkships and on their ability to enable the development of independent learning in students. Benefits of the Pharmacy Longitudinal Clerkships were highlighted by the pharmacist Regional Tutors including the opportunity for students to apply their theoretical knowledge in clinical practice and the opportunity to develop over a period of time in their consultation skills, which would be difficult to achieve in an on-campus setting.

Concerns of taking student pharmacists/need for preparation to ensure good experiences

GP Clinical Supervisors and medical Regional Tutors articulated some of the themes around challenges encountered from being unaware of baseline knowledge and skills of student pharmacists. There was an opinion expressed that indicated a concern for availability of resource and capacity to adequately supervise the pharmacy student. Linked to this were issues of preparedness and what actions to take to be more prepared for taking student pharmacists.

Discussion

There is limited evidence around longitudinal clerkships for student pharmacists. Kerr et al. published on a longitudinal clerkship developed as an integral

Table 3. Mapping of TDF domains to Identified Themes.

TDF domain	Theme	Illustrative quote
Knowledge and skills	Realisation of rapid development of student knowledge and skills through PLC	'. . . we do need more training for the observations, blood pressure and all those sorts of [clinical assessment] skills, if I was not on the clerkship, I would have known none of those' [Student Pharmacist 2]
Social/professional role and identity	Increased student understanding of scope and potential of pharmacists' role in GP setting	'. . . excited to start pre-reg and actually be a pharmacist' [Student Pharmacist 1]
Beliefs about capabilities	Increased levels of student confidence	'I feel like I've just become more and more confident' [Student Pharmacist 1]
Beliefs about consequences	Positivity towards the expected outcomes of clerkship model versus traditional placements	'I'm totally convinced and won over to the fact that, actually, longitudinal clerkships are an excellent way to learn self-directed learning' [GP Clin. Super. 2] 'I'm absolutely totally sold on the longitudinal clerkship'. [Medical Regional Tutor]
Environmental context and resources	Greater student understanding of application to real life of knowledge and skills Need for preparation to ensure good experiences	'I did use my knowledge quite a lot and it does get you thinking 'cause they're real patients' [Student Pharmacist 1] 'We were not really quite sure . . . what clinical knowledge they would already have'. [GP Clin. Super. 1]
Emotion	Concerns of taking student pharmacists	'the biggest challenge was that we didn't actually know what the student pharmacists could and couldn't do'. [Medical Regional Tutor] 'we were kind of envisaging a bit more of a kind of self-regulated learning . . . ' [GP Clin. Super. 1] 'How is this going to impact on our resources and time to see patients?' [GP Clin. Super. 1]

part of a five-year pharmacy degree in Ireland [8]. It provides little detail of the structure and processes of its development and implementation. Indeed, a narrative review indicates that there is little published on this [16]. This study addresses this by using the Donabedian model to consider structures, pro- cesses and outcomes for a LIC for student pharmacists.

Many of the 'tips' outlined by Ellaway et al. have been systematically considered [17]. The practice placement sites were chosen with care to ensure an appropriate teaching environment. There was also careful consideration of induction and exploration of students' expectations and individual development needs. A key part of planning for practice sites was setting up a 'Service Level Agreement' with each practice that outlined the expectations for the service and associate costs.

At the present time, this Pharmacy longitudinal clerkship remains out with the MPharm curriculum. Depending on funding, and further research with larger numbers of students and sites, there may be scope for expansion of Pharmacy longitudinal clerkships. The need to integrate Pharmacy longitudinal clerkships within the development of a new iteration of the Robert Gordon University MPharm course is planned. This is entirely compatible with the recently published standards for initial education and training of pharma- cists with an aspiration that pharmacists will play a much greater role in providing clinical care to patients [18].

Strengths and limitations

All phases involved a collaborative multidisciplinary approach. The trustworthiness of the work was considered throughout [19]. Limitations of this pilot work include the fact that it involved a small number of participants (n = 2) and settings in each of the phases of the work (n = 2 GP practices). This may mean that some aspects may not be directly transferable to other settings or countries given the uniqueness of some aspects of the pilot.

Future developments

There is a need to consider organisation and preparation of staff and students including how best to integrate the Pharmacy longitudinal clerkship to the MPharm. The initial evaluation highlights the need to consider the adequacy of student clinical assessment skills. Longitudinal follow-up would help determine the success of the programme in enabling students to progress to advanced levels of clinical practice in remote and rural settings and to investigate the potential success of recruitment to remote and rural settings.

Conclusion

Overall, the outcomes of this pilot, although limited by the very small number of participants and settings, were positive in terms of student and tutor experience and information has been gathered on the requirement for resources and processes for future development.

Acknowledgments

The research team would like to thank the following individuals: All patients who consented to being seen by the PLC students during their placement. Dr Debbie Miller, Dr Alice Scriven – Nairn Healthcare Group; and Dr Katie Walter – Cairn Medical Practice for all the time and support that they gave to the project and the PLC students and the other practice staff in each site, without whom, the PLC would not have been possible. The former Chief Pharmaceutical Officer (CPO) for Scotland Prof. Rose Marie Parr, Interim CPO Prof. Alison Strath and Postgraduate Pharmacy Dean at NHS Education for Scotland Prof. Anne Watson for 'high level' support of this initiative. All pharmacists and medical staff who gave their time to supply the PLC students with tutorials. Mrs Alyson Brown who supported the RGU elements of the PLC. Dr Tesnime Jebara for support in manuscript formatting.

Ethical approval & research governance

The approval was granted by Robert Gordon University School of Pharmacy and Life Sciences ethics committee. Advice from the NHS Research Ethics Committees confirmed that NHS approval was not required

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This study was funded by NHS Education for Scotland and Highland Medical Education Centre, NHS Highland.

Author contributions

Cunningham S: Conceptualisation; Data curation; Formal analysis; Funding acquisition; Investigation; Methodology; Project administration; Roles/Writing - original draft; Writing – review and editing. Innes C: Data curation; Formal analysis; Writing – review and editing. Rushworth G: Conceptualisation, Project administration, Writing – review and editing. Addison B: Project administration, Writing – review and editing. Wedekind Y: Project administration Writing – review and editing. Watson E: Conceptualisation, Writing – review and editing. Rudd I: Conceptualisation, Writing – review and editing. Power A: Conceptualisation, Resources, Writing – review and editing

References

[1] Scottish Government. Achieving excellence in pharmaceutical care a strategy for Scotland. Cited 2021 Feb 16. Available from: https://www.gov.scot/publications/ achieving-excellence-pharmaceutical-care-strategy- scotland/

[2] Wilson NW, Couper ID, De Vries E, et al. A critical review of interventions to redress the inequitable distribution of healthcare professionals to rural and remote areas. Rural Remote Health. 2009;Apr-Jun;9(2):1060.

[3] O'Donoghue S, Mcgrath D, Cullen W. How do longitudinal clerkships in general practice/primary care impact on student experience and career intention? A cross-sectional study of student experience. Educ Prim Care. 2015 MAY;26(3):166–175.

[4] Norris TE, Schaad DC, Dewitt D, et al. Longitudinal integrated Clerkships for medical students: an innovation adopted by medical schools in Australia, Canada, South Africa, and the United States. Acad Med. 2009 JUL;84(7):902–907.

[5] Worley P, Couper I, Strasser R, et al. Consortium of Longitudinal Integrated Clerkships (CLIC) research collaborative. A typology of longitudinal integrated clerkships. Med Educ. 2016 Sep;50 (9):922– 932.

[6] McKeown A, Mollaney J, Ahuja N, et al. UK longitudinal integrated clerkships: where are we now? Educ Prim Care. 2019 Sep;30(5):270–274.

[7] Bartlett M, Dowell J, Graham F, et al. Dundee's Longitudinal Integrated Clerkship: drivers, implementation and early evaluation. Educ Prim Care. 2019 Mar;30(2):72–79.

[8] NHS England. Enhanced service specification general practice forward view (GPFV) clinical pharma- cists in general practice phase 2 programme. cited 2019 Dec 9. Available from: https://www.england. nhs.uk/wp-content/uploads/2017/11/enhanced-service-clinical-pharmacists-gp.pdf

[9] Scottish Government. Primary care funding - allocation for pharmacists in GP practices 2017-18. cited 2019 May 20. Available from: http://www.sehd.scot.nhs.uk/ pca/pca2017(p)04.pdf

[10] Stewart D, Maclure K, Newham R, et al. A cross-sectional survey of the pharmacy workforce in general practice in Scotland. Fam Pract. 2020 Mar 25;37(2):206–212.

[11] Savickas V, Foreman E, Ladva A, et al. Pharmacy services and role development in UK general practice: a cross-sectional survey. Int J Pharm Pract. 2020 Jul 5. DOI:10.1111/ijpp.12653.

[12] Kerr A, Boland F, Pawlikowska T, et al. Early longitudinal community pharmacy placements: connection, integration and engagement. Res Social Adm Pharm. 2020 Oct 10;S1551-7411(20):31118–31119.

[13] Donabedian A. The quality of care. How can it be assessed? JAMA. 1988 Sep 23-30;260(12): 1743–1748.

[14] Cane J, O'Connor D, Michie S. Validation of the theoretical domains framework for use in behaviour change and implementation research. Implementation Sci. 2012. 7:37. Accessed 2021 Feb 24.

[15] Gale NK, Heath G, Cameron E, et al. Using the framework method for the analysis of qualitative data in multi-disciplinary health research. BMC Med Res Methodol. 2013 Sep 18;13(1):117.

[16] Brown ME, Anderson K, Finn GM. A narrative literature review considering the development and implementation of Longitudinal Integrated clerkships, including a practical guide for application. J Med Educ Curric Dev. 2019 May 27;6: 2382120519849409.

[17] Ellaway R, Graves L, Berry S, et al. Twelve tips for designing and running longitudinal integrated clerkships. Med Teach. 2013 Dec;35(12):989–995.

[18] General Pharmaceutical Council. 2020. New standards for initial education and training of pharma- cists approved. cited 2020 Dec 21. Available from: https://www.pharmacyregulation.org/news/new-standards-initial-education-and-training-pharmacists-approved

[19] Lincoln YS, Guba EG. Naturalist inquiry. Newbury Park, CA: Sage Publications; 1985.

3.3. Pharmacy Longitudinal Clerkship 2 (PLC2)

3.3.1. Research objective

To carry out a theoretically underpinned qualitative evaluation of stakeholder perceptions of influences of behavioural determinants on student pharmacist development for clinical practice in general practice.

3.3.2. Overview of the research and summary findings

PLC2 built upon the experience of PLC1 and extended the programme to five locations, with varying rurality, across NHS Highland. The study ran between November 2019 and February 2021. Central to the concept of study was an exploration of the experiences of student pharmacists exposed to this type of prolonged clinical teaching environment in terms of skills acquisition and development. PLC2 reported on two further cohorts of the PLC model. Qualitative semi-structured interviews of SP and GP tutors were used to explore stakeholder perceptions of influences of behavioural determinants on SP development. Interview design and analysis were informed by the TDF. Seven SPs and five GPs were interviewed. Key themes included: knowledge – utilisation and practical application; skills – triangulation of skills under supervision; beliefs about capabilities – confidence building with clinical and patient contact; professional role and identify. The evaluation showed the benefits of the PLC model by embedding SPs in clinical teams and the clinical environment over a prolonged period. It was expected that this training would translate into a more confident transition to postgraduate professional practice.

3.3.3. Originality

As for PLC1 but with an extension of the programme to five locations, with varying rurality, across NHS Highland. Again, to the best of our knowledge, it was the first programme of its kind within the UK to present data on a prolonged clinical placement for students within the General Practice setting. The PhD candidate was the lead for the design of this teaching and was responsible for its delivery by a team from the academic unit within NHS Highland - the Highland Pharmacy Education & Research Centre (HPERC).

3.3.4. Impact

Economic Impact - following on from this work, the Scottish Government have now formally funded pharmacy longitudinal clerkship placements for student pharmacists under the Pharmacy Additional Cost of Teaching (ACTp) budget.

Instrumental Impact - as a direct result of PLC1 and PLC2, longitudinal clerkship placements are now open to every Scottish Student Pharmacist and is now available at both Scottish Schools of Pharmacy.

3.3.5. Conclusions and linkage to programme of research

Critical to expeditious development of a pharmacists able to work as a clinicians at postgraduate/post-registration level, is the need for undergraduate teaching to have significant practical clinical exposure and

supervised clinical practice. Prior to this project, most students only spent up to one week at a time and only up to 25 days in total in clinical practice over their 4-year degree. This research investigated what happened when students were exposed for up to an 11-week programme (longitudinal clerkship) designed to develop their clinician skills, clinical assessment, and decision-making in practice.

As with all the education and training innovations presented in this thesis, there is the need to consider the results in the context of sequential skills development. There was strong representation made by SPs during PLC1 and PLC2 that the enhancement in their self-perceived competence would lead to application of their newly acquired skills and knowledge in practice. This can be built on further as a postgraduate.

3.3.6. Output citation

Innes C, Cunningham S, Addison B, Wedekind Y, Watson E, Rudd I, Power A, Karim L, **Rushworth GF**. General practice-based pharmacy longitudinal clerkship: a theoretically underpinned qualitative evaluation. *International Journal of Clinical Pharmacy*. 2022; 44: 1123-31. https://doi.org/10.1007/s11096-022-01429-0

International Journal of Clinical Pharmacy
https://doi.org/10.1007/s11096-022-01429-0

RESEARCH ARTICLE

General practice-based undergraduate pharmacy longitudinal clerkship: a theoretically underpinned qualitative evaluation

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Received: 21 January 2022 / Accepted: 7 May 2022

Abstract

Background A Pharmacy Longitudinal Clerkship (PLC) was designed to develop student pharmacists' (SPs) competence in a general practice setting.

Aim The aim was to carry out a theoretically underpinned qualitative evaluation of stakeholder perceptions of influences of behavioural determinants on SP development for clinical practice in general practice.

Method General practice-based PLCs were delivered in 2019/20 and 2020/21 for two cohorts of SPs in NHS Highland, Scotland. Qualitative semi-structured interviews were used to explore stakeholder perceptions of influences of behavioural determinants on SP development. Informed written consent was obtained. An interview schedule was developed and piloted using the Theoretical Domains Framework (TDF). Interviews were recorded, transcribed verbatim and analysed using thematic methodology. Ethics approval was granted.

Results Seven SPs and five general practitioner (GP) tutors were interviewed. Key themes were identified mapped to TDF domains and included: knowledge—utilisation and practical application of knowledge; skills—triangulation of skills under clinical supervision; beliefs about capabilities—confidence building with clinical and patient contact; professional role and identity—elucidation of professional roles within general practice.

Conclusion This evaluation shows benefits of embedding SPs within clinical teams and immersing them in a clinical environment over a prolonged period in a general practice Pharmacy Longitudinal Clerkship. It is expected this will translate into a more confident transition to postgraduate professional clinical practice. Funding should be sought to test alternative PLC arrangements including: multiple full-time longitudinal placement blocks; or ultimately a year-long longitudinal clerkship programme with an IPE element.

Keywords Clinical clerkship · Experiential learning · General practice · Pharmacy

Impact Statements

- Pharmacy Longitudinal Clerkships in general practice, which include supervised clinical practice, increase student pharmacist confidence in managing real-life clinical presentations.
- Prolonged supervised practical clinical placement experience allows utilisation of existing clinical knowledge as well as development and application of clinical skills sets.
- Embedding student pharmacists in multidisciplinary teams has benefits across the professional spectrum in

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Published online: 26 July 2022

terms of triangulation of professional roles and boundaries.

Introduction

The role of qualified pharmacists is continually being developed across the world. In a recent global survey, 28/48 (58%) countries reported that advanced practice frameworks were currently in use or being developed within their country [1]. Within the UK, post-registration curricula from the Royal Pharmaceutical Society (RPS) have defined the standards required of patient-facing pharmacists working at Foundation [2], Advanced [3] and Consultant [4] levels of practice. The General Pharmaceutical Council (GPhC—UK Pharmacist Regulator) recently published Initial Education and Training (IET) Standards which, from summer 2026 onwards, permits pharmacists to have prescribing rights at point of registration [5]. If patients and the public are to be assured of the quality of a prescribing pharmacist clinician workforce, then the delivery of pharmacist IET needs to be significantly augmented and adapted to optimise the training environment. Exposure of student pharmacists (SP) to clinical learning environments is anticipated to increase the practical knowledge, skills and behaviours of the post- graduate and post-registration workforce such that they will be able to competently and autonomously manage patients, their diseases and medicines safely from an earlier stage in their professional career and be in a position to begin to develop advanced roles [6] sooner.

Medical Longitudinal Integrated Clerkship (LIC) models have been used across the world in countries such as Australia, Canada, USA and South Africa [7, 8]. LICs have generated an evidence base which supports transformational practice and workforce outcomes within these countries. LICs afford medical students a longer period of continuous time in the same practice and as a result medical students reported greater understanding and appreciation of general practice careers as a benefit [9, 10].

Definitions and examples of longitudinal clerkship-type models within pharmacy from across the world are limited. Within Ireland, Kerr et al. reported on an evaluation of a longitudinal placement for 2nd year students within a 5 year pharmacy degree and concluded that it promotes learning through curricular integration and interdisciplinary collaboration [11]. These placements related to SPs spending one half-day per week spread over a 13 week semester and were based in the community pharmacy setting.

In 2017, a Pharmacy Longitudinal Clerkship (PLC) programme was announced which offered opportunities for EL and interprofessional learning as well as the development of clinical and consultation skills in managing 'real-life' practice-based clinical scenarios that meet the aspirations for service delivery models of the future [12]. A 10-week PLC pilot, involving two fourth-year SPs from the Robert Gordon University, was completed from November 2018 until January 2019 [13]. SPs were in practice for 3 days each week. The pilot reported increased student confidence in clinical practice, increased enthusiasm for a career in pharmacy as well as General Practitioner positivity for the PLC compared with more traditional limited-duration placements. Building on the learning from the pilot, two further PLC cohorts were evaluated in academic years 2019/20 and 2020/21—the results of these two further cohorts are published in this paper.

Aim

The aim was to carry out a theoretically underpinned qualitative evaluation of stakeholder perceptions of influences of behavioural determinants on SP development for clinical practice in general practice.

Ethics approval

Ethics approval was sought and granted by the Robert Gordon University School of Pharmacy and Life Sciences ethics review committee (Ethics Approval Number: S150; 20th November 2018).

Method

This research was undertaken according to an interpretivism philosophy using a qualitative research methodology. Conducting individual semi-structured qualitative interviews with PLC participants was considered the most appropriate method to facilitate in-depth rich data capture and analysis.

Setting

The PLC was based in five GP training practices in the NHS Highland area of Scotland. These GP practices covered a range of rurality based upon the Scottish Government eight-fold Urban Rural Classification [14]. Two practices were in the "other urban area"; one in the "accessible small town"; one in a "remote small town"; and one in a "remote rural" location. Practice list sizes ranged from around 5000 to 15,000 patients.

Sampling and recruitment

PLC was run as a research programme such that Student and GP recruitment onto the educational programme was

intrinsically linked with research recruitment. Student recruitment was limited to five students each year for two years based on available funding. Applications were open to the whole final-year MPharm group. Applications were shortlisted by panel prior to interview.

GP practices were recruited using a purposive sampling method where all GP training practices within NHS Highland who had experience of hosting University of Dundee LIC students were invited to participate.

All GP clinical tutors and all SP were invited via email to participate in the qualitative interviews. There were no exclusions.

Data collection

The interview schedule for the semi-structured interview was developed from several sources: literature review; PLC pilot topic guide [13] and The Theoretical Domains Frame- work (TDF). The TDF summarises key elements of 33 theories and proposes that determinants of behaviour cluster into 14 domains [15]. Those domains most relevant (e.g. knowledge, beliefs about capabilities and consequences, motivation and goals, environmental context and resources) were used to guide construction of interview core questions as they allowed systematic consideration of behavioural determinants for SP development of competencies for clinical practice. The data collection process was linked directly to the views and experiences of stakeholders and their involvement in the PLC. Credibility of the interview schedule was enhanced through review of the draft by key expert researchers and practitioners. Each stakeholder was provided with study information sheet prior to obtaining informed consent. The researchers (CI and TJ) trained in carrying out individual semi- structured interviews conducted either face-to-face in the workplace or telephone interviews, depending on what was convenient for the participants.

Data analysis

Qualitative interviews were audio-recorded, transcribed naturalistically verbatim, and checked for accuracy by the research team. The data generated were analysed thematically [16] using an interpretivist approach. Data was uploaded to NVIVO to facilitate coding. The initial coding framework developed based on the main sections of the interview schedule and using the TDF domains as a thematic guide. This was then applied to one interview by different researchers. This was then modified and refined and applied to subsequent interviews independently by two experienced qualitative researchers (CI and LK). The processes and stages of analysis were overseen at all stages by a Professor of Pharmacy (SC) who mediated on any disagreements that could not be resolved through discussion by the analysis team.

Illustrative quotes were selected through team discussion. The quotes and themes were used to produce a textural description of the theme and a structural description of the context or setting that influenced participants' experience. These were then used to create a composite statement of the "essence" of the evaluation themes.

Saturation of themes was explored by considering the adequacy of the number of interviews in each group and was considered to be reached when no new themes emerged [17]. Credibility was enhanced through pilot testing of the interview schedule, audio recording and transcription checks, independent coding, and use of verbatim quotations. Transferability was assured through detailed reporting of the research process and inclusion of characteristics of the interviewees and their settings. Dependability arose within the process of data analysis through repeated listening and review of transcripts. Lastly confirmability was enhanced through regular meeting and discussion of the research processes with the whole research team and through inclusion of verbatim illustrative quotes from participants to support the thematic narrative.

Results

Five SPs were recruited to the 2019/20 cohort; of these, three SPs completed the ten-week block and two SPs partially completed the placement, leaving after 6 weeks. Five SPs were recruited to the 2020/21 cohort; of these, two SPs were unable to start due to international travel restrictions imposed during COVID. The duration of the 2020/21 PLC also had to be shortened due to COVID quarantine requirements prior to attendance on placement and was expected to run for eight weeks in total. Of the three SPs in 2020/21 undertaking PLC: one SP completed the eight week PLC, one SP completed six weeks, and the other SP completed five weeks. PLC had to be stopped early for the last two students due to Scottish Government legislation limiting travel during the COVID pandemic. Neither student willingly dropped out. All SPs spent three days per week in practice and the other two days on coursework while on the PLC.

Individual qualitative semi-structured interviews were conducted with seven SPs (19/20 cohort $n = 4$; 20/21 cohort $n = 3$) and five GP tutors. One GP tutor was unable to be contemporaneously interviewed due to COVID workload. Two of the five GP tutors were involved with both cohorts and so were interviewed once. 2019–20 interviews: one GP was interviewed in person, three GPs by phone, four SPs in person. All 2020–21 interviews were completed by phone:

one GP and three SPs. GP interview mean 42 min (range 35–50 min); SP interview mean 57 min (range 43–78 min). All GP tutors had prior experience with undergraduate medical students, and one had co-authored the NHS Education for Scotland Advanced General Practice Clinical Pharmacist Framework [19]. However, only one had experience of supervising SPs, but not as lead tutor. Some GP tutors (n = 3) had prior experience of being tutors for medical LIC students.

In general, participation in the PLC was a positive experience for SPs, including those that withdrew before the end of the placement. This was reflected throughout the interviews. The main themes identified related to: utilisation and practical application of knowledge; triangulation of skills under clinical supervision; confidence building with clinical and patient contact; elucidation of professional roles within GP. Key themes emerging from the focus group, linked to the TDF, are given in Table 1.

Discussion

Statement of key findings

This work provides data on the significant and unique opportunities for SPs of a GP longitudinal clerkship EL placement. Clear benefits were seen by both SPs and GP tutors of embedding SPs in clinical practice for prolonged placement. Key findings related to the five main themes.

Utilisation and practical application of knowledge: there were clear benefits reported by students of applying knowledge in clinical practice in real patients rather than in simulated cases. Some specific benefits related to the necessity to link data and complexity in real life patients and students gaining an insight to the limitations of their own knowledge in a practical context and well as having the opportunity to explore their "unknown unknowns" (things they did not know that they did not know) with a GP tutor.

Triangulation of skills under clinical supervision: again, students also reported benefits of practicing clinical skills with patients and in particular consultations skills. Some GPs commented on their perceptions of how the lack of clinical consultation exposure prior to this placement made the PLC challenging for their SPs.

Confidence building with clinical and patient contact: there was an overwhelmingly positive response from students in terms of the benefit of prolonged clinical expo- sure on their clinical confidence. This confidence seemed to extend beyond simple confidence in their clinical and consultations skills but was also felt to have increased their personal self-confidence too.

Elucidation of professional roles within General Practice: being embedded in a GP clinical team and having input from a GP as well as witnessing advanced pharmacists in practice had a profound effect on some whereby this experience opened their minds to the challenges and complexities of general practice.

Influence of environmental context and resources: there were however some learning points to take away around set- ting expectations of SPs knowledge and what the training involves and could deliver within the timescales. However, overall the SPs seemed to relish the opportunity to learn in practice within the multidisciplinary team and benefited from this type of exposure.

PLC has demonstrated the benefits of teaching and application of clinical and communication skills within the practice setting, with ease of access to patients and the wider healthcare team, rather than in the setting of a university campus.

Strengths and limitations

A key strength of this study is that it provides valuable information on SP and GP tutor views and experiences of a PLC. Such information is lacking in the published literature. It is important to consider the effect of reflexivity in the qualitative research process and consider the impact personal experiences may have on the outcomes of this research. To minimise this, the trustworthiness of the qualitative research process has been strengthened by reporting the study in line with COREQ guidelines [18].

Limitations of this work include the small number of participants and the effect of COVID regulations on participants' ability to undertake the full placement. How-ever, those adversely affected by COVID regulations still reported a positive learning experience. There exists the potential for bias in the collection of the data due as all SPs and GPs would know the researcher conducting the inter-views. While both SPs that opted to stop the PLC early were invited to interview, only one was able to participate. Some aspects may not be directly transferable to other settings or countries.

Interpretation

Utilisation and practical application of knowledge & Triangulation of skills under clinical supervision & Confidence building with clinical and patient contact

Interpretation of these first three themes has been amalgamated as there is thought to be considerable overlap in the rational for the findings.

Overall, this PLC is entirely compatible with the recently published GPhC IET Standards where there is an aspiration that pharmacists will play a much greater role in providing clinical care to patients, as clinicians [5].

Table 1 Key themes emerging from focus groups

TDF domains	Overarching theme	Description	Supporting quotes
Knowledge	Utilisation and practical application of knowledge	Most of the SPs identified that participating in the PLC had helped them apply their knowledge, realising that applying it with patients was different from theoretical or simulated cases in the university environment	"I wasn't sure about the application of the knowledge in practice and, I think that extended period of time, where I was exposed to all of that—putting names to illnesses and putting faces to illnesses—just consolidated all that, […] work from university, for me" [SP1 2019–20]
		The most frequently identified gap in knowledge cited by students was "linking" different elements of knowledge together to inform clinical reasoning and decision making and informing diagnosis, management and prescribing	"It was about bringing that knowledge and understanding of a single disease state and trying to group it so that you know what to question to kind of rule out the most serious illnesses" [SP2 2019–20]
		Other identified gaps included depth of knowledge and insight into unknown unknowns	"I realised early on that there was definitely gaps in my knowledge of things I'd already learned, I just didn't know" [SP3 2020–21]
		One GP tutor was very impressed with the pharmacy students' knowledge and professional manner throughout her placement. However, the opinion on pharmacy students' knowledge did vary across the GP tutors	"It was fantastic the knowledge they did bring actually … the pharmacy knowledge. I mean, that was actually really helpful, […] to bring their expertise, and I think the patients really appreciated that as well." [GP4 2019–20]
		SPs also reported how supportive the GP Practice learning environment was:	"For anything that I didn't know, or asked a question about, I was never made, I was always made to feel very included and, yeah, I was never made to feel bad for not knowing " [SP2 2020–21]
Skills	Triangulation of skills under clinical supervision	Students also discussed that the PLC helped with application of skills as well as knowledge and recognised that practise of skills within a practice environment is required	"[I]didn't know the scope of… why you were taking them [basic observations] and how they affected, and how they could be abnormal and what that may indicate, and I think, definitely, PLC gave me great understanding of that" [SP3 2020–21]
		All students reported participation in PLC had improved their communication and consultation skills	"I feel like mine [communication skills] have come on so much from having my time there, both kind of professionally and with patients" [SP2 2020–21] "[consultation skills] was something I kind of struggled with initially, to just get the nice balance of professionalism but also keeping it natural as well. But they were all definitely enhanced while I got to spend time in [the GP practice]" [SP3 2020–21]
		One tutor was very positive about their student's consultation skills with patients and their interactions within the multidisciplinary team	"[they were] absolutely fantastic at making patients feel at ease. [They were] very human, very real and… just a very caring healthcare professional. Extremely approachable; patients all really liked [them], and [they were] really professional and appropriate with every- one, and very eager and keen to learn" [GP1 2020–21]
		Some students also noted the rapid development of practical clinical assessment skills and, for some, the confidence that this gave them:	"…in practice, it happens so quickly, one morning you feel like you really can't do something and by the end of the afternoon you're sort of, oh, that's fine." [SP2 2019–20]

Table 1 (continued)

TDF domains	Overarching theme	Description	Supporting quotes
		One student commented that they benefited from:	"… seeing patients and sort of thinking about them more from like the holistic point of view, rather than just what's on their prescription" [SP3 2019–20]
		However, one GP expressed that the students could have had better preparation prior to starting PLC – particularly with regards to history taking and succinctly presenting cases:	"Our second student […] probably didn't come with that same experience … and therefore … the most challenging aspect for [them] was actually gaining some confidence and some skills in that patient facing consultation [….] I saw progress on that during the course of [their] time here." [GP3 2019–20]
Beliefs about Capabilities	Confidence building with clinical and patient contact	The majority of students reported an increase in confidence having participated in the PLC, with one student commenting:	"If it was on a zero to hundred scale, I think I'm like a hundred times more confident than I was going into the clerkship" [SP1 2019–20]
		Students acknowledged that applying and consolidating knowledge and skills during the placement led to increased confidence:	"I think it is about having that confidence kind of in yourself which is quite difficult to start with, to be, you know, there was a few times that folk asked me questions and I was like, oh, I don't know, and then they would tell me the answer and I'd be like, oh, I did know that." [SP2 2020–21] "There was quite a few red flags that I might not have picked up on if someone had said to me, or related to a problem, but now I think I'd be a lot more comfortable to do that" [SP2 2020–21]
		One student felt that, in addition to her professional confidence, her self-confidence had also increased commenting:	"I think you come out stronger at the end in so many different ways. In terms of your […] clinical skills […] and then like aspects of your own personality as well" [SP3 2020–21]
Professional Roles & Identity	Elucidation of professional roles within GP	Most GP tutors saw their role as a supervisory, overseeing the placement and offering support when needed:	"It was just making sure that [they were] okay and adapting the programme to what [they] felt [they] needed at different stages" [GP2 2019–20] "…trying to give them a good glimpse of general practice, and to enthuse them, in a way, and to get them to understand the complexities of a primary care team" [GP3 2019–20]
		The importance of feedback and encouragement from their tutor in addition to exposure to tasks was identified, which led to increased confidence of the students with one commenting:	"I think just the exposure to doing it and, from feedback off my tutor as well, saying, like, it's okay, you are doing the right thing" [SP4 2019–20]
		One GP tutor also suspected that this opportunity gave their student a different understanding of a pharmacist's role in practice:	"It gave [them] insight into what you could do as a pharmacist, and certainly [what they] expressed that at the end, is that [they would] never would of thought that [they] would've ended up doing the things that [they] did, and that seeing pharmacists in advanced roles suddenly made [them] think about [their] career in a different way" [GP3 2019–20]

Table 1 (continued)

TDF domains	Overarching theme	Description	Supporting quotes
Environmental Context and Resources positive learning experience:	Influence of environmental context and resources	For the majority of SPs the PLC was perceived as a	"It was just such a supportive environment and I just really, really, I think the way they let me decide when I was ready to do something, but at the same time, gave me an idea of when I should be able to do it. It was just a really nice balance, and I think that actually made me flourish more" [SP3 2020–21]
		However, an issue was noted at one site where there was a miss-match of expectations around the knowledge and skill base of SPs:	"Perhaps maybe it was … an issue to do with their [GPs] confidence in what a pharmacy student knew. I think it was a sort of [a lack of] awareness [from the GP]." [SP3 2019–20]
		This was echoed by the student's GP tutor who commented:	"It was difficult to know what [their] knowledge base was meant to be" and "maybe a bit more information about what their training involves, in comparison to medical students… maybe pointing out the differences between the two…" [GP2 2019–20]
		One student also reported developing an increased awareness of the importance of lifelong learning commenting:	"It wasn't until I actually started PLC I realised that … seeing other healthcare professionals, people that were already graduated and were working years, and their attitude towards it was that you're learning, and you can always learn something new" [SP3 2020–21]
		It was noted by some of the student pharmacists that interprofessional learning with non-pharmacist healthcare professionals added depth to their learning:	"I think you get definitely a lot, a better range of things to think about and it definitely broadens your mind working with people that are [in] healthcare but different professions" [SP3 2020–21] "I think the main benefit was that the teaching was different from [that of] a pharmacist, I think. Whenever I've been with a pharmacist it's a lot of like: a question–answer, question–answer, because you know the medication or don't, and with the doctors, it's a bit more holistic" [SP2 2019–20]
		It was identified the importance of supporting the SPs, and encouraging them to work as part of the multidisciplinary team. All GP tutors reported it was important for the student to experience as many of the different health disciplines as possible, to give them the best experience of general practice	"We tried to really give [them] a chance to experience everything. [They were] offered, a session with mid- wives, you know, with physios, occupational therapists, the pharmacy team, the social work, district nurses, nurses here, practice nurses, healthcare assistants, doctors, home visits, hospital management, discharge management, terminal care, communication skills, you name it. The front desk, reception, answering phones, gathering information […] we made sure that, as much as possible, [they] get exposure to every single one of these scenarios" [GP1 2020–21]

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Key enablers to the success of the PLC include effective preceptorship and prolonged exposure to patients and multidisciplinary teams. The positive influence of effective preceptorship on SP communication skills has been reported in the USA [19]. The effect of immersive and an ongoing continuum of preceptorship, from the same, high-quality medical preceptor, has not been evaluated elsewhere. The benefit to the development of clinical knowledge, clinical skills and patient communication skills can all be influenced by high-quality clinical preceptorship. There is also clear evidence in this research of increased SP confidence from experiential consolidation of knowledge and expansion of clinical skills. This type of increase in confidence in communication skills from placement activity has been seen in other healthcare professional groups, including undergraduate speech pathology students in Australia [20]. To create credible and useful clinicians from our pharmacy degrees, similar EL opportunities are essential which host students for substantial periods of time within clinical environments.

Elucidation of professional roles within general practice

Improving self-confidence in communication skills through IPE in medical, nursing and pharmacy students in the USA as part of a communication skills development course [21]. Further work has been completed within the clinical placement setting within Scotland across multiple sectors of practice [22] as well as on a one-week pilot within a secondary care setting between medical and pharmacy students [23]. A key opportunity arising from the PLC is the potential to explore the possibility of expanding IPE within experiential settings to complement campus-based education activities.

Influence of environmental context and resources

The suitability and acceptability of SP placements in general practice has been reported in England [24]. However, the longitudinal element of this placement was unique and the compound effects of such immersion in general practice should not be understated. Also, the context of placing the SPs with GP, rather than pharmacist mentors, should also be considered unique. While there is a definitive need for the pharmacy profession to look to reduce its reliance on GP-time, this research has also reported on the additional insight gained by GPs of a separate healthcare professional group. The effect of that exposure is beyond the scope of this research to explore. There does however remain a need for pharmacy to continue to develop high-quality pharmacist clinical supervisors such that they could take over clinical supervision responsibilities wherever possible.

Further research

Consideration has been given to the future of the PLC by the Scottish Government. An adapted "longitudinal placement" model will now become part of the EL offered within multiple pharmacy sectors in any remote and rural area within Scotland. To fit with timetabling constraints these "longitudinal placements" will occur at the same site over multiple separate full-time EL placement weeks, rather than as one continuous part-time clerkship placement block. Further research is required to determine the effect of this change in structure.
Given the success of PLC in terms of meeting the objectives of developing a SP clinician product, further pilot schemes should be considered which would see SPs given similar EL placement opportunities to other student health- care professionals. Year-long clerkships at undergraduate level should be piloted to explore the benefits of entirely immersive EL clerkships for SPs. Given the pre-existing medical clerkships and the positivity around interprofessional working outlined, consideration should be given by Scottish Government and NES as to IPE longitudinal clerkships.
Further research should focus on interprofessional education opportunities within PLC and longitudinal follow-up of SPs to determine the success of the programme.

Conclusion

This research demonstrates the benefits of embedding SPs within clinical teams and immersing them in a clinical environment over a prolonged period of time as part of a Pharmacy Longitudinal Clerkship model within General Practice. Responses were positive in terms of SP and GP tutor experience in relation to application and triangulation of knowledge and skills under clinical supervision. It built confidence in SPs in relation to practical application of their clinical knowledge, skills and behaviours which will ease their transition to postgraduate professional clinical practice. Immediate adoption of PLC, as proposed, will see repeated exposure of SPs during EL weeks throughout the year. However, funding should be sought to test alternative PLC arrangements including longer full-time blocks or ultimately year-long EL placements with an IPE element for SPs should be considered.

Acknowledgements The research team would like to thank the following individuals. All patients who consented to being seen by the PLC students during their placement. Dr Katie Walter—Cairn Medical Practice; Dr Moira McKenna—Dingwall Medical Group; Dr Paula Starritt—Grantown Medical Practice; Dr Debbie Miller & Dr Alice Scriven—Nairn Healthcare Group; Dr Jim Douglas—Tweeddale Medical Practice; for all the time and support which they gave to the PLC students and without whom, the PLC would not have been possible. The former CPO for Scotland Professor Rose Marie Parr, current CPO Professor Alison Strath and Postgraduate Pharmacy Dean at NHS Education for Scotland Professor Anne Watson for support of this initiative. All staff who gave of their time to supply the PLC students with tutorials and support while on placement. Dr Tesnime Jebara (TJ) for support in interviewing and manuscript formatting.

Funding This study was funded by NHS Education for Scotland.

Conflicts of interest None.

References

1. Bates I, Bader LR, Galbraith K. A global survey on trends in advanced practice and specialisation in the pharmacy workforce. Int J Pharm Pract. 2020;28:173–81.
2. Royal Pharmaceutical Society. Post-registration foundation pharmacist curriculum. 1st ed. London: RPS; 2021.
3. Royal Pharmaceutical Society. Core Advanced Pharmacist Curriculum. Available at: https://www.rpharms.com/development/credentialing/core-advanced-pharmacist-curriculum. Accessed 4 Nov 2021.
4. Royal Pharmaceutical Society. Consultant pharmacist curriculum. 1st ed. London: RPS; 2020.
5. General Pharmaceutical Council. Standards for the initial education and training of pharmacists. 2021; Available at: https://www.pharmacyregulation.org/sites/default/fles/document/standards-for-the-initial-education-and-training-of-pharmacists-january-2021_0.pdf. Accessed 20 Jan 2021.
6. Forsyth P, Rushworth GF. Advanced pharmacist practice: where is the United Kingdom in pursuit of this 'Brave New World'? Int J Clin Pharm. 2021;43:1426–30.
7. Norris TE, Schaad DC, Dewitt D, et al. Longitudinal integrated clerkships for medical students: an innovation adopted by medical schools in Australia, Canada, South Africa, and the United States. Acad Med. 2009;84:902–7.
8. Worley P, Couper I, Strasser R, et al. Consortium of Longitudinal Integrated Clerkships (CLIC) Research Collaborative. A typology of longitudinal integrated clerkships. Med Educ. 2016;50:922–32.
9. McKeown A, Mollaney J, Ahuja N, et al. UK longitudinal integrated clerkships: Where are we now? Educ Prim Care. 2019;30:270–4.
10. Bartlett M, Dowell J, Graham F, et al. Dundee's Longitudinal Integrated Clerkship: drivers, implementation and early evaluation. Educ Prim Care. 2019;30:72–9.
11. Kerr A, Boland F, Pawlikowska T, et al. Early longitudinal community pharmacy placements: connection, integration and engagement. Res Soc Adm Pharm. 2021;17:1313–20.
12. The Scottish Government. Achieving excellence in pharmaceutical care: a strategy for Scotland. Edinburgh: Scottish Government; 2017.
13. Innes C, Rushworth G, Addison B, et al. An innovative general practice based pharmacy longitudinal clerkship: using theory to characterise its development, implementation and initial evaluation. Educ Prim Care. 2021. https://doi.org/10.1080/14739879.2021.1996275.
14. Scottish Government. Scottish Government Urban Rural Classifcation 2016. 2018; Available at: https://www.gov.scot/publications/scottish-government-urban-rural-classifcation-2016/pages/2/. Accessed 4 Nov 2021.
15. Cane J, O'Connor D, Michie S. Validation of the theoretical domains framework for use in behaviour change and implementation research. Implem Sci. 2012;7:37.
16. Gale NK, Heath G, Cameron E, et al. Using the framework method for the analysis of qualitative data in multi-disciplinary health research. BMC Med Res Methodol. 2013. https://doi.org/10.1186/1471-2288-13-117.
17. Francis JJ, Johnston M, Robertson C, et al. What is an adequate sample size? Operationalising data saturation for theory-based interview studies. Psychol Health. 2010;25:1229–45.
18. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. Int J Qual Health Care. 2007;19:349–57.
19. McDonough RP, Bennett MS. Improving communication skills of pharmacy students through effective precepting. Am J Pharmaceut. 2006. https://doi.org/10.5688/aj700358.
20 Quail M, Brundage SB, Spitalnick J, et al. Student self-reported communication skills, knowledge and confdence across standardised patient, virtual and traditional clinical learning environments. BMC Med Educ. 2016. https://doi.org/10.1186/s12909-016-0577-5.
21 Hagemeier NE, Hess R, Hagen KS, et al. Impact of an interprofessional communication course on nursing, medical and pharmacy students' communication skill self-efcacy beliefs. Am J Pharmaceut Ed. 2014. https://doi.org/10.5688/ajpe7810186.
22. Jebara T, Power A, Boyter A, et al. Student pharmacist practice based interprofessional education in Scotland: a qualitative study of stakeholders' views and experiences. J Interprof Care. 2022. https://doi.org/10.1080/13561820.2021.2011843.
23. Jebara T, Thomas I, Cunningham S, et al. Pharmacy and medical student IPE placement week. Clin Teach. 2022;19:143–9.
24. Donovan G, Brown A, Von Hatten E, et al. Introducing pharmacy students to the structure and function of general practice through undergraduate placements. Curr Pharm Teach Learn. 2019;11:1055–64.

4. CHAPTER FOUR: INTERPROFESSIONAL EDUCATION PLACEMENTS

4.1. Chapter introduction

This chapter explores the views of SPs and medical students to a week-long innovative IPE placement in secondary care. This is an evaluation of a programme of teaching which was designed by the PhD candidate. It follows a separate cohort of SPs than participated in PLC1 and PLC2 (Chapter Three).

4.2. Undergraduate Interprofessional Education (IPE) Placement

4.2.1. Research objective

To explore the views of SPs and medical students to an interprofessional education clinical placement.

4.2.2. Overview of the research and summary of findings

The IPE study was conducted in a secondary care setting in NHS Highland in January 2020 with five final year SPs and five final year medical students. It reported on the evaluation of a separate week-long innovative hospital-based IPE placement. Evaluation focused on level 1 and 2 of the Kirkpatrick Four-Level Training Evaluation Model. Focus groups were used to explore the student's views and experiences. Thematic analysis was undertaken using the TDF. Three key categories with multiple sub-themes were identified: Category 1 overall perception of experience; Category 2 student interactions; Category 3 suggestions for improvement. Overall, students valued their participation in the week and reported many benefits of learning with and from other students.

4.2.3. Originality

While IPE teaching could be said to be commonplace within undergraduate student pharmacist and medical student curricula, it is usually classroom based or limited in clinical duration. This innovative work sought to explore the experiences of SPs and medical students when paired with each other for an immersive week-long placement. Students were jointly given access to clinical areas and patients, delivered teaching by medical and pharmacy colleagues and exposed to ward-based Mini-CEX and simulation educational techniques – again these were considered innovations at the time of completion of the research. The PhD candidate was the lead for the design of this teaching and was responsible for its delivery by a team from the HPERC in January 2020.

4.2.4. Impact

Economic Impact - as a result of this work, the IPE placement has now been accepted for funding under the NES ACTp funding and as such is now run multiple times every year and is open to students from all Scottish Schools of Pharmacy.

Instrumental Impact - furthermore, other Scottish Health Boards are now actively pursuing a route to adapt this model.

Capacity Building Impact – through personal skills development in student pharmacists and medical students.

4.2.5. Conclusions and linkage to programme of research

Key to working as a clinician within a modern NHS healthcare system is being able to work as part of a collaborative interdependent multidisciplinary team. To develop pharmacists as clinicians, there needs to be greater exposure at a formative career point to learning and working together. This work sought to explore the use of IPE in undergraduate education as a means of achieving this. Similar to the PLC1 output (Chapter Three), one of the benefits of publishing in the 'Innovation, Implementation, Improvement' section of *Clinical Teacher* Journal is that this type of publication looks to share the best practice by giving detailed description of the structures and processes which allowed the innovation to happen. Again, building on PLC1 and PLC2 (Chapter Three), there are commonalities of outcomes in exposing SPs to experiential learning which they do not perceive they can attain on campus.

4.2.6. Output citation

Jebara T, Thomas I, Cunningham S, **Rushworth G**. Pharmacy and medical student interprofessional education placement week. *The Clinical Teacher*. 2022; 19(2): 143-149. https://doi.org/10.1111/tct.13450

DOI: 10.1111/tct.13450

THE CLINICAL TEACHER

Pharmacy and medical student interprofessional education placement week

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Funding information
Highland Pharmacy Education & Research Centre

Abstract

Background: Developing collaborative practice through interprofessional education (IPE) activities in undergraduate healthcare curricula is advocated by the World Health Organisation and the regulatory bodies for Medicine and Pharmacy within the UK.

Approach: Our local faculty, comprising educators from within the Highland Pharmacy Education and Research Centre (HPERC) and Highland Medical Education Centre (HMEC), developed a 5-day IPE placement for pharmacy and medical students on clinical placement within NHS Highland.

Evaluation: We collected qualitative evaluation data using face-to-face focus group discussions with five pharmacy and four medical students (January 2020 cohort). Three key categories and multiple themes within each category were identified from participant narratives: Category 1, overall perception of experience—(themes: better than previous IPE experience; greater exposure to clinical pharmacy); Category 2, student interactions—(themes: learning with a buddy; understanding of interprofessional roles); Category 3, suggestions for improvement—(themes: choice of relevant clinical rotation and content; increase learning from clinical pharmacists; better orientation to placement). Overall, students valued their participation during this week and reported many benefits of learning with students from another profession. Students also highlighted suggestions to improve their learning experience.

Implications: This evaluation has indicated students' support for embedding inter-professional placements into their curricula. Clinical educators should consider designing similar placements, while further work should focus on inclusion of higher student numbers and

1 | BACKGROUND

There is global interest in interprofessional education (IPE) to ensure collaborative and harmonious patient care delivery. According to Fransworth et al.,[1] IPE first emerged in the United States and United Kingdom in the 1960s–1970s but gained more popularity following the publication of two World Health Organisation reports: Continuing Education for Physicians[2] and Learning Together to Work Together for Health.[3]

The Centre for the Advancement of Interprofessional Education (CAIPE) defines interprofessional education as 'occasions when two or more professions learn with, from and about each other to improve collaboration and the quality of care'.[4] Preparing students for collaborative practice is taking on ever-increasing importance in undergraduate healthcare education. It gives students from different healthcare backgrounds the chance to learn together to better prepare them for working in multidisciplinary teams upon graduation. Regulators are

calling for more interprofessional learning opportunities during undergraduate curricula.[5,6]

Many countries across the world have taken steps to embed interprofessional placements into their curricula such as in the United States,[7–9] Australia,[10] UK,[11] Canada[12] and The Netherlands.[13] Literature highlights many benefits of IPE including understanding roles,[7] readiness for teamworking[10] and taking a more active role in delivering care.[13]

While local MBChB and MPharm courses contain elements of IPE, these are limited to non-clinical settings, and there is no current opportunity for IPE clinical placements of a sizable duration.

While local MBChB and MPharm courses contain elements of IPE, these are limited to non-clinical settings.

In this article, we aim to describe and present an initial evaluation of an IPE experiential learning clinical placement for pharmacy and medical students.

2 | APPROACH

We designed a week-long placement within an existing fourth year MBChB placement block (cardiovascular, clinical pharmacology, vascular surgery and respiratory block) in Raigmore Hospital, Inverness. There was no selection process for medical students as they were already due to be on placement. However, we invited all third and fourth year pharmacy students to apply to attend and then convened a panel to review the applications. We selected the top ranked pharmacy students and allocated placement dates in order of student preference.

At the start of the placement, we introduced the medical and pharmacy students to each other and then buddied them into pairs. The placement coordinator then discussed the learning objectives (see Box 1), timetabled activities, assessments and answered any questions.

BOX 1 The learning objectives for the IPE placement week

1. Demonstrate a deeper understanding of the role of other health care professionals.
2. Apply practical experience in the treatment and management of patients with cardiac, respiratory, vascular disease.
3. Analyse understanding of the importance of appropriate prescribing, including the practical problems of prescribing, including the use of Personal Formularies.

During the week, the students were given ample time for clinical experience with opportunity to attend ward rounds, outpatient clinics, investigations and interventions such as broncoscopy, PCI or vascular surgery (depending on clinical specialty). The IPE week also offered additional clinical learning opportunities such as attending wards with clinical pharmacists.

We delivered a number of tutorials over the course of the week which were attended jointly by the students. The multidisciplinary faculty who taught during the week included physicians, surgeons and pharmacists. Students were provided with case studies and, within their pairs, were asked to jointly produce a PowerPoint presentation typically focusing on clinical therapeutic management.

The students also completed mini-Clinical Evaluation Exercises (mini-CEX) in their pairings. This was a formative assessment where we observed students taking a clinical history from a patient on a ward setting. The medical student was asked to open the history and explore the presenting complaint, history of presenting complaint and past medical history before the pharmacy student took over to complete the history, including the drug history. At the end of the mini- CEX, we conducted verbal debrief and provided written feedback to each of the students. Learning points were linked back to the learning objectives of the IPE week as well as picking out some of the specific learning points from the individual cases.

Finally, the week culminated in a ward-based immersive simulation, conducted within the Highland Clinical Skills Centre, where the students 'acted-up' as qualified junior pharmacists and doctors. Within their pairs, the students were given an orientation to the simulation ward setting, including the equipment, the simulated patient and documentation available as well as the nurse (confederate). We designed the simulation scenario, with defined learning objectives, such that the students were required to work together to get through the simulation. At the end of the scenario, the students were debriefed on their experience by the placement coordinator.

3 | EVALUATION

To explore students' views and experiences with the IPE week, we invited all pharmacy and medical students of the January 2020 IPE week cohort to participate in focus groups at the end of their placement.

We applied the Kirkpatrick Four-Level Training Evaluation Model[14] (see Box 2) when designing the evaluation so as to

BOX 2 The Kirkpatrick four-level training evaluation model

- Level 1 – Reaction; relates to how training was valued by participants and how engaged they were with it.
- Level 2 – Learning; relates to the benefits acquired as a result of the training in terms of developed skills, attitudes, knowledge, and confidence.
- Level 3 – Behaviour; relates to the extent to which participants apply their training often in real life situations.
- Level 4 – Results; relates to the extent to which the training has impacted outcomes relevant to an organisation.

objectively determine the impact of training programmes and their effectiveness. The model is based on four levels; reaction, learning, behaviour and results. The current evaluation of the Highland IPE week focused on Levels 1 and 2.

3.1 | Sample and recruitment

Prior to the start of their placement, all medical and pharmacy students who were expected to attend the January 2020 delivery ($n = 10$) were emailed by the placement coordinator inviting them to participate in the focus groups and informing them of their times and locations if they wish to participate.

3.2 | Data generation

We devised a focus group topic guide based on our experience and published literature and underpinned by the Theoretical Domains Framework (TDF).[15] The TDF summarises key elements of 33 theories and proposes that determinants of behaviour cluster into 14 domains. Those domains most relevant (e.g., knowledge, beliefs about capabilities and consequences, motivation and goals, environmental context and resources) were used to guide construction of interview core questions. TJ piloted the questions in an informal educational feedback session on a previous cohort of students, and changes/modifications were made. As shown in Box 3, the final set of questions focused on exploring students' views and experiences within the IPE week in general.

BOX 3 Focus group topic guide

- Overall, how would you describe your experience?
- What were the positive aspects of this week? Anything you particularly liked?
- What about the negatives?
- Have you been on other placements? How does this one compare? What are the biggest differences then between this placement and other placements that you have been on?
- What are your views of the different activities you were involved in this week?
- Is there anything you would like to be changed (added or removed) to improve your experience during this week?
- How did you get along with your partner?
- Did you feel you learned more/better because you were with them? How, if at all, did working with him or her influence your learning?
- How do you think this experience would impact your future practice? Did you learn anything that you would like to implement in any future placements/career?
- As a result of taking part in this week, do you think you are now more confident to go and talk to other people (other healthcare professionals, patients … etc.)?
- Do you think the week has changed your understanding of the role of a pharmacist/doctor? In what way?
- Would you recommend this type of teaching as a way of learning?

We conducted two focus groups to allow for honest reflection within each professional group: one with medical and one with pharmacy students. All focus groups were approximately 60 min in duration and were conducted face to face in Inverness by a trained researcher (TJ). The focus groups were recorded and transcribed verbatim and checked for accuracy of transcribing prior to analysis.

3.3 | Data analysis

We undertook thematic analysis of the data using the TDF and the interview schedule as thematic guides. Analysis was performed by two research members independently with any disagreements resolved through discussion. In reporting this study, the Consolidated Criteria for Reporting Qualitative Studies (COREQ) was followed.

3.4 | Ethics and governance

The evaluation protocol received approval from the ethical review panel of the School of Pharmacy and Life Sciences at Robert Gordon University and adhered to all relevant research governance and ethics policies including the Declaration of Helsinki (1964). Informed consent was collected from all interviewees prior to commencing the focus groups.

3.5 | Results

Two 60-min focus groups were conducted; one with pharmacy ($n = 5$) and another with medical ($n = 4$) students. One medical student was unable to attend the focus group due to illness.

We identified multiple key themes from participant narratives, which we mapped under three categories: Category 1, overall perception of experience—(themes: better than previous IPE experience; greater exposure to clinical pharmacy); Category 2, student interactions—(themes: learning with a buddy; understanding of inter- professional roles); Category 3, suggestions for improvement— (themes: choice of relevant clinical rotation and content; increase learning from clinical pharmacists; better orientation to placement). These categories and themes are explored in more detail in Table 1. Overall, students reported that the Highland IPE week was more beneficial when compared to previous IPE events. They believed that this week allowed them to consolidate knowledge gained from their degrees and get exposed to new experiences (such as clinical pharmacy for medical students). Students also reported that, as a pair, they were able to learn better about patient care in general and about each other's profession and are subsequently better prepared for a more collaborative practice in the future. However, they did express a desire to change the clinical area where the placement will be conducted in future, to allow both students to gain the most out of

TABLE 1 Key themes identified from qualitative evaluation data

Category	Theme	Definition	Quotes
(1) Overall perception of experience	Better than previous IPE experience	Students noted that it was better than any previous IPE experience they had as it was the first time they were allowed to work alongside another healthcare student in a real-life practice.	'This does not even compare to previous IPE that I felt was completely pointless in the past because we basically just did team building exercise and then never saw the people again. I think this was better'. M3 'They were just showing us what they do on a day-to-day basis … Usually when you go on a placement, they will have a list of things … and it's not probably what they have actually in their day-to-day'. P3
	Greater exposure to clinical pharmacy	Medical students were particularly impressed with clinical pharmacists and how they were able to learn a lot from them. The week was also praised by students as it allowed them to experience things they would not have exposure to otherwise during their studies.	'She was speaking to me about a few different resources … and how I could get in contact with a pharmacist if I needed help prescribing something, and so that was good because I did not know those services were available'. M4 'Another good bit I thought was the tutorials we did because they had more of a pharmacology focus, which we do not normally get, but it's still really important'. M4 'We've had a couple of tutorials with the pharmacists [before] but nothing like this week. This week has been by far the best pharmacology teaching'. M1 'I was able to sit through a surgery … and that's something, without IPE, I would not have been able to experience, like at all'. P5 'We got to see a lot of conversation between the doctors and occupational health in terms of managing patients at home … We have seen a lot of IPE-type [sic interprofessional] things going on between referring to different services all over the highlands'. P3 'I feel like I probably could tell you a lot more now than what I would from what were taught at uni, so as much as I understood it then, my understanding is completely different'. P3
(2) Student interactions	Learning with a buddy	Students from both professions enjoyed doing this placement together and reported that, as a result, they were able to learn better. Being paired with a medical student was considered beneficial to help pharmacy students interact with them without feeling intimidated.	'I quite enjoyed having her there, I got on with her, and when we did a history together, it worked really well'. M2 'I learned so much from medical student just like a lot of terms that came up … and then I would then explain the pharmacology … so we have been able to just kind of do

(Continues)

TABLE 1 (Continued)

Category	Theme	Definition	Quotes
	Understanding of interprofessional roles	The week was also believed to help students better understand each other's profession and the different roles they can perform.	half and half to get the whole picture'. P1 'I think it's quite healthy to integrate us because in a few years we all will be working together, and I think that mixing us in early is a good thing to do'. M2 'It was nice being with medical students, because they are students as well, there's still stuff that they are learning, so talking to them about different things, it did not feel uncomfortable'. P3 'I chatted with [partner] quite a bit about pharmacy and their career routes and I learnt more about what they can do … we do not really cover that otherwise'. M4 'I think it's really nice to have that kind of peer environment … we have kind of built up a relationship of understanding what each other knows and does not know, and the benefits of discussing things together'. P3
(3) Suggestions for improvement	Choice of relevant clinical rotation and content	Most students were placed in cardiovascular or respiratory wards except for one pair who were allocated to vascular surgery. This was considered a poor choice as pharmacists usually have little input in this area. Also, medical students did highlight that they had less clinical contact with patients compared to their regular placements.	'The pharmacists do not get taught anything about vascular surgery, so I felt kind of sorry for [partner] who I was with, she was put in a ward that has very little pharmacy input anyway'. M1 'Being on vascular [ward] felt quite out of joint almost, because there wasn't really much pharmacy side, so the medic was having to explain everything'. P1 'We certainly had far less contact time this week, I must say, but when you double the amount of students on a ward, I do not really think there's any way around that'. M1
	Increase learning from clinical pharmacists	Both medical and pharmacy students expressed interest in attending more clinical pharmacist wards and advocated for incorporating this into future placements as the current week was more focused on medical activities.	'I was with [clinical pharmacist] for like 3 hours … I learned loads … I'd quite like to have stuff with the ward pharmacist'. M2 'Me and my medical student only saw a pharmacist today … it has been good for us to see the medical side, but I do not think the balance has been there with the medical students getting to see the pharmacy side'. P4
	Better orientation to placement	In addition, students also pointed that they require a better introduction to the IPE week and the students they are partnering with.	'I think it was good, I would do it again, but again [needs] more structured approach and just 100% knowing what our role is, and what we are

(Continues)

TABLE 1 (Continued)

Category	Theme	Definition	Quotes
		One medical student noted that sometimes they had to take on a more mentoring role than anticipated.	meant to do with it, would be helpful at introduction maybe'. M3 'She [student pharmacist] could not follow exactly what was going on, so at times, I would be trying to explain it. I wanted to try and help them have a good time, but I do not know if that was our role'. M4

this week. Time spent with clinical pharmacists was highly valued by all students who encouraged embedding more of it in future placements.

Overall, students reported that the Highland IPE week was more beneficial when compared to previous IPE events.

They were able to learn better about patient care in general and about each other's profession.

Better prepared for a more collaborative practice in the future.

4 | IMPLICATIONS

Due to coronavirus complications, data were only collected from one cohort (January 2020); thus, results should be interpreted with caution.

The IPE placement was well perceived by students who highlighted its impact on improving their learning experience and providing insight into their future practice. As a result of this evaluation, we have made some changes to the design of the placement week; in particular, it has been offered to students as part of a long-term conditions block hosted in an older adults unit. There was thought to be plenty of scope for both sets of students to optimise the interprofessional placement learning opportunity within this clinical specialty. Three 1-week placements are planned for the coming academic year, and all have successfully recruited students.

IPE placement was well perceived by students who highlighted its impact on improving their learning experience.

The authors recommend that other Schools of Pharmacy and Medicine consider co-production of similar IPE placements and then embed these within their curricula in an effort to better prepare students for real-life collaborative practice. Particular attention should be paid to the hosting specialty and how to ensure sufficient patient contact for all students given increased student numbers in clinical areas. We also recommend having a robust plan for the orientation of students arriving on placement. Beyond a geographical orientation of the placement site for all students, faculty should set expectations of how students will communicate and work to help each other through the week, giving examples of how the students could get the most from their placement.

ACKNOWLEDGEMENTS

The authors would like to thank the students for giving of their time to complete this evaluation.

FUNDING INFORMATION

This study was funded by the Highland Pharmacy Education & Research Centre.

CONFLICT OF INTEREST

The authors have no conflict of interest to disclose.

ETHICS STATEMENT

The evaluation protocol received approval from the ethical review panel of the School of Pharmacy and Life Sciences at Robert Gordon University.

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REFERENCES

1. Fransworth TJ, Seikel JA, Hudock D, Holst J. History and development of interprofessional education. J Phonet and Audiol. 2015; 1(101):1–5.
2. World Health Organisation. Continuing education for physicians: Report of a WHO expert committee. World Health Organ Tech Rep Ser. 1973;534:1–32.
3. World Health Organisation. Learning together to work together for health. Report of a WHO study group on multiprofessional education of health personnel: The team approach. World Health Organ Tech Rep Ser. 1988;769:1–72.
4. Centre for the Advancement of Interprofessional Education. Inter-professional Education (CAIPE): Today, yesterday and tomorrow. Available at: https://www.caipe.org/resources/publications/caipe-publications/caipe-2002-interprofessional-education-today-yesterday-tomorrow-barr-h. Accessed Feb/11, 2020.
5. Pharmacy Regulation. Standards for the initial education and training of pharmacists. Available at: https://www.pharmacyregulation.org/sites/default/files/document/standards-for-the-initial-education- and-training-of-pharmacists-january-2021_0.pdf. Accessed Jan/20th, 2021.
6. GMC UK. Achieving good medical practice: guidance for medical students. Available at: https://www.gmc-uk.org/-/media/documents/achieving-good-medical-practice-20200729_pdf-66086678.pdf. Accessed March/3rd, 2021.
7. Biehle L, Mann A, Fox L. Evaluation of pharmacy student perceptions and stereotypes of healthcare professionals before and after an internal medicine advanced pharmacy practice experience. Curr Pharm Teach Learn. 2019;11(4):417–23.
8. Nwaesei AS, Jacob BC, Peasah SK, Perkins JJ, Hogan M. A structured approach to intentional Interprofessional experiential education at a non-academic community hospital. Am J Pharm Educ. 2019;83(9): 2002–2010.
9. Caratelli LA, Bostwick JR, Templin T, Fitzgerald M, Filter MS, Ginier E. Development and evaluation of an interprofessional semi- nar pilot course to enhance collaboration between health professions at a student-run clinic for underserved populations. J Interprof Care. 2020;34(3):422–6.
10. Seaman K, Saunders R, Williams E, Harrup-Gregory J, Loffler H, Lake F. An examination of students' perceptions of their inter-professional placements in residential aged care. J Interprof Care. 2017;31(2):147–53.
11. Nasir J, Goldie J, Little A, Banerjee D, Reeves S. Case-based inter-professional learning for undergraduate healthcare professionals in the clinical setting. J Interprof Care. 2017;31(1):125–8.
12. Doucet S, Loney E, Brown PA. Perceptions of graduating health professional students of their interprofessional education experiences during pre-licensure education. J Allied Health. 2016;45(2):e5–9.
13. Visser CLF, Kusurkar RA, Croiset G, Ten Cate O, Westerveld HE. Students' motivation for interprofessional collaboration after their experience on an IPE ward: A qualitative analysis framed by self-determination theory. Med Teach. 2019;41(1):44–52.
14. Kirkpatrick DL, Kirkpatrick JD. Evaluating Training Programs: The Four Levels. 3rd ed. Oakland: Berrett-Koehler Publishers; 2006.
15. Cane J, O'Connor D, Michie S. Validation of the theoretical domains framework for use in behaviour change and implementation research. Implem Sci. 2012;7 (37):1–17.

How to cite this article: Jebara T, Thomas I, Cunningham S, Rushworth GF. Pharmacy and medical student interprofessional education placement week. Clin Teach. 2022;1–7. https://doi.org/10.1111/tct.13450

5. CHAPTER FIVE: ADVANCED PRACTICE

5.1. Chapter introduction

This chapter presents a commentary on advanced pharmacist practice which the PhD candidate co-authored with another accredited consultant pharmacist in Scotland. It is a piece of primary thought on where the future of the profession lies and gives some critical opinion on what changes are needed to the education and training of pharmacists to enable them to develop as advanced clinicians.

5.2. "Brave New World" advanced pharmacist practice commentary

5.2.1. Overview

This public output is a commentary, not research. It has been included here because it of its significance in challenging thinking around the subject of advanced pharmacist practice within the UK. It was published more than a year before the RPS published their RPS Core Advanced Curriculum (Royal Pharmaceutical Society 2021a). Both authors were on the UK-wide group which helped to write that curriculum. As such, the concepts in this commentary align well with the new curriculum. The work, and thinking behind it, was a collaboration between the authors. To be asked to write a commentary on a subject like this, in an international peer-reviewed journal, demonstrates the impact the PhD candidate has in terms of leading original and innovative thinking in this field.

5.2.2. Originality

To move-on the debate around what advanced pharmacist practice is, and to create some interest in the standards to be contained within the (then) developing Royal Pharmaceutical Society (RPS) Core Advanced Curriculum, the PhD candidate and another senior clinical pharmacy colleague in Scotland wrote a purposefully challenging article in April 2021 as a commentary and submitted it for peer-reviewed publication in the International Journal of Clinical Pharmacy. It was written as a rallying call and a challenge to the profession about what the full scope of an advanced pharmacist might look like. At the time, there was the need to socialise the concept of what an Advanced Pharmacist might be and to promote the idea of the need to develop a training programme for an Advanced Pharmacist Practitioner. Communication of this complex and challenging thinking looks to anticipate and recognise potential barriers and begins the process of persuading, with cogent argument and logical thought, how the profession might seek some common ground to adapt and evolve, going forward. While this is not research, it has been selected for inclusion within this PhD submission as another type of academic output – especially given its originality, topical nature and impact.

5.2.3. Impact

Conceptual Impact – this work was received positively by the profession - especially in Scotland. The ideas within

the document have helped to shape the concept of modern advanced pharmacist practice within the profession in Scotland. Indeed, the SP3A Group (Scottish Primary Care Lead Pharmacists) now have a group set up called the *Brave New World* group, which was the title of the paper, showing the influence of the thinking in terms of influencing decision makers. The PhD candidate has also been asked to deliver a plenary presentation at the European Society of Clinical Pharmacy Autumn Symposium 2023 and has been given the presentation title of *Clinical Pharmacy in a Brave New World*.

5.2.4. Conclusions and linkage to programme of research

While Chapter Three (PLC) and Four (IPE) have focused on education and training innovations within formative education. There is also a need to understand how the scope of practice changes from undergraduate to through to advanced pharmacist practice. Training clinicians will happen at different levels across the continuum of the pharmacy career and practice. The commentary presented in Chapter Five gives a definition of what it means to be operating as an advanced pharmacist clinician within the UK. It also discusses education and training reforms required to be able to train to advanced level, and then also assess it. The originality of thought to pull all these aspects together this has been included as part of a composite portfolio of public outputs. The concepts contained within the commentary set the scene for the education and training innovations presented in Chapter Six and Seven.

5.2.5. Output citation

Forsyth P, **Rushworth GF**. Advanced pharmacist practice: where is the United Kingdom in pursuit of this 'Brave New World'? *International Journal of Clinical Pharmacy*. 2021; 43: 1426-1430. https://doi.org/10.1007/s11096-021-01276-5

International Journal of Clinical Pharmacy
https://doi.org/10.1007/s11096-021-01276-5

COMMENTARY

Advanced pharmacist practice: where is the United Kingdom in pursuit of this '*Brave New World*'?

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Received: 11 March 2021 / Accepted: 28 April 2021

Abstract
Pharmacy has developed many novel patient-facing roles across the globe, typically delivered through the lens of pharmaceutical care. The macro-level implementation of such interventions is, however, fraught with difficulty. At an individual-level, psychological barriers of pharmacists and their ability to deliver autonomous complex clinical care are key considerations. As the United Kingdom imminently plans to launch a new advanced pharmacist practice curriculum and credentialing pro- cess to support advanced skills development, this commentary discusses where progress to date has taken us and what other developmental, environmental and cultural changes are needed to support this. The commentary also challenges some of pharmacy's historic dogma, discusses a requirement for teaching to transcend simplistic concepts of medicines-harm, considers the need for the standardisation of clinical skills and discusses the necessity of formal advanced practice programmes and preceptorship models. It finally proposes the concept of *Advanced Pharmacist Practitioners* as the ultimate future vision of autonomous practice and the need for Government Policy to support their creation.

Keywords Advanced practice · Competence · Opinion · Pharmacists · Workforce development

Main text

But I don't want comfort….I want poetry, I want real danger, I want freedom, I want goodness.
John the Savage, *Brave New World* by Aldous Huxley.

Advanced pharmacist practice is a growing professional phenomenon across global healthcare systems. A survey by the International Pharmaceutical Federation (FIP) across 48 countries shows that in 28 countries (58 %) advanced practice frameworks are available or in development [1]. The rate of pace towards this vision is however different across the world [2].
The publication of the Advanced Practice Framework by the Royal Pharmaceutical Society (RPS) in 2013 was ground-breaking for United Kingdom (UK) pharmacists [3]. Although not mandatory, this document defined the multiple domains of practice necessary for advanced practice (including expert professional practice; communication/ collaboration; leadership; management; education, training and development; and research) and it provided much needed clarity on what skills differentiation, at various levels, is prerequisite to progress along the advanced practice spectrum. For the first time there was also an appreciation that expert professional advancement was not simply judged by deeper or broader knowledge but was in part measured by a pharma- cist's ability to autonomously apply their expertise and make decisions in uncertain situations. In 2021, the RPS plan to develop and launch a UK 'entry-level' advanced practice curriculum and credentialing process [4]. This has the potential to revolutionise the standardisation of advanced practice skills development. However, before we embark in pursuit of this new future we need to assess where progress to date has taken us and what other developmental, environmental and cultural changes are needed to support this.
Traditional pharmacist roles were built on a cornerstone of the accuracy of dispensing and technical duties, including the ability to correctly supply or produce a medication against a prescription. Such processes have typically also

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Published online: 15 May 2021

included a patient-facing component focused on advice provision and patient education. The underpinning knowledge of the pharmacist has always also been fundamental, typically supported by tendentially binary concepts involving prescription law, indication and contraindication, the evidence-base, the licensed marketing authority and the inclusion of a product on local guidelines and formulary. The need for these roles and responsibilities are still vital across the globe and ensure patient-safety. However, a parallel and equally important role is emerging for pharmacists with direct patient-care responsibilities.

Over the last 30 years, pharmacists have developed novel non-technical patient-facing roles across the globe [5, 6]. Medicines optimisation has been the key focus of most of this work, typically delivered through the lens of pharmaceutical care; a well-known concept defined in the 1990 s by Hepler and Strand [7]. Meta-analyses and systematic reviews have provided a firm evidence base for pharmacist-led medication optimisation reviews and non-medical prescribing by pharmacists [5, 6, 8, 9]. By design, such high-impact methodologies collate evidence from individual randomised trials, typically delivered by highly experienced pharmacists with advanced skills in their area of practice. The real-life implementation of such interventions at the population and professional-level is however fraught with difficulty; one of the reasons is the skill-sets and experiences of the pharmacists involved in the original trials are rarely adequately defined and/or are hard to quickly replicate en-masse. Recent evidence in the UK highlights the need for system-wide changes to education and support structures to enable the population-level delivery of advanced pharmacist practice [10]. In order to expedite these changes safely, there is a need to evolve the education and training of pharmacists throughout the whole continuum of the pharmacy career, from undergraduate, through early years and onwards into the development of advanced practice. Government have stressed the need for transformation change in workforce development and also voiced warnings about the critical need to ensure we are training staff with the right skill and confidence levels needed to safely deliver care [11, 12].

But are pharmacists themselves the main barrier to the lofty aims of advanced practice [13]? A key hurdle in achieving profession-wide delivery of advanced roles is the apparent risk-averse nature of the workforce [14–17]. Psychological factors, including lack of confidence, fear of risk and of taking responsibility, are frequently cited as barriers to pharmacists delivering elements of advanced practice, including prescribing [15–18]. Such findings are not unique to UK pharmacy practice, with examples of such behaviour seen in European [19], North American [20], African [21] and Australasian practice [15]. These common personality traits are also recognised by the medical profession, who have questioned the clinical aptitude of pharmacists when it comes to making autonomous decisions when faced with uncertain or clinically risky situations[18]. This quandary is in part theoretically relatively simple; until now, pharmacists have not actually been trained to autonomously manage risk and uncertainty. There is no doubt they can identify issues of risk and uncertainty, but autonomous management has been beyond the traditional scope of their practice. A trained reliance on formal guidance has exacerbated this problem and sown endemic seeds of anxiety and fear.

Pharmacists have a key strength in identifying and reducing medicines-related harm. The historical need for this role is clear; a vital component of traditional prescription dispensing duties is the identification of unsafe prescribing and/ or significant drug-interactions. But does this focus on stop- ping negative outcomes breed a one-sided attitude towards risk early in a pharmacists career [15, 22]? Risk is not the single-faceted or unidirectional construct often described in pharmacy; benefit and harm can result from both action and inaction. Terms like ‘high-risk medicines’ present an overly-simplified univariate and unidirectional view of total risk. ‘One-size-fits-all’ rules around harm-reduction produce the same unindividualised care as blanket rules for starting medications. Numbers-needed-to-treat and numbers- needed-to-harm, by definition measures of population effect, are also on their own not suitable vehicles for determining individual patient-level benefit or harm. Although necessary for building foundation-level competencies, does longer- term reliance on such simplified tools and guidance documents [23] help or hinder our ability to foster pharmacists with advanced skill-sets and understanding of the complex holistic tasks that they are being asked to provide in new advanced roles? Perhaps this focus alone, without a wider comprehension of multi-factorial all-cause risk, breeds artificial “*comfort*” rather than true comprehension or skill. Beyond the “*comfort*” of this structure and guidance, pharmacists often plunge into a trough of self-doubt, insecurity and paralysis. A restructuring of the undergraduate degree and a greater exposure to experiential learning, especially in the formative stages of the career, is underway in Scotland to address some of these issues [24].

UK pharmacy policy still promotes a predominantly pharmaceutical care-based model for the profession [12, 25]; however, does such a model engineer pharmacists ready for the demands of advanced practice? Pharmaceutical care is an intrinsic and intractable facet of clinical care: but autonomous clinical practice delivery by advanced pharmacists need not be limited solely to its delivery. Likewise, any healthcare professional managing a patient’s condition with medication should be able to deliver competent pharmaceutical care: it is not the sole preserve of pharmacists and the pharmacy profession [26], it is a component of quality holistic clinical care. As described above, its application has been found in multiple meta-analyses to be of critical

benefit to patients, and as such, it should be preserved. However, any pharmacist wishing to practice as a clinician to an advanced level now needs to grow beyond the limits of pharmaceutical care into the "*poetry*" of complex clinical care. We need pharmacist clinicians with an enhanced composite skill-set who are adept at delivering clinical care, can safely apply high-level clinical assessment, reasoning and judgement skills to uncertain clinical problems, drawing upon their extensive knowledge of physiology, clinical pharmacology and therapeutics. Such pharmacists would have a skill-set craved by any modern healthcare system, especially in a limited-resource taxpayer-funded system like the UK's National Health Service. It is essential that changes are made to ensure that pharmacists are equipped with the skills, experiences and exposures to allow them to apply this knowledge in a more meaningful way. Regulators, employers and education-providers all have a part to play to ensure the greatest clinical utility can be obtained from our pharmacists, for the benefit of our population.

Pharmacy also need to challenge their self-titled label of 'expert in medicines'. It is somewhat recklessly touted as a 'unique selling point' for our profession. But what does it actually mean? Although there is no other healthcare professional group with the type of background and undergraduate training which pharmacists are exposed to in relation to clinical therapeutics, a degree of realism is needed here. We need to be truthful and honest about why this is an issue. The label suggests a flat level of skill and ability across the profession and that all staff have no advancement left to achieve. It sets unrealistic expectations for junior members of staff at early stages of their career. Pharmacists cannot truly be an 'expert in medicines' until they can assess whether the drug prescribed, or to be prescribed, is the right one for the patient. In most cases, to do this autonomously necessitates drawing out an accurate complex clinical history, examination of the patient and undertaking a sophisticated assessment of the risk:harm ratio with or without the drug; all this, in the context of addressing the patient's ideas, concerns and expectations about their condition and its management. Currently the lack of standardised practical clinical skills for pharmacists, including communication-skills, history-taking, examination and procedural skills and diagnostic ability, limit the holistic assimilation of all these data points, which disable the formation of a realistic understanding of the full clinical-picture: this is a common inhibiter of advanced practice development [15, 22]. Advanced practice pharmacists could overcome these issues with an appropriate training programme.

The real world of autonomous advanced patient-level assessment, care provision and prescribing is often tinged with isolated and "*savage*" contrasting experiences for advanced pharmacists in-training; "*goodness*" when their patients achieve the outcomes desired and sadly also "*real danger*'' when patients come to harm through either action or inaction. The population-level implementation of the upper spectrum of advanced pharmacist practice is currently an arid landscape of professional support and mentorship; few pharmacists truly flourish in these conditions. This needs to change. Ultimately the "*savage*" experiences of advanced practice never stop but clinicians can learn from senior peers about how to rationalise them and how to mini- mise them, in the form of total risk, going forward. Such senior peers could come within both pharmacy and/or the multidisciplinary team.

Lack of competence is known to be associated with failures in receiving appropriate feedback [27]. Experts in most fields also commonly describe that the observation of competent senior peers, early in their career, allowed them to accurately estimate their own ability and identify deficiencies [27]. A culture change is required within the profession in respect of education and training; students and trainees (at all levels of practice, up to and including trainees at advanced level) should be omnipresent fixtures within the workplace. Exposure to experiential and interprofessional learning at all levels, including clinical situations and simulation, is key to the development of pharmacists as clinicians and thus advanced-level practice. All registered pharmacists must have an obligation to train others, including directly supervising and preceptoring those in training. This ultimately will require new professional infrastructure and the development of formal support models. Some early examples of sophisticated preceptorship models in UK pharmacy have delivered measurable benefits to populations of patients at regional health-authority level and influenced Government policy [12, 28]. Such models also link to the FIP Development Goals around Academic Capacity, Early Career Training and Advanced and Specialist Development [29].

The pharmacy profession in the UK needs to reflect on how we build upon our strong traditional foundations and attributes if we do truly aspire to deliver an effective standardised model for autonomous patient-facing advanced practice. The imminent development of the UK-wide advanced practice curriculum and credentialing process gives us a fresh chance to consider this. Recent research shows that such frameworks are shown to improve the performance of pharmacists [30]. However; we need to build the environments essential for achieving this, especially in the primordial stages of development, to succeed at the macro-level. The profession need to rise above our historic dogma, teaching needs to transcend binary, unidirectional and univariate concepts of harm, pharmacists need to be given time to develop advanced skill-sets, and workforce development strategies need to find solutions anchored in preceptorship models, direct supervision of early advanced practice and assessments of competence. Such changes will increase the

metacognitive capability of the individual pharmacist (i.e. the ability to correctly judge their own competence) [27, 31]. A clear vision of advanced practice roles now needs to be articulated by the profession. Beyond the 'entry-level' scope of nationally accredited advanced pharmacist practice, we propose the concept of '*Advanced Pharmacist Practitioners*' (APPs). These individuals are on the continuum of advanced pharmacist practice, but critically, their scope of clinical practice will be broader and deeper in terms of autonomous clinical assessment, diagnosis, investigation, management and follow-up of patients. A multi-profession Advanced Clinical Practitioner status in the UK healthcare system is beginning to be recognised—available to nurses, paramedics and pharmacists, but uptake within pharmacy has so far been limited [32]. Routine pharmacist-specific post-graduate training programmes, supported by Government Policy, are now required to protect and deliver APPs as a common career destination. These should be designed to ensure the APP product at the end of the programme has the capabilities and competence required for the role. To deliver this, such a programme would require formal taught elements to boost skills and knowledge in clinical assessment, procedures and decision-making, while consolidating this acquired knowledge on a longitudinal experiential preceptorship programme.

In summary, defining advanced practice competence levels at the national-level is only the first step in developing advanced practice skills in the workforce. Thereafter, creating a strategy, infrastructure and environment for achieving this is essential, to allow these skills to be developed across the spectrum of primordial, early and advanced career stages. Standardising clinical skills using preceptorship models, with direct evidencing of their practical application, must be a core element. This will require the formation of routine advanced practice training programmes. All these steps are vital in breeding healthcare professionals ready to autonomously manage all-cause risk, trust their own judgement and deliver the *Brave New World* of real-life advanced practice.

Funding This commentary received no specific funding from any agency in the public, commercial, or not-for-profit sectors.

Conflicts of interest The authors declare that they have no conflicts of interest.

References

1. Bates I, Bader LR, Galbraith K. A global survey on trends in advanced practice and specialisation in the pharmacy workforce. Int J Pharm Pract. 2020;28:173–81.
2. Bader LR, Bates I, Galbraith K. Trends in advanced practice and specialisation in the global pharmacy workforce: a synthesis of country case studies. Int J Pharm Pract. 2020;28:182–90.
3. Royal Pharmaceutical Society. Advanced practice framework. Royal Pharmaceutical Society. 2013. https://www.rpharms.com/resources/frameworks/advanced-pharmacy-framework-apf. Accessed 02 Feb 2021.
4. Burns C New 'core curriculum' will help pharmacists direct their careers, says RPS. Pharmaceutical Journal Online. 2018. https://pharmaceutical-journal.com/article/news/new-core-curriculum-will-help-pharmacists-direct-their-careers-says-rps. Accessed 23 April 2021.
5. Hazen ACM, de Bont AA, Boelman L, Zwart DLM, de Gier JJ, de Wit NJ, et al. The degree of integration of non-dispensing pharmacists in primary care practice and the impact on health outcomes: a systematic review. Res Soc Adm Pharmacy. 2018;14:228–40.
6. Weeks G, George J, Maclure K, Stewart D. Non-medical prescribing versus medical prescribing for acute and chronic disease management in primary and secondary care. Cochrane Database Syst Rev. 2016;11:CD011227.
7. Hepler CD, Strand LM. Opportunities and responsibilities in pharmaceutical care. Am J Hosp Pharm. 1990;47:533–43.
8. Koshman SL, Charrois TL, Simpson SH, McAlister FA, Tsuyuki RT. Pharmacist care of patients with heart failure: a systematic review of randomized trials. Arch Intern Med. 2008;168:687–94.
9. Pousinho S, Morgado M, Falcão A, Alves G. Pharmacist interventions in the management of type 2 diabetes mellitus: a systematic review of randomized controlled trials. J Manag Care Spec Pharm. 2016;22:493–515.
10. Evans C, Pearce R, Greaves S, Blake H. Advanced clinical practitioners in primary care in the UK: a qualitative study of workforce transformation. Int J Environ Res Public Health. 2020;17:4500.
11. Wickware C. Lack of leadership and clinical skills are a 'barrier' to pharmacy investment, warns NHS England. Pharm J Online. 2019. https://pharmaceutical-journal.com/article/news/lack-of-leadership-and-clinical-skills-are-a-barrier-to-pharmacy-investment-warns-nhs-england. Accessed 09 March 2021.
12. The Scottish Government. Achieving excellence in pharmaceutical care: a strategy for Scotland. Edinburgh: Scottish Government; 2017.
13. Rosenthal M, Austin Z, Tsuyuki RT. Are pharmacists the ultimate barrier to pharmacy practice change? Can Pharm J. 2010;143:37–42.
14. Fisher J, Kinnear M, Reid F, Souter C, Stewart D. What sup- ports hospital pharmacist prescribing in Scotland? A mixed methods, exploratory sequential study. Res Soc Adm Pharm. 2018;14:488–97.
15. Zhou M, Desborough J, Parkinson A, Douglas K, McDonald D, Boom K. Barriers to pharmacist prescribing: a scoping review comparing the UK, New Zealand, Canadian and Australian experiences. Int J Pharm Pract. 2019;27:479–89.
16. Rosenthal M, Austin Z, Farrell J, Tsuyuki RT. Overcoming our nature and nurture. Can Pharm J. 2017;150:5–7.
17. Maddox C, Halsall D, Hall J, Tully MP. Factors influencing nurse and pharmacist willingness to take or not take responsibility for non-medical prescribing. Res Soc Adm Pharm. 2016;12:41–55.
18. Rokib T. Pharmacist led care in General Practice (PLAGE) Study. Pharm Res UK. https://pharmacyresearchuk.org/wp-content/uploads/2017/01/Pharmacist-led-care-in-General-Practice.pdf. Accessed 08 March 2021.
19. Brazinha I, Fernandez-Llimos F. Barriers to the implementation of advanced clinical pharmacy services at Portuguese hospitals. Int J Clin Pharm. 2014;36:1031–8.
20. Frankel GEC, Austin Z. Responsibility and confidence: identifying barriers to advanced pharmacy practice. Can Pharm J 2013;146:155–61.

21. Auta A, Strickland-Hodge B, Maz J. Challenges to clinical pharmacy practice in Nigerian hospitals: a qualitative exploration of stakeholders' views. J Eval Clin Pract. 2016;22:155–61.
22. McIntosh T, Stewart D. A qualitative study of UK pharmacy pre- registration graduates' view and reflections on pharmacist pre- scribing. Int J Pharm Pract. 2016;24:139–41.
23. Scottish Government Polypharmacy Model of Care Group. Polypharmacy guidance, realistic prescribing. 3rd ed. Edinburgh: Scottish Government; 2018.
24. NHS Education for Scotland. Experiential learning for student pharmacists in Scotland. 2020. https://www.nes.scot.nhs.uk/our- work/experiential-learning-for-student-pharmacists-in-scotland/. Accessed 20 April 2021.
25. Royal Pharmaceutical Society. The RPS roadmap to advanced practice. 2016. https://www.rpharms.com/Portals/0/RPS%20document%20library/Open%20access/Development/Roadmap%20to%20Advanced%20Practice/the-rps-roadmap-to-advanced-practice.pdf. Accessed 20 April 2021.
26. Hepler CD. Clinical pharmacy, pharmaceutical care, and the quality of drug therapy. Pharmacotherapy. 2004;24:1491–8.
27. Kruger J, Dunning D. Unskilled and unaware of it: how difficulties in recognizing one's own incompetence lead to inflated self- assessments. J Pers Soc Psychol. 1999;77:1121–34.
28. Forsyth P, Moir L, Speirits I, McGlynn S, Ryan M, Watson A, Reid F, Rush C, Murphy C. Improving medication optimization in left ventricular systolic dysfunction after acute myocardial infarction. BMJ Open Qual. 2019. https://doi.org/10.1136/ bmjoq-2019-000676.
29. FIP. FIP Development Goals. 2021. https://www.fip.org/fip-development-goals. Accessed 20 April 2021.
30. Udoh A, Bruno-Tomé A, Ernawati DK, Galbraith K, Bates I. The effectiveness and impact on performance of pharmacy-related competency development frameworks: a systematic review and meta-analysis. Res Soc Adm Pharm. 2021. https://doi.org/10. 1016/j.sapharm.2021.02.008.
31. Fuller KA, Donahue B, Kruse A. Examining student self-awareness of performance on entrustable professional activities given context of preceptor evaluations. J Am Coll Clin Pharm. 2021;4:169–75.
32. Health Education England. What is advanced clinical practice? 2021. https://www.hee.nhs.uk/our-work/advanced-clinical-practice/what-advanced-clinical-practice. Accessed 20 April 2021.

6. CHAPTER SIX: SIMULATION-BASED EDUCATION

6.1. Chapter introduction

In this chapter, an evaluation of another educational modality – SBE – is presented. The setting for utilising this technique is in the training of GPCPs to the advanced level. SBE allows for clinical scenarios to be designed to meet specific learning objectives using a process called 'constructive alignment' (May 2014). Constructive alignment dictates that simulations are built around learning objectives; the scenario is then structured to meet those learning objectives by the delivering faculty. A structured debrief takes place after each simulation where facilitators invite participants to set the agenda for in depth group discussion before participants are asked to identify their 'take-home messages' (THM). If the simulation functions as intended, then the participant's identified THM should match the learning objectives. The rigour within this process allows faculty to design scenarios for specific end points. It allows faculty to pull out common clinical presentations in GP and to expose advanced GPCPs to these but in a safe and supported way. SBE is an educational technique that explores clinical human factors in the application of participant's knowledge, skills and behaviours. It is not used to teach new skills or knowledge per se, but rather explore the decision making behind how existing skills and knowledge are applied. Clinical human factors are organisational, environmental, personal and professional characteristics which influence our clinical behaviours (Carayon 2006). The debrief component of the simulation is therefore the most vital part. It is reliant on a skilled facilitator to explore behaviours with the participants such that they can understand how they, as an individual, respond to situations and scenarios, reflect on this, then identify their own learning needs or THMs.

6.2. GPCP Simulation

6.2.1. Research objective

To design and deliver an innovative simulation course to support the development of advanced General Practice Clinical Pharmacists in clinical assessment and management of patients in General Practice.

6.2.2. Overview of the research and summary of findings

This paper reported on the implementation of innovative SBE to support the development of advanced GPCPs. An interpretivist philosophy was applied where pre and post simulation questionnaires were used to support an evaluation focused on level one and two of the Kirkpatrick Four-Level Training Evaluation Model. Increased confidence and self-reported competence were reported in all areas pertaining to application of consultation and clinical skills. Qualitative comments from the participants regarding the training course were also favourable, highlighting the value of the training in developing clinical competence and confidence when dealing with a variety of general practice scenarios.

6.2.3. Originality

Simulation is a relatively new educational technique within pharmacy education and training in NHS Scotland. While role play and observed structured clinical examination (OSCE) have been used for decades, the use of simulation with a structured debrief of a clinical scenario is entirely new. The PhD candidate was the lead for this research and led the design of the teaching and delivery of the teaching by a team from the HPERC in the Louisa Jordan National Hospital in Glasgow in November 2020.

6.2.4. Impact

Instrumental Impact - This research contributed to the funding and subsequent set up of a National Pharmacy Simulation Faculty within NHS Scotland. It also led to further funding for subsequent courses in 2021/22 which were delivered in NHS Highland, NHS Ayrshire & Arran, NHS Lothian and NHS Orkney.

Capacity Building Impact – The evaluation presented outlined the improvement in confidence and competence of the participants.

Academic Impact - the PhD candidate was then able to build upon this initial simulation research by supporting a local Lead Pharmacist (Lyndsay Steel) with a successful application for a Scottish Clinical Academic Fellowship application and secondment into the Highland & Islands Pharmacy Education & Research (HIPER) academic unit (the new incarnation of HPERC) which the PhD Candidate directs. The PhD Candidate is now working with the HEI as an advisor on that research programme. The subject for the subsequent research being an evaluation of the simulation programme with a focus on tolerance of ambiguity by pharmacists when making clinical decisions. Lyndsay is expected to submit for an MRes later this year and is looking to develop this further by undertaking a PhD in simulation following on this work.

6.2.5. Conclusions and linkage to programme of research

This research is focused on using the SBE to enable the development of patient-facing pharmacist clinicians in general practice to the advanced level. There are several differences and similarities from the research presented in Chapter Three (PLC) and Chapter Four (IPE). In this research, participants are practicing senior pharmacists, and so are embedded in clinical settings and teams, negating the need for an experiential learning environment. However, regardless of whether within the experiential or real-life clinical environment, there is not always the ability to control clinical workflow and presentations to address bespoke learning objectives. This is where SBE is particularly advantageous. In one afternoon, these GPCP participants experienced a designed and curated set of clinical presentations that, while common in GP, could not be ensured during an experiential placement. There is also commonality between the research presented in this chapter with the PLC and IPE research. Specifically, the observation of practice and feedback which simulation delivers was also coveted by this group of participants. It seems that the opportunity to have the application of your knowledge, skills and behaviours observed, then be given the opportunity to reflect, is universal to all levels of practice across a variety

of educational modalities.

6.2.6. Output citation

Rushworth GF, Innes C, Macdonald A, MacDonald C, McAuley L, McDavitt A, Stewart F, Bruce R. Development of innovative simulation teaching for advanced general practice clinical pharmacists. *International Journal of Clinical Pharmacy*. 2021; 43: 817-824. https://doi.org/10.1007/s11096-021-01305-3

International Journal of Clinical Pharmacy
https://doi.org/10.1007/s11096-021-01305-3

ESCP BEST PRACTICE

Development of innovative simulation teaching for advanced general practice clinical pharmacists

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Received: 21 April 2021 / Accepted: 27 June 2021

Abstract
Background. Advanced General Practice Clinical Pharmacists (GPCPs) are expected to manage patients by undertaking clinical assessment then make safe, competent autonomous decisions. Simulation provides a safe learning environment to develop clinical skills, but is rarely used for postgraduate pharmacist development. *Aim*. Design and deliver innovative simulation teaching to support Advanced GPCPs in Scotland. *Setting*. General Practice. *Development*. Experienced clinical pharmacy educators designed a simulation day with ten scenarios based on general practice clinical presentations. Learning objectives were mapped to the National Advanced GPCP competency framework. *Implementation*. Simulation took place at the National Skills Education Hub, Louisa Jordan National Hospital, Glasgow, November 2020. Participants were briefed prior to each immersive simulation. Mannequins were used if clinical signs were expected to be identified on examination. Verbal and written feedback was given after each simulation. *Evaluation*. Pre and post simulation questionnaires were developed. Increase in confidence and competence were reported in all areas pertaining to application of consultation and clinical skills. Qualitative comments from the participants regarding the training course were also favourable with respondents highlighting the value of the training, especially in terms of developing confidence via the real-time feedback. *Conclusion*. This innovative simulation evaluated as being of value to GPCPs in developing clinical confidence and competence when dealing with a variety of typical General Practice scenarios. Plans are underway to establish a Scottish Pharmacy Simulation Faculty which could support this training in each health board.

Keywords Clinical pharmacy · Education and Training · General Practice · Simulation

Facilitators to best practice

- Faculty—suitably trained staff with experience of simulation teaching techniques, including how to deliver feed- back, is essential.
- Faculty—suitable clinical experience of facilitators is thought to enhance the learning experience for participants.
- Clear aims of clinical practice set out within a nationally approved Advanced Practice Framework

Barriers to best practice

- Funding—clinical simulation teaching of this sort is relatively expensive.
- Service infrastructure in terms of a simulation suite is required.
- Travel—this course was run in the largest Scottish city but the Faculty to deliver it came from some of the most remote parts of the Highlands & Islands. A strategy to develop local expertise to deliver courses locally is being developed.

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Background

In 2013, the Scottish Government put into policy the need for clinically-focused pharmacists working in primary care [1]. Subsequent Government strategy [2] and funding [3] has further supported the roll out of General Practice Clinical Pharmacists (GPCPs) into every General Practice in Scotland. The general duties of GPCPs and the wider pharmacy team are set out in the *Pharmacotherapy Service* section of the General Medical Services contract for primary care [3] where the *Service* is comprised of three general roles: (1) medicines reconciliation, acute and repeat medicines systems and prescribing; (2) medication review and optimisation; and (3) polypharmacy clinics based on National Polypharmacy Guidance [4] and other specialist clinics (e.g. chronic pain, heart failure etc.). However, a 2018 national evaluation of pharmacy teams working within GP practices within Scotland showed that while 69.7% (n = 274) of GPCPs were independent prescribers, only 58.8% (n = 231) of GPCPs engaged in patient-facing service delivery [5].

To enable pharmacists to undertake this work safely, a commitment was made by the Scottish Government that GPCPs should be credentialed. This work has been undertaken by NHS Education for Scotland (NES) Pharmacy, who commissioned a multidisciplinary team to develop an Advanced Framework [6] which is mapped to the Royal Pharmaceutical Society's Advanced Practice Framework [7]. The Framework has been supported by the Royal Pharmaceutical Society and Royal College of General Practitioners in Scotland [8]. GPCPs in Scotland use it to support their learning and development in practice, primarily through gathering of evidence in the form of supervised learning events including: mini-clinical examination (MiniCEX), case-based discussion, clinical examination & procedural skills, patient satisfaction questionnaire, team assessment of behaviour and a clinical skills log.

There has been a significant change in expectation around autonomous clinical practice placed on pharmacists since the inception of the GPCP role. Due to the nature of how care is delivered in general practice (principally a patient- to-clinician consultation model) there is a need for GPCPs to work in a predominantly autonomous manner. It would be inefficient, for example, if GPCPs were unable to manage patients independently, requiring either to seek GP advice during the consultation to inform the management plan, or to refer the patient to a subsequent GP appointment—resulting in inconvenience for patients and increased workload for GPs. To autonomously manage patients safely has required GPCPs-in-training to develop a new augmented skill set incorporating greater clinical assessment skills than their predecessors. These skills include more advanced clinical consultation, history taking, procedural and examination skills. In addition to the technical ability to conduct these tasks there is the need for GPCPs to apply critical evaluation skills in the context of the presentation or clinical situation. They are required to make informed clinical decisions, taking into account the patient's ideas, concerns and expectations, while balancing these with clinical risk and uncertainty. The breadth of complexity a GPCP can independently manage by expertly exhibiting such skills and behaviours, whilst autonomously applying their clinical therapeutic knowledge, will largely determine how advanced their practice is.

Meeting this demand in a rapidly changing and advancing clinical field becomes a challenge for educators. The traditional way of teaching and training pharmacists is by predominantly knowledge-based academic and theoretical coursework submissions, supported by direct observation of clinical practice by way of a portfolio. This will not necessarily be enough to ensure GPCPs have the skills, knowledge and behaviours required to meet this new expectation. Increasing time in clinical practice may increase the likelihood of exposure to clinical scenarios, but it does not guarantee it. Innovative means of meeting the educational requirements of GPCPs need to be explored to meet the breadth of clinical complexity which GPCPs are expected to manage within the clinical environment which the GPCP is required to practise in.

Simulation has been used extensively in medical teaching to provide a safe learning environment for doctors-in-training to refine their skill set in the management of patients. There is a spectrum of sophistication employed in the delivery of simulation educational experiences—these can range from synthetic body parts to complex clinical human factor interactions involving simulated patients (actors) in simulated environments [9]. Critical to the effectiveness of the training is the establishment of fidelity, which is the term used to describe the similarity of the simulated procedure/ interaction with the real-life comparator. Simulation has been shown to be effective in delivering learning outcomes for complex interactions across a wide variety of clinical and care settings [10].

Simulation has been used in clinical pharmacy teaching before and is thought to complement taught material from the undergraduate curricula [11, 12]. It has been found to be useful in teaching specific clinical scenarios to pharmacy students including drug-induced dyspepsia [13] and critical care [14]. A recent scoping review of simulation-based skills assessment for pharmacists found a limited evidence of use of simulation in this regard and noted an underutilisation of the potential of simulation in pharmacy education [15]. Furthermore, Lloyd et al. [16] in their excellent paper covering simulation-based training applications in clinical pharmacy, found the evidence supporting simulation in pharmacy training is lacking. More research is needed to ascertain the place

of simulation training of pharmacists at advanced level, as well as in evolving GP clinical roles.

Aim

To design and deliver an innovative simulation course to support the development of advanced GPCPs in clinical assessment and management of patients in General Practice.

Development

The learning objectives for the course were developed by the Highland Pharmacy Education & Research Centre (HPERC) team. These included: (1) develop confidence and demonstrate competence in clinical assessment, management, prescribing and consultation skills over a range of common clinical encounters within General Practice including; long-term conditions, acute presentations, polypharmacy and multimorbidity, acute-on-chronic presentations, interpreting blood tests and medicines reconciliation; (2) show how supervised learning events can be used effectively to sup- port GPCP development through the NES GPCP Advanced Framework.

The HPERC Faculty designed the clinical simulations in advance to meet these learning objectives. These were written in a standard format using a case scenario proforma which included: information for pharmacist participants (scenario synopsis, past medical history, medication, or other relevant details); information for simulated patients (scenario synopsis, opening line, ideas concerns & expectations; behaviour; specific responses if asked; any specific clothing or props; moulage); clinical information for facilitators and simulated patients (given as a standard full clinical history); facilitator's guide for assessment (expectation of pharmacist assessment; expectation of investigation plan; management plan; consultation & interaction with patient). Each scenario was mapped to the NES GPCP Advanced Framework such that the composite of all clinical scenarios was designed to cover as many different presentations and competencies as possible. MiniCEX from the NES GPCP Advanced Framework were used to give written feedback to the participant on their performance after the event. All members of the HPERC Faculty have portfolio posts which include clinical, as well as education & training components which were critical to attaining fidelity of the scenario to real practice.

Scenarios were based on typical General Practice type presentations/consultations that are covered under the auspices of the NES GPCP Advanced Framework. Scenarios included: new presentation of atrial fibrillation (see supplementary material); asthma review; frailty in a nursing home patient and ceiling of care towards end of life discussions; medication review within a GP practice; acute asthma exacerbation; symptomatic uncontrolled diabetes; chronic pain review; care home medication review; polypharmacy and the frail elderly; and cardiovascular risk management in type 2 diabetes.

Invitations were sent out by NES to all GPCPs registered on the national training pathway and recruitment to the course was completed via an online booking portal. NES staff and HPERC Faculty collaborated extensively prior to the event to ensure the appropriate equipment and room set up was available on the day. Standard medical equipment including; sphygmomanometer, thermometer, pulse oximeter and stethoscopes were available at all stations. In two stations, where the scenario determined a need for cardiorespiratory examination, the SimMan® mannequin was used to maintain fidelity of the simulation. This mannequin can generate specific examination signs—such as wheeze chest sounds for pulmonary auscultation in the acute asthma simulation, and an irregularly irregular pulse and heart sounds in the atrial fibrillation simulation.

The corresponding author (GR) led the course and undertook the briefing and de-briefing sessions. Simulated patients were used to role play at each station based on the clinical case scenarios which were developed by the HPERC Faculty. All scenarios were tested for face validity with a team of experienced clinical pharmacists and educationalists prior to running the training. Each scenario was designed on a proforma to ensure consistency between different simulations. It had been planned to recruit simulated patients from volunteer members of the public, but due to the COVID restrictions locally, this was not possible, so members of NES and HPERC Faculty were required to undertake this role. In addition to having a simulated patient at each station, there was also a facilitator from HPERC Faculty present. They observed the consultation and provided a micro-debrief at the end of the consultation. During the live simulation, the GPCP could request the facilitator to play the role of a Clinical Supervisor, i.e. a more senior colleague, to provide assistance based on the clinical instructions outlined in the case scenario proforma.

Written feedback in the form of a MiniCEX from the NES GPCP Advanced Framework was offered to each participant. Participants were encouraged to submit an electronic feed-back request to the facilitator from each station. All HPERC Faculty have completed an online NES training course on how to deliver feedback in the form of a MiniCEX.

The course was split into a morning and afternoon session, with five stations per session. Ten GPCPs participated in the course. On arrival, participants were given a presentation which included an overview of the day, an orientation to the simulation suite and equipment available to them—this included an overview of the equipment at each station and how to examine SimMan®. It also explained that at each station

there would be a person playing a simulated patient and that the GPCP was expected to communicate with the simulated patient as if they were a real patient. It was explained that the simulated patient may be examined after consent was gained. Clinical protocols and additional information were available, and GPCPs were informed that this could be requested from the facilitator during the simulation.

The group was divided into pairs, with each pair rotating through the five stations during each session. One was to take the lead at each station, alternating between each station, such that by the end of the course, each GPCP had experience of leading on five consultations. The GPCP not leading at each station would observe the lead GPCP undertaking the consultation and were asked to observe and reflect on the behaviours they observed, and consider how these differed from their own perceived skill set. The GPCP was given a clinical scenario synopsis to read at the start of the simulation. Each simulation lasted 20 min—at the end of this the GPCP leading the simulation gave the facilitator a handover including an overview of the clinical scenario, their assessment and management plan. There was opportunity to debrief on the clinical scenario before the groups rotated and the non-lead GPCP from the current station then became the lead GPCP at the next station. GR then conducted a meta-debrief at that end of the morning and afternoon sessions pulling out general themes on what went well for the participants and what were some of the common challenges. These were then explored in more detail before pulling out take home messages.

Implementation

The simulation took place at the National Skills Education Hub, Louisa Jordan National Hospital, Glasgow, in November 2020. The training Faculty was comprised of pharma- cists from across HPERC including various locations in the Highlands and Islands of Scotland as well as teaching staff from NES in Glasgow. In total, six HPERC Faculty and three NES staff attended. Again, due to restrictions at that time, we were unable to use simulated patients as hoped to run the event. We were therefore reliant on Faculty role playing the simulations and for two stations, Faculty members were required to play the part of the patient as well as the facilitator.

Evaluation

Method

Pre and post course questionnaires were developed by the HPERC and NES teams. The training was evaluated broadly based on levels 1 and 2 of The Kirkpatrick Model, [17] where level 1 describes the degree to which participants find the training engaging and relevant, and level 2 describes the degree to which participants acquire the intended knowledge and confidence based on their participation in the training.

Questionnaires were designed to capture quantitative and qualitative data on using simulation as a training intervention and measuring perception of confidence and competence in consultation, decision making and clinical skills pre and post training.

Results

Ten participants (100%) completed the pre course questionnaire and seven (70%) completed the post course questionnaire. Three participants were lost to follow up despite repeated invites to complete the post course questionnaire.

Figures 1 and 2 show that, of the 30 questions relating to self-rated confidence and competence for clinical, consultation and decision-making skills, there was an improvement in the scores for 28 questions and the final two questions were neutral.

All participants reported they would be able to use the course attendance as evidence for their NES GPCP Advanced Framework portfolio.

Figure 3 shows that despite > 40% of participants never having experienced simulation before, that simulation was perceived as a useful training intervention with all the participants strongly agreeing that they would like to participate in further simulation. Participants also strongly agreed with the statement that simulation increased confidence and competence in clinical practice.

There was favourable qualitative feedback as evidenced below:

- Each simulation was in a different clinical area and, while I felt quite anxious about this initially, as they were not all conditions I would have said I felt confident prescribing in, it was actually fantastic. I think it made us all realise that we know more than we think about most clinical areas and that is a real confidence boost. Having access to a clinical supervisor also helped with this as you recognised the remit of your own knowledge. I've reflected a lot on the training day and I really feel it is one of, if not the, most valuable training [courses] I have been on to date. The environment was very supportive. I will definitely feel more confident branching out into other clinical areas than I would have in the past. [Participant 1: *how to utilise a clinical supervisor to push the scope of clinical practice*].
- Having a safe environment to practice consultation and clinical assessment skills was highly valuable. Being given direct in-the-moment feedback was beneficial as it allowed for reflection of your consultation while fresh

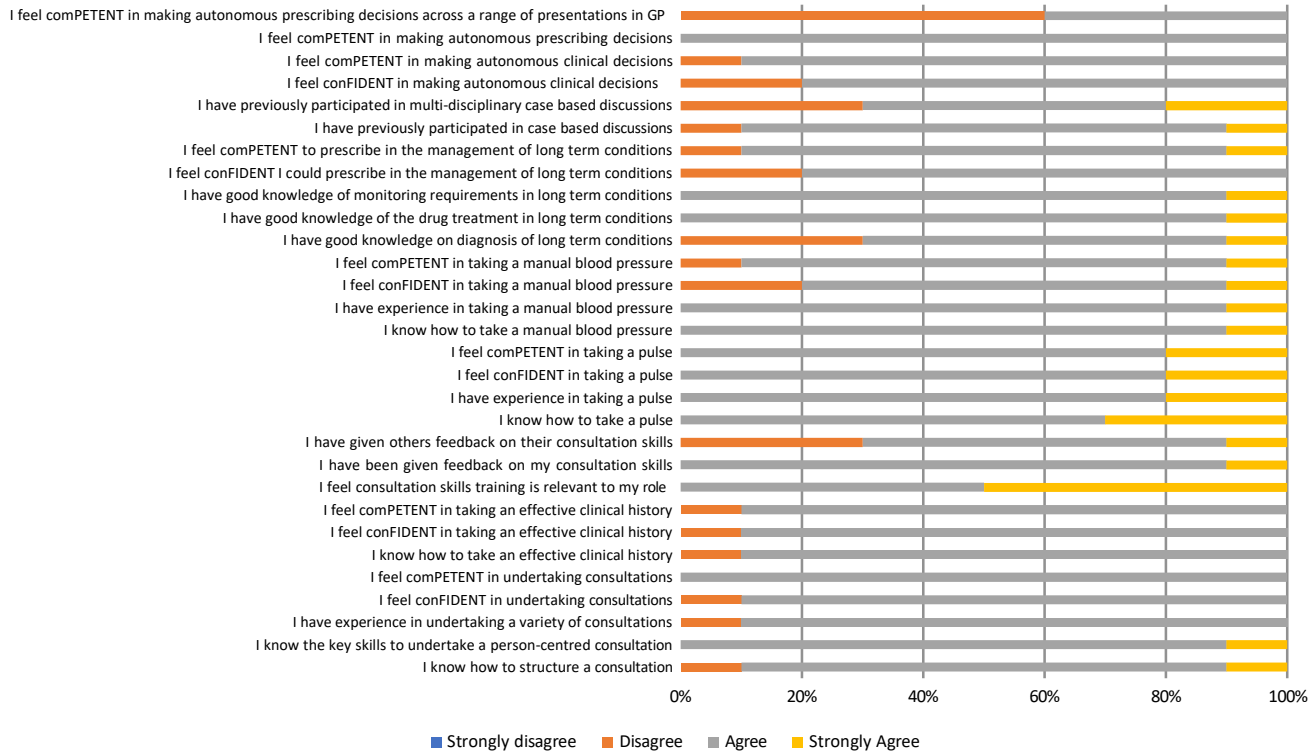

Fig. 1 Pre-simulation clinical, consultation and decision-making skills questionnaire results (n=10)

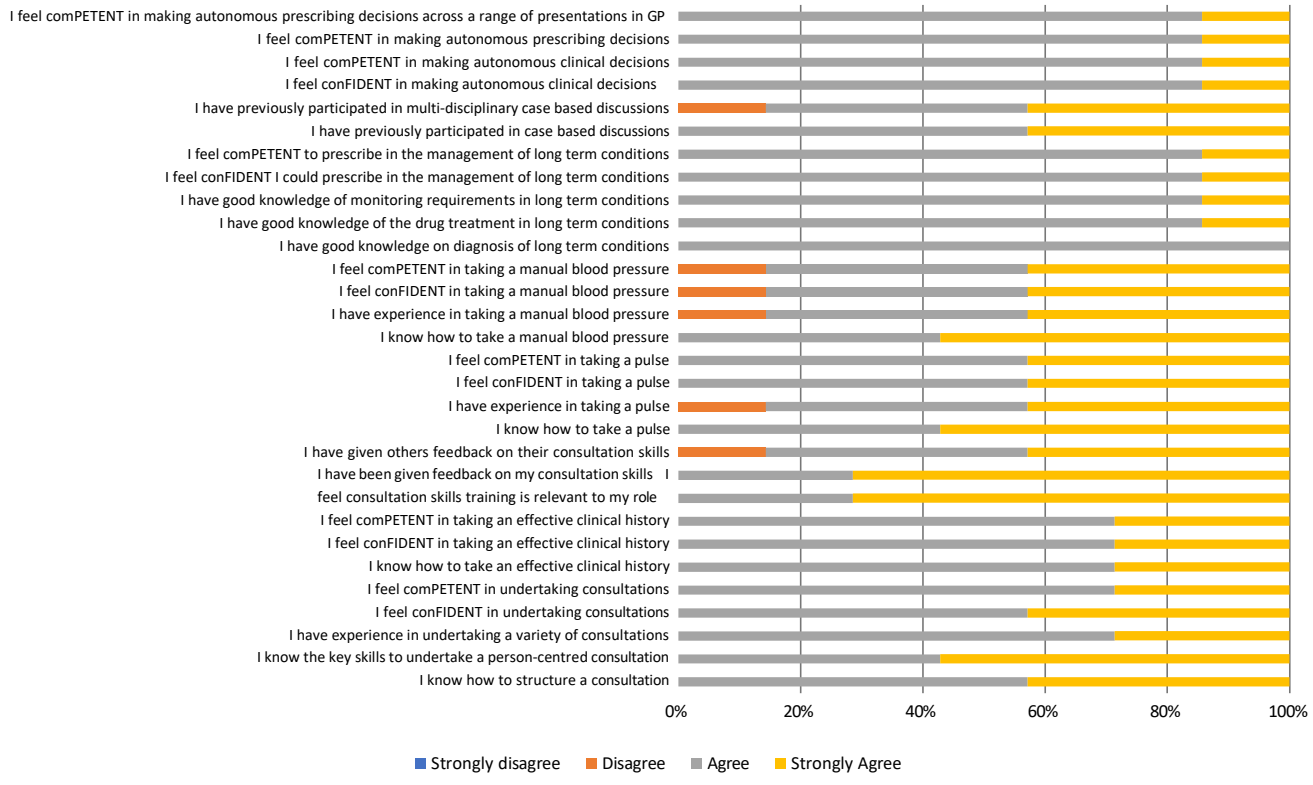

Fig. 2 Post-simulation clinical, consultation and decision-making skills questionnaire results (n=7)

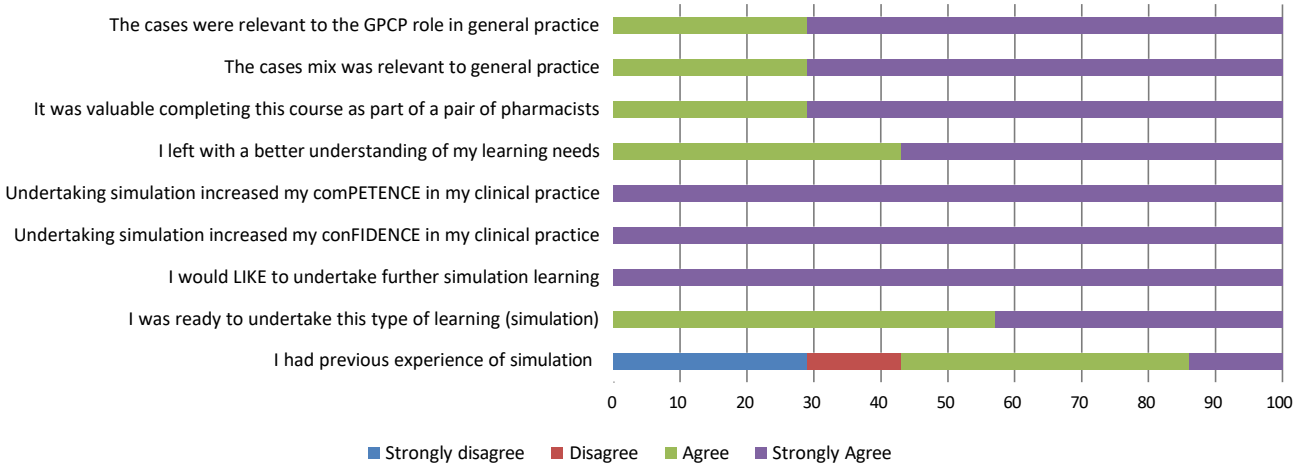

Fig. 3 Experience of simulation (n=7)

and identified further consultation skills and learnings relating to your recent consultation. [Participant 3: *benefit of a simulation environment to practice advanced skills*].

- I feel if something like this was completed early in Pharmacist's journey through the framework it would provide them with confidence and take away some of the fears of the unknown. [Participant 5: *benefit of simulation in development of clinical confidence*].

Discussion

Pre-simulation confidence and competence in clinical practice was high among participants – this is expected in an advanced GPCP cohort. However, despite the potential for a ceiling effect, there was still a clear increase in participants' self-reported post-simulation confidence and competence across a range of consultation and clinical skills. In particular, there was a positive shift in the confidence of GPCPs to make autonomous prescribing decisions across a range of General Practice presentations. The clinical supervisor was seen as a facilitator to GPCPs developing their confidence and stretching their decision-making. These were the key learning objectives of the course. In general, there was also strong agreement as to the benefit of simulation where all respondents expressed a strong desire to have future simulation experiences.

Advanced pharmacist practice is changing: there is growing expectation that the role of the clinical pharma- cist now include the autonomous assessment, investigation, diagnosis and management (including prescribing) for complex patients [18]. There is a need to adapt clinical pharmacist training – from undergraduate through advanced pharmacist programmes—to encompass more simulation and preceptored experiential learning in practice (i.e. utilising effective clinical supervision) to stretch the confidence, and ensure the competence, of the next generation of advanced pharmacists [19]. A recent sur- vey by the International Pharmaceutical Federation (FIP) comprising 48 countries reported that frameworks sup- porting advanced practice are currently available, or are in development, in 28 countries worldwide [20]. The development of effective pharmacy simulation should be seen as essential to the effective and safe development of advanced pharmacist practice globally.

Simulation of this type consumes a lot of Faculty time before, during and after the course to ensure the content is appropriate to meet the aims and learning objectives and that the course itself runs smoothly [16]. While funding is a prerequisite for any new education and training activity, there needs to be recognition from service and education and training providers of the increased costs associated with this type of activity as a result of the Faculty required to run the event. Also, specialist units and clinical skills centres (while not necessarily essential for these types of scenarios) are well placed, through experience, to run these types of sessions; however, access to these types of units normally comes at a higher cost.

HPERC developed a Faculty of local clinical educators and worked with the national education provider, NES, to deliver this event. It is essential that any future roll out of this type of event look to develop that Faculty and link with NES.

Simulation as a teaching and training tool is discernibly different from a simulated assessment—i.e. an Observed Structured Clinical Examination. There is a need to draw this distinction among the pharmacist workforce in Scotland to ensure that participation on a course such as this is seen

by participants as being about their own individual learning, rather than assessment.

Evaluation of a new training system should start with Level 1—reaction analysis—using the Kirkpatrick model. This should be developed over time after securing additional staffing and funding resources to explore more in- depth evaluation on the impact of the learning (Level 2) then the impact on behaviour change for the individual (Level 3) and ultimately looking at the impact of the outcomes of the composite of the change (Level 4) [17]. HPERC have been successful in a bid for a clinical academic to be recruited to undertake some of this work to develop and further evaluate the simulation programme. A change will be made to the simulation programme for future iterations such that completion of the post-assessment would become a compulsory requirement for successful completion of the course.

HPERC and NES are currently working with other pharmacy clinical educators from across Scotland, as well as the Scottish Centre for Simulation & Clinical Human Factors to develop a Scottish Pharmacy Simulation Faculty (SPSF). The hope is to bring together a group of individuals from across the country with the knowledge, skills and experience to roll out validated pharmacy simulations across the country. As a prerequisite to joining the SPSF, each educator will be offered either a one-day or two-day training course to upskill them in the design and delivery of a simulation course, particularly in the skills surrounding the debrief model.

As part of the development of the SPSF, there is a need to consider how to train pharmacists in the various different sectors, as well as levels, of practice—from student pharmacists on placement, through pre-registration and newly qualified, to advanced pharmacists. Beyond this, the authors think it essential to look to develop novel and innovative interprofessional learning simulations utilising the wider multidisciplinary team. There is a need to develop the educator team within the SPSF to ensure that all the sectors are represented and also consider the geographical spread of representation across Scotland. In part, some of this will be achieved by adoption of a simulation course, such as this, for national roll out by the SPSF. Ongoing funding is required to ensure continuity of service but what has become apparent is the need for such a Faculty to exist to take forward, in a considered and collaborative manner, simulation training for the pharmacy profession in Scotland.

Conclusion

This innovative simulation evaluated as being of value to GPCPs in developing clinical confidence and competence when dealing with a variety of typical general practice scenarios. It supported the development of advanced GPCPs in clinical assessment and management of patients in general practice and in doing so met the aim and learning objectives of this course. This course has since been recommissioned and a funding for a clinical academic pharmacist has been secured to undertake more extensive evaluation of the impact of simulation in advanced pharmacist training.

Acknowledgements The authors would like to acknowledge the following groups and organisations for their help with the set-up, design and delivery of this course: staff of the Louisa Jordan National Hospital for their assistance in the set-up of this course; Robert Gordon University School of Pharmacy & Life Sciences, NES, NHS Highland & NHS Shetland for releasing teaching staff to participate in the design and delivery of the course.

Funding Funding for the development of this course was given by NES. Funding for the delivery of this teaching was given by NES and the HPERC.

Availability of data and material All data and materials are available from the corresponding author upon reasonable request.

Conflicts of interests None.

Ethical approval Was not required as no patient data were used in this publication.

References

1. The Scottish Government. Prescription for excellence: a vision and action plan for the right pharmaceutical care through integrated partnerships and innovation. Edinburgh: The Scottish Government; 2013.
2. The Scottish Government. Achieving excellence in pharmaceutical care: a strategy for Scotland. Edinburgh: Scottish Government; 2017.
3. The Scottish Government. The 2018 General Medical Services Contract for Scotland. Edinburgh: Scottish Government; 2017.
4. Scottish Government Polypharmacy Model of Care Group. Polypharmacy Guidance, Realistic Prescribing. 3rd Ed ed. Edinburgh: Scottish Government; 2018.
5. Stewart D, Bennie M, MacLure K, Newham R, Cunningham S, Bruce R, et al. Evaluation of pharmacy teams in GP practice. 2018; https://pure.strath.ac.uk/ws/portalfiles/portal/88119819/Stewart_Bennie_etal_RGU_University_of_Strathclyde_2018_Evaluation_of_Pharmacy_teams.pdf. Accessed June/8th, 2021.
6. NHS Education for Scotland. General Practice Clinical Pharmacist: Competency and Capability Framework. 1st ed. Edinburgh: NES; 2016.
7. Royal Pharmaceutical Society. Advanced Practice Framework. 2013; Available at: https://www.rpharms.com/resources/frameworks/advanced-pharmacy-framework-apf. Accessed 02/02, 2021.
8. Royal College of General Practitioners Scotland, Royal Pharmaceutical Society Scotland. RCGP Scotland and RPS Scotland Joint Statement: Breaking down the barriers - how pharmacists and GPs can work together to improve patient care. Available at: http:// www.rpharms.com/current-campaigns--scotland-pdfs/rpsscotlan drcgpjointstatement.pdf. Accessed Feb/24th, 2014.
9. Bradley P. The history of simulation in medical education and possible future directions. Med Educ. 2006;40:254–62.

10. McGaghie WC, Issenberg SB, Petrusa ER, Scalese RJ. A critical review of simulation-based medical education research: 2003– 2009. Med Educ. 2010;44:50–63.
11. Seybert AL. Patient simulation in pharmacy education. Am J Pharmaceut Ed. 2011;75:187.
12. Seybert AL, Smithburger PL, Benedict NJ, Kobulinsky LR, Kane- Gill S, Coons JC. Evidence for simulation in pharmacy education. J Am Coll Clin Pharm. 2019;2:686–92.
13. Branch C. Pharmacy students' learning and satisfaction with high-fidelity simulation to teach drug-induced dyspepsia. Am J Pharmaceut Ed. 2013;77(2):30.
14. Reape A, Lips-Nassif C, Bailey L, Ashwell P, Brown D. The use of human patient simulators for teaching UK pharmacy students about critical care. Pharm Ed. 2011;11:1–7.
15. Croft HA, Glass B, Gilligan C, Rasiah R, Levett-Jones T. Integrated simulation-based skills assessment for evaluating pharma- cist competence: A scoping review. Pharm Ed. 2019;19:381–96.
16. Lloyd M, Watmough S, Bennett N. Simulation-based training: applications in clinical pharmacy. Pharm J. 2018;10. https://pharm aceutical-journal.com/article/research/simulation-based-training- applications-in-clinical-pharmacy
17. Kirkpatrick DL, Kirkpatrick JD. Evaluating training programs: the four levels. 3rd ed. Oakland: Berrett-Koehler Publishers; 2006.
18. Terry D, Ganasan S, Aiello M, Huynh C, Wilkie V, Hughes E. Pharmacists in advanced clinical practice roles in emergency departments (PARED). Int J Clin Pharm. 2021. https://doi.org/ 10.1007/s11096-021-01275-6.
19. Forsyth P, Rushworth GF. Advanced pharmacist practice: where is the United Kingdom in pursuit of this 'Brave New World'? Int J Clin Pharm. 2021. https://doi.org/10.1007/s11096-021-01276-5.
20. Bates I, Bader LR, Galbraith K. A global survey on trends in advanced practice and specialisation in the pharmacy workforce. Int J Pharm Pract. 2020;28:173–81.

7. CHAPTER SEVEN: ADVANCED CLINICAL EXAMINATION & ASSESSMENT (ACE) COURSE

7.1. Chapter introduction

The pharmacist profession is evolving. Part of that evolution is the expansion of the clinical role of the pharmacist. The PhD candidate has expounded their thinking on the advanced pharmacist role within the *Brave New World* commentary (Chapter Five). The use of SBE in the development of advanced GPCPs has been discussed in Chapter Six. While Chapter Six focused on the application of pre-existing knowledge and skills in participants who self-identified as advanced, this chapter looks to identify potential behavioural determinants influencing the implementation of skills gained from a taught course. Advanced Clinical Examination & Assessment (ACE) courses have been used by other professions to upskill them for advanced clinically autonomous roles where they are able to undertake assessment without supervision, then make decisions based upon findings, often when there is risk and uncertainty. The ACE course comprises of taught elements, time in supervised practice developing a portfolio of evidence, and a summative OSCE.

7.2. ACE course skills implementation for GPCPs

7.2.1. Research objective

To explore potential behavioural determinants influencing the implementation of skills gained from Advanced Clinical Examination and Assessment courses by General Practice Clinical Pharmacists.

7.2.2. Overview of the research and summary of findings

Data was captured between June - August 2021. The work used an interpretivist philosophy and qualitative methodology with theoretical underpinning using the TDF. Seven dyadic (paired) interviews were conducted. Three main themes were identified: 1. Factors influencing implementation of advanced clinical skills by pharmacists; 2. Social and environmental influences affecting opportunities for pharmacists in advanced clinical roles; 3. Perceptions of pharmacist professional identify for advance practice roles. The work identified numerous behavioural determinants related to the implementation of advanced clinical skills including: the course supported clinically autonomous practice; frustration around social and environmental factors limiting implementation causing alienation; need for clarification of professional identity/roles.

7.2.3. Originality

To-date there is little in the literature to support the specific development of advanced pharmacist practice within general practice. This research sought the experiences of the first 14 pharmacists working in general practice across NHS Scotland who had completed an ACE course. These individuals are all at the cutting-edge of pharmacy practice within NHS Scotland. The PhD candidate was the lead for this research.

7.2.4. Impact

Conceptual Impact - this publication was tabled at a meeting of the NHS Scotland Advanced Pharmacist Practitioner (APP) Short-life Working Group – a group set up to consider the need and implications of establishing APP-level practice within NHS Scotland. The group felt that the paper should be included as part of its final report (see Appendix 2). The final report has now been ratified by the NHS Scotland Pharmacist Post-Registration Strategic Group as well as the NHS Scotland Advanced Pharmacist Group. The former is looking to draft policy for Scottish Government as to the establishment of APPs within NHS Scotland and will be fundamental in informing policy decisions.

Instrumental Impact - The lack of opportunity to practice ACE skills on course completion, causing alienation, has been picked up by Director of Pharmacy colleagues within NHS Scotland. Beyond this, the PhD candidate was invited to join a collaborative group comprised of other accredited Consultant Pharmacists, the International Pharmaceutical Federation (FIP) CEO, the President of the Guild of Healthcare Pharmacists, Senior Pharmacy Educationalists, and a Reader in Philosophy from the University of Edinburgh to produce a paper on values-based, four pillar practice by pharmacists – called the *Collaborative Care Model* (Forsyth et al. 2023). This work featured in that paper and was used to evidence the disconnect between values and implementation of advanced clinical practice by pharmacists as clinicians.

Further work citation: Forsyth P, Radley A, **Rushworth GF**, Marra F, Roberts S, O'Hare R, Duggan C, Maguire B. The Collaborative Care Model: Realizing healthcare values and increasing responsiveness in the pharmacy workforce. *Research in Social and Administrative Pharmacy*. 2023; 19(1): 110-22. https://doi.org/10.1016/j.sapharm.2022.08.016

7.2.5. Conclusions and linkage to programme of research

The modality of learning in this innovation was different from the others within the thesis. This was a formal taught course over many months. However, again there were similarities with the outcomes from Chapters Three, Four and Six in that they all reported an increase in confidence and competence in the practical application of their skills, regardless of the level that they worked. While the participants in Chapter Three (PLC) and Chapter Four (IPE) noted that they felt more confident in the application of the skills learnt from their placements, and more enthusiastic about a postgraduate career, it is notable that they were still SPs at the time of research. The research presented in this chapter reports on pharmacists who are already working as a pharmacist where they would hope to apply their newly augmented skillsets. There was frustration at the numerous barriers to implementation of the new skills. An outstanding question, therefore, is whether SPs exposed to the placements outlined in this thesis, would become equally frustrated upon graduation, should they be unable to find opportunities to utilise the skills learnt on the placements.

7.2.6. Output citation

Rushworth GF, Jebara T, Tonna AP, Rudd I, Stewart F, MacVicar R, Cunningham S. General Practice Pharmacists' implementation of Advanced Clinical Assessment skills: a qualitative study of behavioural determinants. *International Journal of Clinical Pharmacy*. 2022; 44: 1417-1424. https://doi.org/10.1007/s11096-022-01484-7

International Journal of Clinical Pharmacy
https://doi.org/10.1007/s11096-022-01484-7

RESEARCH ARTICLE

General practice pharmacists' implementation of advanced clinical assessment skills: a qualitative study of behavioural determinants

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Received: 31 May 2022 / Accepted: 3 September 2022

Abstract

Background The role of General Practice Clinical Pharmacists is becoming more clinically complex. Some are undertaking courses to develop their skillsets.

Aim To explore potential behavioural determinants influencing the implementation of skills gained from Advanced Clinical Examination and Assessment courses by General Practice Clinical Pharmacists.

Method This study used a qualitative methodology with theoretical underpinning. General Practice Clinical Pharmacists in the Scottish National Health Service, having completed an Advanced Clinical Examination and Assessment course, were invited for online dyadic (paired) interviews. Informed written consent was obtained. The interview schedule was developed using the Theoretical Domains Framework and piloted. Interviews were recorded, transcribed verbatim and analysed using a framework analysis. Ethics approval was obtained.

Results Seven dyadic interviews were conducted. These included fourteen pharmacist participants from eight Health Boards. Three main themes were identified: 1. Factors influencing implementation of advanced clinical skills by pharmacists; 2. Social and environmental influences affecting opportunities for pharmacists in advanced clinical roles; 3. Perceptions of pharmacist professional identity for advanced practice roles. Nine sub-themes provided a depth of insight including; participants reporting courses allowed clinically autonomous practice; participants shared frustration around social and environmental factors limiting implementation opportunities; participants expressed a need for clarification of professional identify/roles within current contractual mechanisms to allow them to fully implement the skills gained.

Conclusion This work identified numerous behavioural determinants related to implementation of advanced clinical skills by pharmacists in general practice. Policy, and review of implementation strategies are urgently required to best utilise pharmacists with these skills.

Keywords Advanced pharmacist practitioner · Advanced practice · Behaviours · General practice · Pharmacy

Impact Statements

- Advanced Clinical Examination & Assessment (ACE) courses and the skills gained increase General Practice Clinical Pharmacist (GPCPs) confidence in relation to implementation of knowledge, skills and behaviours required to deliver advanced pharmacist practice.
- ACE courses would seem key to development of a versatile Advanced Pharmacist Practitioner (APP) workforce in General Practice with potentially significant impacts for delivery of primary care services.
- While ACE courses provide skills acquisition for advanced clinical assessment, training programmes are

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Published online: 10 October 2022

needed to triangulate and embed these skills and so support transition to autonomous APP-level practice.
- Policy, and review of implementation strategies are urgently required to ensure pharmacists that have gained advanced clinical assessment skills can provide advanced clinical care to patients in support of existing healthcare services.

Introduction

The role of qualified pharmacists continues to evolve and expand. To support and sustain progression of practice there is an obvious need to simultaneously develop educational programmes and governance structures to ensure safe and effective care delivery. A recent global survey of country members of the International Pharmaceutical Federation (FIP) reported that advanced pharmacy practice frameworks were in use, or are being developed, in 58% (28/48) of those countries [1]. Despite this, there continues to be high levels of variance as to what would constitute advanced pharmacist practice, even within individual countries [2].

Legislation offers qualified pharmacists the opportunity to function as prescribers in certain parts of the world—in particular; some provinces of Canada [3], United Kingdom (UK), some states of the United States of America (USA) [4] and South Africa [5]. The degree of prescribing autonomy and independence which pharmacists are offered across the world varies in the extreme—from no prescribing rights, through supplementary/complementary prescribing, to independent autonomous prescribing. Within the UK, from 2026 onwards, all newly qualified pharmacists will have legal independent prescribing rights at point of registration [6]. Therefore, in the UK, the right to prescribe itself will not be considered advanced practice. Supporting this concept, the Royal Pharmaceutical Society (RPS) have included independent prescribing in their recently published Post-Registration Foundation Curriculum which sets the standard for entry-level pharmacists in the UK [7].

Advanced pharmacist practice, therefore, is some- thing different, expanding beyond prescribing. Forsyth & Rushworth have set out an opinion of what constitutes an advanced pharmacist role [8]. Central to this is the ability to make autonomous prescribing decisions where there is risk and uncertainty and where there is a limited evidence base. They go on to note that the advanced pharmacist should be able to act upon their own clinical assessment findings and investigate, diagnose, prescribe (where necessary) and manage patients through full episodes of care. The standards expected at this level of practice are set out within the RPS Core Advanced [9] and Consultant [10] Curricula.

If patients and the public are to be assured of the quality of the prescribing pharmacist clinician workforce, then Governments, Regulators, service providers and educational bodies need to consider how to equip pharmacists with the necessary additional clinical skillsets. The Chief Nursing Officer for the Scottish Government has written policy to support the requirements for working as an Advanced Nurse Practitioner (ANP) in a variety of care settings [11, 12]. As part of the educational governance for these roles, all ANPs are required to complete a Master's level advanced course [13]. Advanced Clinical Examination & Assessment (ACE) courses are taught as modules within these MSc programmes and teach advanced clinical history taking and clinical examination of various physiological systems i.e.: cardiovascular; respiratory; gastrointestinal; musculoskeletal; neurological; ear, nose & throat; and ophthalmology. ACE courses also teach advanced clinical decision-making, such that practitioners can act on the finding of their clinical history and examination. ACE courses are available from numerous Higher Education Institutions.

At present, advanced clinical assessment skills training is absent from most Scottish undergraduate and postgraduate pharmacy curricula and currently limited to ad hoc pharmacist experiences. Therefore, the effect of exposure to this type of training is currently poorly understood within pharmacy. The style of patient interaction within the general practice setting lends itself to autonomous clinical practice. Consultations tend to be had on a one-to-one basis, and while the wider team opinion can always be sought, it is imperative that clinicians working in primary care are able to function autonomously within this environment. General Practice Clinical Pharmacists (GPCPs) have been rolled out across the National Health Service (NHS) in Scotland to support clinical care delivery [14]. Some of these GPCPs have opted to undertake the ACE courses described above to support their transition to advanced level practice but, as yet, there has been no formal exploration of the potential behavioural determinants influencing implementation of advanced skills.

Aim

To explore potential behavioural determinants influencing the implementation of skills gained from ACE courses by GPCPs.

Ethics approval

Ethics approval was granted by the Robert Gordon University School of Pharmacy and Life Sciences ethics review committee (Approval Number: S283; 23/Nov/2020). West of Scotland NHS Research Ethics Committee confirmed NHS ethics was not required.

Methods

The research was undertaken according to an interpretivist philosophy using qualitative research methodology.

Setting

General [Family] Practice (GP) within NHS Scotland.

Sampling and recruitment

Pharmacists working in Scottish GP practices providing patient facing/clinical services as independent prescribers, having at any time previously undertaken an ACE course, were eligible to participate and included in the study. Secondary care-based pharmacists providing 'outreach' services to GP practices were excluded.

There is, to the knowledge of the project team, no single collated source of pharmacists that have completed an ACE course in Scotland. To identify GPCPs who have completed an ACE course and to ensure as many eligible participants as possible were included, Chairs or Leads for key groups representing service, education and academia in Scotland [Directors of Pharmacy; Primary Care Pharmacists Leads (SP3A); Schools of Pharmacy; NHS Education for Scot- land] were asked to email their groups with the study invite. Those interested in participating were asked to respond via email. All eligible respondents were then emailed the participant information leaflet and consent form to their work emails (TJ). If no response was received within two weeks, a reminder email was sent. If agreeing to participate, a convenient date and time for the interview was set and informed consent obtained (TJ).

Development of interview Schedule

This work was underpinned by the Theoretical Domains Framework (TDF) [15]. This summarises key elements of 33 theories and proposes that determinants of behaviour cluster into 14 domains. It was initially developed for implementation research to explore behaviours related to evidence-based medicine implementation [16]. The interview schedule was developed using the TDF [15] with those domains most relevant to the research aim and questions included (see supplementary material). The TDF was employed in all stages of the research including developing the interview schedule, analysis, and reporting of findings. The interview schedule was reviewed for face and content validity by all research team members including: pharmacists, GPs, academics and educationalists and then piloted prior to use. No changes were made so the results from the pilot were included in the final dataset.

Data collection

Dyadic interviews were conducted by a trained researcher (TJ) using video conferencing (Zoom Meeting), digitally recorded then transcribed verbatim and checked for accuracy by the research team using repeated listening and review of transcripts to ensure dependability. Data collection ran in the period of June–August 2021. Dyadic interviews were chosen over individual interviews since they allow participants to share and discuss ideas or issues [17]. They also offer more opportunity than focus groups for in-depth exploration of participant experiences, opinions and recommendations, thus enriching the data generated [18]. Participants were allocated at random to dyads—the principal link between participants was their interest in the research topic [19].

Data analysis

Framework analysis was undertaken using the TDF as the thematic framework following the steps outlined by Ritchie and Spencer [20]. All interviews were coded based on the domains of the TDF before being examined for further sub-themes within each domain. The analysis was performed by at least two independent team members (TJ and either AT, GR, or SC), with any disagreements resolved through discussion. Illustrative quotes were selected through team discussion. Data saturation was tested using the principals of the approach described by Francis et al. [21]. Initially, six interviews were completed and analysed thematically. An additional interview was then conducted and analysed to ensure that no further themes emerged. Data were man- aged using NVivo software [version 20, QSR International]. The Consolidated Criteria for Reporting Qualitative Studies (COREQ) was followed in reporting findings of this study [22].

Results

Seven dyadic interviews containing two participants each were conducted with 14 GPCPs. Participants practiced in eight of the 14 Scottish Health Boards covering approximately 74% of the Scottish population including: Greater Glasgow & Clyde; Grampian; Highland; Lanarkshire; Lothian; Orkney; Shetland; and Tayside. The mean age was 41.14 years old, 57% (n = 8) were female, and 74% (n = 10) were > 10 years post-registration. Each dyadic interview was approximately 60 min long. All pharmacists who responded to the invite were interviewed.

Three main themes were identified with a total of nine sub-themes. These are considered in turn below, with provision of illustrative quotes.

Theme1: factors influencing implementation of advanced clinical skills by pharmacists

Key sub-themes presented below are linked to the following TDF domains: Knowledge; Skills; Memory attention and decision process; Beliefs about consequences; Behavioural Regulation.

Continuum of development: the ACE course allowed participants to build on the knowledge and skills from their prescribing course and increased their self-perceived capability and confidence in implementation of autonomous clinical decision-making.

"I didn't really feel when I came out of independent prescribing qualification that I was anywhere near as confident as I am now." **– P4**

Advanced clinical skills gained: Participants noted the course completely changed their decision-making matrix in relation to clinical problems.

"Instead of seeing them as their tablets, you see them much more as a person […] just even having started the course, I'm already thinking completely differently." **– P9**

As a consequence, participants believed that it enabled them to adopt a holistic approach when reviewing patients, allowing them to provide safer care.

"[ACE skills] will allow me to manage patients more autonomously in a more holistic fashion […] will allow me to prescribe in a safer manner as I will be more aware of red flags and differential diagnosis." **– P9**

Boundaries of practice: Participants believed another consequence was that completing an ACE course highlighted their need for continued preceptored multidisciplinary (MDT) support after the course to embed the skills gained in clinical practice.

"The risk of it is that you kind of feel that I've done this now [ACE course], I shouldn't be asking any questions, or I shouldn't be utilising other people's knowledge, when actually that's absolutely not the way to be going." **– P10**

Vision for integration: Participants articulated a factor aligned to regulation of behaviours through describing the need for a clear vision to encourage greater integration of pharmacists with advanced clinical skills to capitalise on the learning and aid implementation in practice.

"[We need] clear vision of how this will be useful to others so we can get support, get buy in." **– P9**

Theme2: social and environmental influences affecting opportunities for pharmacists in advanced clinical roles

Key sub-themes presented below are linked to the following TDF domains: Environmental context & resources; Social influences.

Limited number of pharmacists in advanced practice roles: participants described the environmental context and expressed concern around limited numbers of pharmacists undertaking the course and how this might affect personal and wider professional opportunities for implementation of these skills.

"We still aren't seeing enough pharmacists through it. It's quite disappointing […] the value is clearly obvious to people who've done it, but it's not permeating through the workforce." **– P13**

"Nothing's changed since we've completed it so we're trying to forge our role." **– P4**

Course delivery modality: in relation to resources available, most participants expressed a preference for face-to-face multidisciplinary courses to aid the acquisition of practical skill, which was thought to aid implementation in practice.

"I found the mix quite good […] to learn from each other." **– P8**

"It's a course that you're looking to gain the actual clinical examination skills and that's something that's crucial to be doing in a face-to-face capacity." **– P14**

Macro, meso, and micro-level socio-institutional influences: most participants highlighted influences at a wide range of social-institutional levels describing the limited opportunities to utilise the skills learnt as obstructing the implementation. There was an indication that the reasons for this were complicated and multifarious.

"I think the new [primary care - GMS 2018 [23]] contract has probably taken us a slight step back- wards because we were really moving into the clinical patient-facing sphere in general practice, and then pharmacotherapy came forward." **– P2**

"I work in three different practices, one of them is extremely supportive, [...] At another one, I have to go and seek out support, but if I seek it out, they are willing to give it to me. And the third one isn't supportive. It's very stressful […] I'm keen and I want to do this." **– P9**

Limited understanding of what pharmacists' offer in terms of clinical service delivery following course completion was a commonly reported perception at practice, line management, Health Board and Government level.

"I think health boards have a responsibility […] to try and work […] to get that message out around 'we have pharmacists with these skills, they are going to be able to do this'." **– P10**
"I think that is what's needed, something from higher up, from Scottish Government level to promote pharmacists extended roles and what the benefits will be." **– P11**

Participants were hopeful that future changes to Government Policy would create a supportive environment for the implementation and embedding of advanced skills.

"Our work is very much aligned with the GP practice contracts. They will be influenced by Scottish Government […] I'd be quite confident that in another two/three years' time, people will be working in more advanced roles." **– P12**

Likewise, participants felt that the RPS Advanced and Consultant Curricula may influence the implementation of advanced roles in practice.

"The RPS advanced practice and consultant practice frameworks are coming along so that can be hopefully utilised to help grow that image […] There are lots of people out there that didn't really know what a pharmacist can do." **– P10**

Some had concerns about matters related to organisational governance with articulation of concerns around higher clinical risk and higher indemnity costs which could act as a barrier to implementation.

"We need to pay for indemnity and that comes out of the pharmacist's pay, it's not paid for by anybody else." **– P10**

At the micro level, participants indicated that patients were thought to be broadly supportive of new roles and so could potentially act as advocates influencing implementation.

"As long as you can deliver what they need; assessment, history-taking, plan, reassurance, they take that as they would take it from another professional." **– P13**

Theme 3: perceptions of pharmacist professional identify for advanced practice roles

Key sub-themes presented below are linked to the following TDF domains: Social/professional role and identity; Beliefs about capabilities; Emotions.
Pharmacists' professional identity in advanced practice roles: most participants expressed frustration over the currently available career options for GPCPs, which did not cater for integration of ACE course skills, leaving pharmacists feeling deflated about the future and alienated.

"We've also got a service direction that isn't necessarily pushing people into a patient-facing clinical role." **– P13** "You don't want to be sitting all day doing acutes and med rec […] you do want to be managing […] complicated, complex patients and using your prescribing skills in a much more patient focused kind of way." **– P9**

They noted a lack of understanding of their new advanced roles by other healthcare professionals and management, some of which was attributed to the lack of clearly defined roles for advanced pharmacists but affected their ability to implement.

"I've completed the course and I know what it means, but I don't necessarily think that [GPs] know what it means […] They don't have an appreciation of how they could use me." **– P6**
"I feel I didn't have support from immediate line management because they just didn't understand." **– P3**
"I feel definitions of what different pharmacists at different levels in the primary care team do hasn't really been drawn." **– P4**

Participants felt senior leadership need to define these roles to optimise utilisation of these pharmacist advanced skills.

"There was no definition of what I was supposed to be doing. I was supposed to have a clinical case load, I hadn't." **– P1**
"It needs a little bit of drive from the top, and it needs more in the way of organisation." **– P5**

Pharmacists' self-perceptions of advanced practice role: Linking to TDF domains emotions and beliefs about capabilities—the course was considered to increase pharmacists' competence and confidence. However, some participants expressed frustration about deskilling and erosion of capability, especially if they were unable to implement skills in a timely manner once qualified.

"I'm getting frustrated because, as the months go, the confidence in your own ability diminishes exponentially." **– P6**
"Not to be in a position to use [ACE skills] is incredibly frustrating […] People do this because they want to have that clinical patient facing role." **– P8**

Discussion

Statement of key findings

This work provides data on the potential behavioural determinants influencing implementation of ACE course skills in GPCPs. Key findings relate to the three main themes.

Factors influencing implementation of advanced clinical skills by pharmacists

The ACE course allowed participants to develop knowledge and advanced clinical skills capabilities beyond the scope of traditional pharmacist roles. Those able to use the skills in practice, post-course, reported managing patients with a higher degree of clinical autonomy. Participants described the need to be embedded in an MDT environment and for supervised triangulation of clinical skills and decision-making in practice to aid implementation.

Social and environmental influences affecting opportunities for pharmacists in advanced clinical roles

Participants expressed frustration about a range of factors that hindered implementation which were out with their control. There was a clear feeling that Government policy was required to support advanced pharmacist practice. To optimise the opportunity for utilisation of pharmacists' augmented advanced clinical skillsets, there is a need for senior leadership at local and national level to define and normalise these roles.

Perceptions of pharmacist professional identity for advanced practice roles

A widespread limited understanding of advanced pharma- cist professional identity was seen as a significant barrier to integration and implementation of these roles into current clinical care teams and demotivating in terms of development of advanced practice roles. This has left some of these innovators feeling a degree of alienation within the profession and wider healthcare team.

Strengths and weaknesses

Strengths of this research included using robust theory- driven qualitative approach at all steps. Similarly, having an MDT research team benefitted development and testing of topic guide, trustworthiness and applicability of the research. GPCP participants came from a spread of diverse geographical areas and health boards, were exposed to different courses and modalities of teaching and were able to give a breadth of views. Multiple techniques were employed to ensure the robustness of the research and enhance its trustworthiness [24]. To address reflexivity in relation to the impact of personal experiences on research outcomes, differing views were reconciled through iterative discussion within the MDT research team and bracketing of views.

Limitations of this research included the small numbers of participants. However, data saturation was reached using an established method [21]. It is also possible, due to the recruitment methods, that some pharmacists may not have been recruited, missing their views. Some aspects of this research may not be directly transferable to other settings or countries, especially those without pharmacist prescribing rights.

Interpretation

Factors influencing implementation of advanced clinical skills by pharmacists

The positive impact of pharmacists developing and implementing advanced clinical skills has been demonstrated in other sectors of practice—notably Emergency Departments (ED). One study found pharmacists with advanced clinical skills training were able to deal with more than seven times the number of ED presentations as pharmacist pre- scribers without (5202 vs 719, respectively) [25]. The training programme used [26] has broad similarities with the ACE course reported here, allowing pharmacists to operate beyond "traditional" models of care, as "practitioners"; being responsible for whole episodes of holistic care [27]. This blended skillset enables a versatile workforce, optimising what pharmacists can offer patients and the healthcare system in general. Similar to the GPCP cohort, the effective- ness of pharmacists in these advanced roles is positively correlated with the supportiveness of the learning environment [28].

The GPCP cohort in this study identified the need for a similar "wrap-around" supervised structured training pro- gramme to facilitate development. Participants asked for supervision post-ACE qualification so they could under- take their skills with clinical supervision to aid transition to more autonomous practice across the spectrum of presentations they would be expected to cover. Preceptorship models should be explored to enable the clinical supervision of pharmacists in these advanced training roles [29]. Further- more, participants identified that the RPS Advanced Pharmacist Curriculum may be beneficial in setting the standard for advanced practice and consideration should be made to align any future programmes with this [8, 9].

Social and environmental influences affecting opportunities for pharmacists in advanced clinical roles

There is an obvious opportunity to development a similar model to that described above for ED, but within general practice. An "Advanced Pharmacist Practitioner" (APP) model could equip general practice with a modern, dynamic and responsive generalist clinician that offers versatility to service. In addition to traditional clinical therapeutics, polypharmacy and medicines management systems work, an APP could clinically cover urgent and emergency presentations and lead on the management of patients with long-term conditions. The skills developed on the ACE course form the prerequisite skill-base required for the APP role, including those skills required to assess and manage undifferentiated generalist presentations across the age and acuity spectrum. In doing so, this would address the concerns many participants had regarding the limited opportunities for pharmacists in advanced roles in general practice, while also establishing this type of advanced practice as a social norm.
Effectiveness of previous capability frameworks to develop advanced pharmacist practice have been limited [30]. Participants spoke of role suppression under the cur- rent GMS 2018 (primary care) contract [23]. Organisational, structural, and cultural barriers to the delivery of advanced pharmacist practice in the general practice setting have been reported in the UK before [31]. Critical to the agency of pharmacists to innovate, must be the inclusion of augmented skillsets, as described here, in subsequent Government pol- icy. It is proposed, therefore, that the role of the APP in general practice be defined in Government policy, funded, and a structured training programme be commissioned for their development.

Perceptions of pharmacist professional identity for advanced practice roles

Globally, there is variation as to what would, could or should constitute an Advanced Pharmacist model [2, 32]. This lack of clarity makes the discussion and common understanding of a generalised and globally relevant professional role and identify with defined skillset difficult, if not impossible [28]. Participants in this research highlighted a demotivating aspect related to concerns about the professional identity and lack of understanding of pharmacists in advanced roles. This seemed to be an inter and intra-professional issue.
Misalignment between innovative advanced practice and the clinical scope of the current GMS 2018 contract has led to policy alienation within this cohort. Policy alienation has been described as a 'disconnection' comprised of two core components: 'powerlessness'—when workers feel they are unable to input based on their experience, or have no flexibility for implementation; and 'meaninglessness'—when workers question the value of the policy to [in this case] patients and health services [33]. Policy alienation has been observed within other UK health service contexts too [34].

Further research

Consideration should be given to how best to develop techniques that link to each of the themes identified to support behavioural change.
Further research is required to inform the design and evaluation of a training programme for APPs which provides preceptored learning post-ACE course to aid implementation of clinical skills in practice. Delivery and content should map to Government policy to deliver an effective product to meet service need.

Conclusion

This work has identified a number of TDF-linked behavioural determinants related to implementation of advanced clinical skills by pharmacists in GP. ACE courses would seem to equip pharmacists with the prerequisite skills required for APP-level service. Policy, and review of implementation strategies are urgently required to ensure pharma- cists with ACE skills can provide advanced clinical care to patients in support of existing healthcare services.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s11096-022-01484-7.

Acknowledgements The research team would like to thank the following individuals: all GPCPs who gave their time to participate in this research; Postgraduate Pharmacy Dean at NHS Education for Scotland Professor Anne Watson; Dr Rod Sampson, General Practitioner, for support of this initiative.

Funding This study was funded by NHS Education for Scotland.

Conflicts of interest Nothing to declare.

References

1. Bates I, Bader LR, Galbraith K. A global survey on trends in advanced practice and specialisation in the pharmacy workforce. Int J Pharm Pract. 2020;28:173–81.
2. Frost TP, Adams AJ. Are advanced practice pharmacist designations really advanced? Res Soc Adm Pharm. 2018;14:501–4.
3. Lewis J, Barry AR, Bellefeuille K, et al. Perceptions of independent pharmacist prescribing among health authority- and community-based pharmacists in Northern British Columbia. Pharmacy. 2021;9:1–8.
4. Berei T, Forsyth P, Balakumaran K, et al. Implementing nonphysician provider guideline-directed medical therapy heart failure clinics: a multi-national imperative. J Card Fail. 2021;27:896–906.
5. Tonna A, Stewart D, McCaig D. An international overview of some pharmacist prescribing models. J Malta Col Pharm Pract. 2008;14:20–6.
6. General Pharmaceutical Council. Standards for the initial edu- cation and training of pharmacists. 2021. Available at: https:// www.pharmacyregulation.org/sites/default/files/docum ent/stand ards-for-the-initial-education-and-training-of-pharmacists-janua ry-2021_0.pdf. Accessed 20 Jan 2021.
7. Royal Pharmaceutical Society. Post-registration foundation pharmacist curriculum. 1st ed. London: RPS; 2021.
8. Forsyth P, Rushworth GF. Advanced pharmacist practice: where is the United Kingdom in pursuit of this 'Brave New World'? Int J Clin Pharm. 2021;43:1426–30.
9. Royal Pharmaceutical Society. Core advanced pharmacist curriculum. 1st ed. London: RPS; 2022.
10. Royal Pharmaceutical Society. Consultant pharmacist curriculum. 1st ed. London: RPS; 2020.
11. Scottish Government. Paper 07: Transforming Nursing Roles— Advanced Nursing Practice—Phase II: Transforming nursing, midwifery and health professions' (NMaHP) roles: pushing the boundaries to meet health and social care needs in Scotland. 1st ed. Edinburgh: Scottish Government; 2021.
12. Scottish Government. Paper 08: Review of Clinical Nurse Special- ist and Nurse Practitioner Roles within Scotland: Transforming nursing, midwifery and Health Professions' Roles: pushing the boundaries to meet health and social care needs in Scotland. 1st ed. Edinburgh: Scottish Government; 2021.
13. Scottish Government. Paper 02: Transforming nursing, midwifery and health professions roles: advance nursing practice. 1st ed. Edinburgh: Scottish Government; 2017.
14. The Scottish Government. Achieving excellence in pharmaceutical care: a strategy for Scotland. Edinburgh: Scottish Government; 2017.
15. Cane J, O'Connor D, Michie S. Validation of the theoretical domains framework for use in behaviour change and implementation research. Implement Sci. 2012;7:37.
16. Atkins L, Francis J, Islam R, et al. A guide to using the theoretical domains framework of behaviour change to investigate implementation problems. Implement Sci. 2017;12:1–18.
17. Creswell JW. Research design: quantitative, qualitative and mixed methods approaches. 4th ed. London: Sage Publications; 2014.
18. Morgan DL, Ataie J, Carder P, et al. Introducing dyadic inter- views as a method for collecting qualitative data. Qual Health Res. 2013;23:1276–84.
19. Morgan DL, Eliot S, Lowe RA, et al. Dyadic interviews as a tool for qualitative evaluation. Am J Eval. 2016;37:109–17.
20. Ritchie J, Spencer L. Qualitative data analysis for applied policy research. In: Bryman A, Burgess RG, editors. Analyzing qualitative data. Oxon: Routledge; 1994. p. 173–94.
21. Francis JJ, Johnston M, Robertson C, et al. What is an adequate sample size? Operationalising data saturation for theory-based interview studies. Psychol Health. 2010;25:1229–45.
22. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. Int J Qual Health Care. 2007;19:349–57.
23. The Scottish Government. The 2018 general medical services contract for Scotland. Edinburgh: Scottish Government; 2017.
24. Guba EG. Criteria for assessing the trustworthiness of naturalistic inquiries. ECTJ. 1981;29:75–91.
25. Hughes E, Terry D, Huynh C, et al. Future enhanced clinical role of pharmacists in Emergency Departments in England (PIED- Eng): multi-site observational evaluation. Int J Clin Pharm. 2017;39:960–8.
26. Health Education England. Multi-professional framework for advanced clinical practice in England. 1st ed. London: HEE; 2017.
27. Greenwood D, Tully MP, Martin S, et al. The description and definition of Emergency Department Pharmacist Practitioners in the United Kingdom (the ENDPAPER study). Int J Clin Pharm. 2019;41:434–44.
28. Terry D, Ganasan S, Aiello M, et al. Pharmacists in advanced clinical practice roles in emergency departments (PARED). Int J Clin Pharm. 2021;43:1523–32.
29. Knott GL, Mylrea MF, Glass BD. A scoping review of pharmacy preceptor training programs. Am J Pharmaceut Ed. 2020;84:1322–34.
30. Preston K, Weir NM, Mueller T, et al. Implementation of pharmacist-led services in primary care: a mixed-methods exploration of pharmacists' perceptions of a national educational resource package. Pharm Pract. 2021;19:2440–9.
31. Seston EM, Schafheutle EI, Willis SC. "A little bit more looking…listening and feeling" A qualitative interview study exploring advanced clinical practice in primary care and community pharmacy. Int J Clin Pharm. 2022;44:381–8.
32. Shalansky S. The advanced pharmacist practitioner: a new series in the Canadian Journal of Hospital Pharmacy. Can J Hosp Pharm. 2019;72:42.
33. Tummers LG. Policy alienation and the power of professionals. 1st ed. Cheltenham: Edward Elgar; 2013.
34. Tucker DA, Hendy J, Chrysanthaki T. How does policy alienation develop? Exploring street-level bureacrats' agency in policy context shift in UK telehealthcare. Hum Relat. 2021;1–28.

8. CHAPTER EIGHT: DISCUSSION & CONCLUSIONS

This chapter will summarise the individual public outputs before pulling together the findings such that they outline a coherent and cogent argument in support of the overall aim of this PhD thesis. The chapter will be structured by first presenting a summary of the key findings, then the strengths and weaknesses of the research, before interpreting the findings in the context of the wider literature and practice. A further section will give summative recommendations based on the synthesis of findings from across the research presented in this thesis, as well as proposals for further research. Finally, a conclusion to this programme of research will be set out.

8.1. Summary of key findings

This programme of research explored the use of longitudinal clerkship and IPE in undergraduate experiential learning placements, as well as SBE and ACE courses in postgraduate advanced pharmacist training. All education and training interventions and techniques were felt by participants to improve their clinical confidence and self-perceived competence in the application and undertaking of clinical tasks. These innovations in clinical education for pharmacists and SPs enabled their development as clinicians. An overview of the specific key findings of each programme will now be given.

8.1.1. Pharmacy Longitudinal Clerkship placements (Chapter Three)

The research around PLC placements comprised two pieces of work conducted over a 3-year span.

The first output – PLC1 – was comprised of two components. It used the Donabedian Model (Donabedian 1988) to consider and describe the structures, processes, and outcomes required to deliver a longitudinal clerkship SP placement. This included data on the curriculum, learning outcomes, timetabling, clinical activities, travel and subsistence, equipment required and data on overall costs for staffing, such that other HEIs would be able to plan similar clerkships. The second component related to an evaluation of the pilot PLC. Seven themes linking to seven TDF domains were identified. Overall, there was general positivity regarding the placements by SPs, GPs and faculty. The SPs self-reported improved competence and confidence, as well as an increase in their enthusiasm for a career in pharmacy. There was also GP positivity around the expected outcomes of clerkship model versus traditional model.

The second output – PLC2 – was a qualitative evaluation of the main PLC programme. Qualitative evaluation underpinned by the TDF explored stakeholder perceptions of influence of behavioural determinants on SP development for clinical practice in GP. The research provides data on the significant opportunity for SPs of a GP longitudinal clerkship EL Placement. It also reports on the key

benefits observed by both SPs and GPs of embedding SPs in clinical practice. The key themes identified included: *Utilisation and practical application of knowledge* – where SPs reported benefits of applying knowledge in real-life patients, often due to the associated complexity. They also reported opportunity to explore 'unknown unknowns'. *Triangulation of skills under clinical supervision* – again students appreciated the real-life clinical exposure and became aware of their lack of prior clinical exposure. *Confidence building with clinical and patient contact* – this was felt to extend beyond simple confidence in consultation and clinical skills, but also increased their own self confidence too. *Elucidation of professional roles within General Practice* – witnessing GP and advanced pharmacist practice opened SPs minds to the challenges and complexities of general practice. *Influence of environmental context and resources* – overall, SPs relished the opportunity to learn within the MDT.

Both PLC1 and PLC2 demonstrated the benefits of prolonged immersion of SPs in the clinical environment to enhance their confidence and competence in relation to the application of knowledge and the acquisition and application of clinical and consultation skills sets. The training provided here was considered by the MDT stakeholders to be valuable in the training of SPs who were developing as clinicians.

8.1.2. Interprofessional education placements (Chapter Four)

Three key categories with multiple themes in each category were identified from participant narratives. *Category 1: overall perception of experience* – better than previous IPE experiences as this was the first-time they were able to work alongside another healthcare student in real-life practice. Medical students were particularly impressed by getting exposure to clinical pharmacists in practice – something they would not normally be exposed to during their placements – the inverse being true of SP exposure to doctors. *Category 2: student interactions* – students from both professions enjoyed doing this placement together and as result reported that they were able to learn better. Students also reported that they believed the placement led to a greater understanding of each other's professional roles and in turn, their own role. *Category 3: suggestions for improvement* – choice of relevant clinical rotation and content, increased learning from clinical pharmacists and better orientation to placement were given as suggestions for improvement.

Overall, both groups of students valued their participation in the IPE week and coveted the opportunity to learn from, with and about another professional group while practicing. In summary, the students felt better prepared for a more collaborative clinical practice in the future.

8.1.3. Advanced pharmacist practice (Chapter Five)

This public output is not research. It is a commentary: one that is designed to challenge current thinking as to how the profession should adapt to meet the challenge posed by advanced pharmacist practice. It has been included in this thesis as it demonstrates multiple Doctorate Level Assessment Criteria as set out in the academic regulations for this PhD by Public Output (Robert Gordon University 2022). These include critical overview, knowledge and understanding at the forefront of the profession, as well as critical reflection based on the current evidence base to offer novel and creative insights into complex ideas and issues.

The commentary sets out that the standard for this type of practice will shortly be defined within the UK by the RPS Advanced Pharmacist curriculum and highlights a concern that the current reliance on a predominantly pharmaceutical care-based practice may not be able to produce pharmacists ready for the demands of advanced practice – specifically there was a concern around the extent to which pharmacists are able to make autonomous clinical management and prescribing decisions where there is limited evidence, or where there is clinical risk or uncertainty. The commentary challenges the commonly held perception that 'pharmacists are experts in medicines' by exploring this concept further and presents that up until now, pharmacists have been trained as 'experts in medicines governance' – not necessarily 'experts in the clinically autonomous prescribing of medicines'. The application of the term expert is misleading when generically applied to the entire pharmacist profession – an example given being that it would not really be appropriate to consider a newly qualified pharmacist as a clinical expert in medicines. The commentary goes on to express an opinion as to how pharmacists should be trained in the future, to capitalise on our knowledge of clinical therapeutics, pharmacology and physiology, but how to augment this in the context of the clinical environment where more pharmacists are now operating as independent pharmacist prescribers. It calls for programmes of preceptored clinical training to ensure safety for patients and assure the public. It also goes on to introduce the concept of an Advanced Pharmacist Practitioner, asking for clarity and policy from Government, around this as a career destination.

8.1.4. Simulation Based Education (Chapter Six)

Pre and Post course questionnaires were used to evaluate an innovative simulation course designed for advanced GPCPs based on the Kirkpatrick model for evaluation of training programmes (Kirkpatrick and Kirkpatrick 2006). Simulation was perceived as a useful training intervention for GPCPs who were undertaking an advanced pharmacist framework portfolio. Participants also strongly agreed that simulation increased confidence and competence in clinical practice. The access of the advanced 'trainee' to a clinical supervisor was seen as a facilitator to GPCPs developing their clinical competence and stretching their clinical decision-making. There was strong agreement with

the acceptability of simulation as a modality for training at advanced level, to develop pharmacists as clinicians.

8.1.5. Advanced Clinical Examination & Assessment (ACE) course (Chapter Seven)

This theoretically underpinned qualitative study that provided data on potential behavioural determinants influencing implementation of ACE course skills in GPCPs. This resulted in three main themes. *Factors influencing implementation of advanced clinical skills by pharmacists* – the ACE course enabled pharmacists to learn the prerequisite knowledge and clinical skills to operate at advanced level. It was felt that practicing in an MDT environment and having a clinical supervisor who was able to triangulate the application of the clinical skills and decision-making aided implementation of the advanced behaviours. *Social and environmental influences affecting opportunities for pharmacists in advanced clinical roles* – there was frustration expressed within the cohort as to a range of factors which were perceived to inhibit the implementation of advanced practice behaviours. Government policy was felt to be required to support advanced pharmacists trying to utilise and implement their skills. There was also a call for senior leadership at local and national level in support of the normalisation of roles where pharmacists could routinely implement these advanced skillsets. *Perceptions of pharmacist professional identity for advance practice roles* – there was felt to be an endemic lack of understanding of advanced pharmacist roles, both internal and external to the profession which has led to the alienation of innovators within our profession.

Overall, the ACE course was felt by GPCPs to be beneficial in their training as clinicians. However, there were noted to be several factors outwith the control of the GPCPs which has limited their ability to implement the behaviour changes in practice.

8.1.6. Synthesis of outputs

This programme of research identified numerous separate innovations in education and training which each allow pharmacists to develop as clinicians over a variety of career stages and healthcare settings. There is commonality between PLC and IPE placements in terms of affording SPs exposure to clinical environments as part of undergraduate education. The benefits observed during individual placements are also likely to be synergistic if combined into a longitudinal IPE placement. SBE was used effectively in both undergraduate and advanced pharmacist education and can be expected to augment clinical teaching at all levels of pharmacist education. As described in the National Report co-authored by the PhD candidate in Appendix 2, ACE courses would make a suitable component of a competency-based training programme for advanced pharmacist practitioners, where skills learned on the course can be integrated into practice in a preceptored and supervised environment. This is similar to how clinical skills were implemented and practiced during PLC placements.

Consideration will be given in section 8.4 as to the need for revised education and training pathways such that the beneficial innovations described in this thesis might be selected to expeditiously develop pharmacist clinicians with the skills to enhance healthcare capacity in support of clinical care delivery to patients.

8.2. Strengths and weaknesses

The strengths and weaknesses of each research paper have been discussed within each of the publications in the preceding chapters – that information will not be repeated here. Instead, this section will focus on strengths and weaknesses of the programme of research as a whole.

The key strength of the outputs included in the main chapters of this thesis is that they have all been published in international peer-reviewed journals. This process was rigorous and tough. Revisions were called upon for most papers as part of this key academic process. Revisions to formative drafts, rewrites of papers as well as rebuttal letters outlining and clarifying author positions took a long time to complete. The benefit of undertaking this type of approach is the assurance it gives. As all papers are already in the public domain (and indeed many have now been cited) this has again provided a further strength to this work outlining the need for it.

Chapters Three, Four, Six and Seven are focused on a variety of educational techniques at various stages of development of pharmacist clinicians. This again is a key strength of the work. There is no "quick fix" to the national clinical healthcare capacity issue when it comes to the production of new clinicians. The requisite skill set takes years of training, skills acquisition, and experience to develop it. By compounding a programme of research like this, attached to the common aim of the ultimate production of a pharmacist as a clinician, this thesis has demonstrated not just a variety of educational techniques which could contribute to this endpoint, but also that it is likely that ALL techniques would be useful in the production of the endpoint. In effect, one of the key strengths of this work is the emergence of the concept of multifaceted training programmes, grounded in clinical supervised practice from undergraduate level, then the layering of additional and advanced clinical skills to a growing clinical therapeutics knowledge, while honing clinical acumen and increasingly independent clinical reasoning.

One of the cardinal strengths of the research presented in Chapter Three, Four and Seven, is that it was underpinned using the TDF theoretical framework. The TDF was used in the design, planning and analysis phase of the research, which has made the outputs of each of those studies more rigorous. Likewise, the evaluation presented in chapter six was underpinned by linkage to the Kirkpatrick model for the evaluation of a training programme (Kirkpatrick and Kirkpatrick 2006) and

the description of the set-up of the PLC in chapter three was also described in the context of the Donabedian Model (Donabedian 1988).

One final strength of the programme must be to recognise the impact of each of the outputs. There are six published outputs listed in Chapters Three to Seven and a significant piece of work demonstrated in Appendix 2 – all of the outputs listed have either led to commissioning of further work, or resulted in the assimilation of the work into standard practice i.e. PLC and IPE into NES ACTp EL funded SP placements; simulation work being adopted by the National Pharmacy Simulation Faculty and then the recruitment of a Scottish Pharmacy Clinical Academic Fellow to continue the research evaluation of the revised GPCP simulation course.

Individual weaknesses of specific research programmes are given within each of the research outputs and will not be repeated here. Instead, the weaknesses of the whole programme of research will be discussed. As a composite of outputs, one of the weaknesses of this work is that it does not follow a singular cohort of SPs sequentially through each of these educational programmes (PLC and IPE placement), and techniques (simulation) all the way to advanced practice (via ACE course). Despite this, it was deemed that the modular approach would allow the development of these concepts and ideas more expeditiously. Running these studies in parallel is more realistic in terms of transformation of the educational intervention into real-life practice. The impacts of the work to-date are good evidence of this.

One of the significant limitations of this work is that it pertains to practice as is currently being developed within the UK. Independent prescribing is considered to be a fundamental skill for a clinician as outlined in this thesis. It is well understood there is no equality in global prescribing rights for pharmacists. There is then an inherent limitation on the applicability of these results to other healthcare systems beyond the UK where pharmacist-practice is currently restricted in terms of autonomous prescribing.

8.3. Interpretation of innovations in context of current literature and practice

Section 8.1 outlined the key findings of the education and training innovations within this programme of research as enablers for the development of pharmacists as clinicians. The detail as to how each innovation relates to the current literature has been discussed within the individual research outputs listed in Chapters Three, Four, Six and Seven. This section will build on the individual published outputs and relate the work to current practice. Section 8.4 will give recommendations as to how the education and training innovations might be used sequentially, or in combination, at various career stages to enable the development of pharmacists as clinicians.

8.3.1. Pharmacy longitudinal clerkship placements (Chapter Three)

Clinical exposure at undergraduate level is essential for the expeditious development of postgraduate clinicians. All other healthcare professional (HCP) groups who, at a postgraduate level, individually assess and treat patients, would expect their undergraduates be exposed to this type of fundamental experience. In this respect, it is important to be understanding of the approach to initial pharmacy education and training currently undertaken within NHS Scotland. The four-year undergraduate course is followed up by a FTY, which is predominantly based in one sector of practice with some placement weeks in another sector. RGU delivers a wide range of undergraduate health and social care programmes – nursing, midwifery, pharmacy, paramedic, physiotherapy, occupational therapy and social work. Of all these health and social care degree programmes, pharmacy ranked bottom for time in clinical practice within the confines of the four-year degree, having just 25 days in clinical practice. Steps are being taken by the Scottish Government to address this by increasing the number of clinical weeks students are exposed to within the four-year undergraduate course as part of a NES run ACTp EL programme (NHS Education for Scotland 2020). This ACTp EL programme started in 2019 and stipulated that each student pharmacist would get a total of 7 weeks of EL placement as part of their degree course. This has been raised within NHS Scotland to 9 weeks per student over four years from academic year 2023/24, then to 11 weeks per student from 2024/25. However, to-date, undergraduate pharmacy courses in Scotland remain funded as science courses rather than clinical courses (clinical courses attract multiple magnitudes of payment per head of student - higher than basic science courses) – effectively inhibiting the investment required to redesign the focus of the teaching towards clinical education, and in support of the development of pharmacists as clinicians.

Longitudinal clerkships offer a unique opportunity to accelerate skills acquisition, incubate and assimilate application of clinical skills and decision-making in practice at an undergraduate level (Norris et al. 2009). The PLC which ran as part of this research has some unique facets. As mentioned above, when these clerkships ran, they offered in one placement, more time in clinical practice than would be offered to their peer group for their entire four-year course at university. Besides simply the time in clinical practice, the structure of the clinical teaching on the clerkship demanded that students would need to upskill in their technical competence of undertaking observations, basic clinical examination, clinical history-taking, and consultations. Perhaps the most clearly tangible difference in the clinical aspiration of these clerkships was the handing over of the kit bag at the end of the clinical skills training each student pharmacist received at the start of their placement. This set the tone for the clerkship. SPs were there to participate, not observe. The allocation of a local GP as a clinical tutor/supervisor was also key in this regard. What was clear at the end of these

placements was that, in those completing the placement, they felt more prepared for clinical practice. This also seemed to open their minds to the potential scope of clinical practice of a pharmacist.

Longitudinal placements are slightly different – they use the same location for repeated placement activity over a period (Thistlethwaite et al. 2013). These build up clinical exposure but with the added benefit of time to consolidate learning between clinical experiences. Kerr et al described a successful model of running a longitudinal clerkship in community pharmacy in Dublin, where student pharmacists were on placement for half-a-day each week over the course of a semester (Kerr et al. 2021). Constraints on the timetable have necessitated the adaptation of the clerkship into the current programme of ACTp EL placements such that students can opt to attend the same locations for sequential longitudinal placements.

8.3.2. Interprofessional education (Chapter Four)

Chapter Four presented research relating to an IPE placement. IPE placements are used frequently in medical education. They are stipulated by the General Medical Council (GMC) – the regulator for medical practice, teaching and training within the UK – as an essential part of any undergraduate curricula or postgraduate training programme (General Medical Council 2016). Likewise, IPE teaching within undergraduate pharmacy curricula has been stipulated by the GPhC – the regulator for pharmacy practice within the UK – as a key standard for the initial education and training of pharmacists (General Pharmaceutical Council 2021). Christensen et al laud the use of IPE teaching stating: 'The idea that medical education is all about training individual artists who will practice their crafts independently of each other and in isolation from the work of nurses and technicians, pharmacists, administrators, and external service providers was appropriate a century ago, but is dangerously incorrect today.' (Christensen et al. 2009).

The NHS Highland IPE programme has now been incorporated into the standard provision of placements offered by the Health Board as part of the national ACTp EL programme, accepting students from both Scottish Schools of Pharmacy. Both medical and pharmacy undergraduates, reported a growing sense of their professional identify and interdependency during the week. This allowed them to develop their perceptions of their own role in the clinical space. Again, both professional groups considered this IPE placement week to be an improvement in terms of their IPE learning experience, which prior to this placement had always been in a non-clinical setting with choreographed tutorials. The contribution of this work to the enablement of pharmacists to develop as clinicians is in part created by moulding these concepts in clinical practice. Setting expectation on professional roles and interprofessional collaboration is a key enabler to setting up future

professional careers as clinicians.

The IPE paper was published in the 'Innovation, Implementation, Improvement' section of *The Clinical Teacher* (the journal of the Association for the Study of Medical Education). The journal mandated that the paper contain the detail around the structure and composition of the approach taken to the training week. There is value in this beyond allowing other HEIs the opportunity to adapt the programme for their courses too. It also sets the tone for the complexity of the placement and of the myriad of learning experiences and exposures it delivers for each of professional groups.

8.3.3. Advanced pharmacist practice (Chapter Five)

This section will take a specific focus on the development of advanced practice within GP in NHS Scotland, as this links in with the next two sections on Simulation and ACE courses for advanced GPCPs.

The 2018 General Medical Service (GMS) Contract outlined primary care services which the Scottish Government would fund, and how managed services (i.e. pharmacy services) were going to engage with contractor services (i.e. GPs) (Scottish Government 2017a). The vision for pharmacy services was revolutionary and was termed the 'Pharmacotherapy Service' (PTS). It cemented pharmacy teams in general practice where it stipulated a three-tier system of practice. Level one being a technical/administrative prescription management service; level two relating to basic medicines review; and level three, being specialist clinics – e.g. single disease state clinics or polypharmacy. A commitment was made by the Scottish Government to have a pharmacist in each practice in Scotland (Scottish Government 2017b). RPS and the RCGP had previously released a joint statement to set the expectation of what pharmacists should and could do within GP (Royal College of General Practitioners Scotland and Royal Pharmaceutical Society Scotland 2016). Despite this, practice for many pharmacists seemed constrained to the lower levels of the GMS contract – possibly because the PTS was included in the chapter within the 2018 GMS contract termed 'Manageable Workload' – it was explicitly speaking of GP workload. The influx of pharmacy teams was to support the GP workload agenda, not primarily to advance the pharmacist profession in support of patient care. Despite the upper ranges of the PTS model advocating pharmacists practice clinically, most were restricted to the completion of lower-level tasks as these were prioritised by GP leaders in support of the manageable workload agenda. As a result, a common gripe from many GPCPs was a lack of face-to-face clinical time – a problem persisting to the present day, and something which has recently been acknowledged by the British Medical Association (BMA) Scotland and the RPS Scotland who have released a joint statement stipulating that: 'We recommend that use of pharmacists' clinical skills is maximised. Pharmacists should be focused predominantly on patient-facing clinical roles'

(Royal Pharmaceutical Society Scotland and British Medical Association Scotland 2023). It is important to understand these factors – only in doing so, can the full impact of simulation and ACE course teaching be understood.

8.3.4. Simulation based education (Chapter Six)

SBE is relatively new for pharmacy clinical education in NHS Scotland – certainly new within the advanced pharmacist space in GP. The concept for this research came from a growing awareness of the issues which GPCPs have in applying their clinical skills in practice. These are various: a physical restriction in patient-facing contact (COVID, lack of physical space in the practice, lack of understanding of the scope of patient-facing pharmacist practice by line management, GPs, and service leads); self-limitations (despite acquisition of clinical assessment and prescribing skills, many pharmacists are disinclined to prescribe, or not prescribing widely beyond simple prescribing. Campagna (Campagna 1995) described a model for clinical decision making by pharmacists which has been updated recently to include prescribing tasks by Waghorn (Waghorn et al. 2021) (see Figure 1).

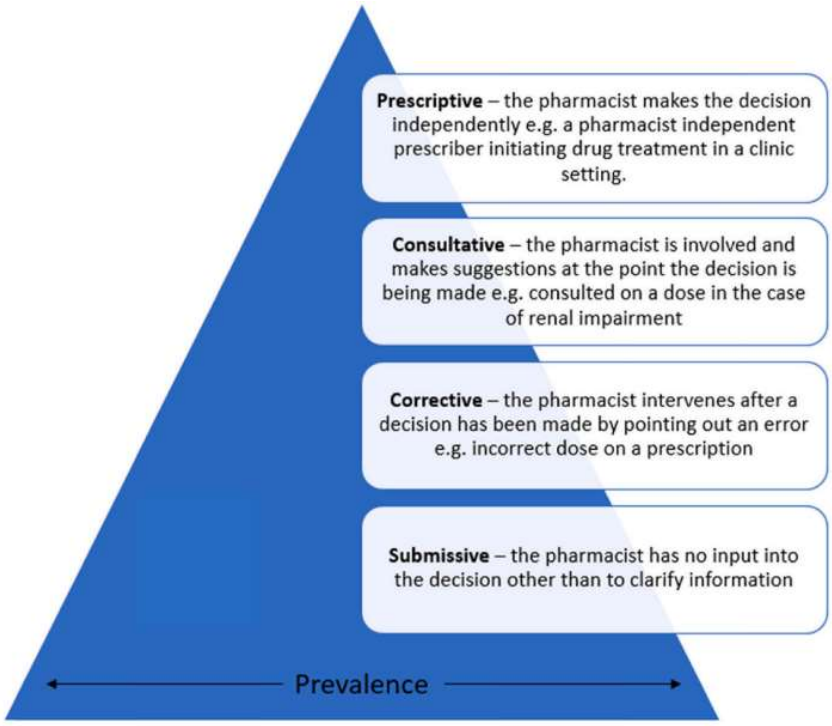

Figure 1 - Hierarchical levels of pharmacist decision making (Campagna 1995) - adapted by and taken from (Waghorn et al. 2021).

Waghorn et al state the majority of decisions which pharmacists make are towards the lower end of this hierarchy (Waghorn et al. 2021) while it is known from the RPS Advanced Pharmacist Curriculum (Royal Pharmaceutical Society 2021a) that 'prescriptive' practice would be closest linked to

advanced pharmacist practice. Waghorn et al go on to describe that clinical decisions are made on a spectrum between intuitive and deductive thinking depending on the complexity of the decision in consideration. A more simplistic decision tends towards the intuitive (Kahneman 2012). Waghorn et al explored the intuitive decisions pharmacists made using a technique called 'clinical judgement analysis' and found that judgments could be accurately predicted by the selection of specific cues within the clinical scenario. Within SBE, scenarios are designed such that, post-scenario, participants can be facilitated through a structured debrief to explore the clinical decisions they made, and why. These are called 'clinical human factors' and are important for individuals to understand their higher cognitive processes and afford them insight into why they made specific decisions.

Section 8.3.3 above on advanced pharmacist practice outlines the inherent difficulties pharmacists have in getting to practice clinically. Hence, part of the rational for devising the simulation course was to allow participants to be exposed to a controlled range of clinical scenarios which commonly present within GP. This augmented the limited exposure which many had experienced in their practice through COVID. The SBE acted as an accelerator and incubator for the safe and supported application of those skills. It promoted confidence in the GPCPs and increased self-reported competence in their clinical skills. Simulation is therefore a useful tool to explore implementation behaviours in a supported and safe environment (both for patients, and psychologically safe for participants).

8.3.5. Advanced Clinical Examination & Assessment course (Chapter Seven)

There are burgeoning numbers of pharmacists from across all pharmacy sectors undertaking ACE courses within NHS Scotland. ACE courses teach full clinical history and examination of a multitude of clinical systems. They normally then go on to teach clinical decision-making skills too. As described in section 8.3.3 – there is an issue with the full utilisation of pharmacist skill within GP in NHS Scotland. Many pharmacists are turning to more in-depth courses to meet perceived learning gaps in their clinical skill sets in the hope this allows them to have more patient-facing practice.

What the ACE course research showed was that to enable the implementation of the new clinical skills behaviours, there is a complex structure and system to be addressed within the environmental and social contexts too. Individual recipients of an ACE course were unable to single-handedly effect a change in how they practiced, and so the paper calls for a review of policy and implementation strategies. The ACE course itself was thought by participants to improve their confidence and self-perceived competence of implementation of the skills – albeit, that they were then subject to forces and factors beyond their own sphere of control in relation to implementation in practice.

There were signals of alienation among the participants in relation to their perceived underutilisation of their newly acquired advanced skills in the context of a lack of implementation strategies at a local, regional or national level. This work has since been picked up by the NHS Scotland Advanced Pharmacist Practitioner Short-life Working Group (APP SLWG). The report for that group is included in Appendix 2. As part of that work, those in posts who were thought to be operating at APP level were invited to present to the SLWG. Regardless of the sector of practice which the pharmacist operated in, all reported a degree of alienation. Alienation was defined in the publication, but further to the definitions given there, alienation was best orated by Jimmy Reid, a Glasgow shipbuilder and Unionist leader, who in 1972 was given the honour of being appointed as Rector of the University of Glasgow. In his Rectorial Address, he described alienation as '… the frustration of ordinary people excluded from the processes of decision making. The feeling of despair and hopelessness that pervades people who feel, with justification, that they have no real say in shaping or determining their own destinies.' (Reid 1972). The publication and subsequent APP SLWG Report are bold in challenging the current situation. Indeed, as Reid explains, alienation must be called out and rejected as all costs – 'Reject the insidious pressure in society that would blunt your critical faculties to all that is happening around you, that would caution silence in the face of injustice lest you jeopardise your chances of promotion or self-advancement'.

The publication and the report go on to explore how and when an ACE course would be best utilised, such that alienation is eliminated. While the ACE course itself will be able to upskill a pharmacist to deliver more autonomous clinical management due to advanced clinical and diagnostic skills acquisition, it is also recognised that this would not be a universally useful qualification for all advanced pharmacists. It is therefore proposed that ACE courses, due to the wide range of clinical examinations, over multiple clinical systems, would be best acquired by generalists. The report goes on to define that ACE qualifications would be expected as a basic training requirement of APPs where an APP has been described as follows: 'Advanced Pharmacist Practitioners are accredited advanced pharmacists working in a generalist specialty. In addition to the expected characteristics of an advanced pharmacist, they possess the ability to manage patients through full episodes of care by autonomous application of a suite of advanced generalist clinical assessment, investigative, procedural, communicative, diagnostic, prescribing and decision-making skills, over a wide range of clinical systems and presentations specific to that specialism.' (Rushworth et al. 2023). There is also an understanding from the publication that any GPCPs undertaking an ACE course would then need to undertake a period of preceptored and clinically supervised practice to successfully triangulate these new skills and implement them safely. This thinking is supported by similar experiences from upskilling pharmacist practitioners in Emergency Departments in NHS England (Hughes et al. 2017,

Greenwood et al. 2019, Terry et al. 2021)

The report calls for service visioning work, aligned with national drivers, to enable the creation of posts which will allow pharmacists to practice in such a way as to utilise the skills learnt from the ACE course. By training advanced GPCPs with ACE courses, putting them through an APP training programme in practice, then employing them in specifically designed APP clinician roles in GP – integrated as part of the clinical system and team - there would be a high likelihood of this eradicating the feeling of alienation.

8.4. Recommendations

While recommendations have been given at the end of each published output, generalised recommendations will now be made, pulling this work together. They will offer insight on utilisation and implementation of education and training innovations as described in this thesis, for the purpose of developing pharmacists as clinicians.

8.4.1. Recommendation 1: sequential skills development throughout the pharmacist career

Education and training innovations should be serially utilised to enable sequential skills development throughout the pharmacist career.

Pharmacist clinicians will, from 2026 onwards under new prescribing legislation, operate across all career stages. Training should therefore begin at undergraduate level to prepare new registrants for autonomous patient-facing practice. This training should continue into the postgraduate space, where basic skills will continue to be refined and enhanced, and new advanced skills be assimilated and layered into an individual's practice as part of spiral learning along the continuum of practice, all the way to advanced practice.

The research presented in PLC (Chapter Three) and IPE (Chapter Four) share commonalities of outcomes in exposing SPs to experiential leaving which SPs do not perceive they can attain on campus. One similarity of each placement is the expectation for the SPs to undertake supervised consultations and review of real-life patients. This leads to improved competence in SPs exposed to these programmes and would be expected to lead to improved application of their newly acquired skills and knowledge in practice upon registration. This builds on campus-based teaching and augments it with additional clinical assessment, reasoning and management skills, to deliver a clinician product fit for the needs of the NHS.

Simulation as an educational technique was used as a component of one of the undergraduate

placements (IPE, Chapter Four) and in an advanced cohort (Chapter Six). It was shown to be beneficial at all levels of pharmacist practice to increase trainee exposure to the benefits of reflections on their own clinical human factors in relation to clinical assessment, reasoning and management.

The ACE study presented in Chapter Seven is a good example of layering sequential skills along the continuum of practice. It utilised a structured HEI-delivered course with formal taught elements, twinned with observation in practice and a clinical exam, to demonstrate how the additional advanced assessment skills can be assimilated into advanced pharmacist practice.

8.4.2. Recommendation 2: training within the clinical environment and team

Supervised learning in clinical practice, including learning with other peer groups, is key to enabling development of pharmacists as clinicians.

Developing competent clinicians takes time. Campus-based, or theoretical learning, needs to be translated to the clinical environment. Its application to real-life scenarios triangulated through feedback from observed and supervised practice by senior qualified clinicians to aid understanding of the patient-specific environment. Preferably this is done as part of a supervised learning event (SLE) to provide observed feedback on application of knowledge, skills and behaviours in practice.

The Chapter Three (PLC) and Chapter Four (IPE) programmes both utilised observed clinical practice with feedback given in the form of SLEs. Both placements have been adopted nationally and are now being offered as standard undergraduate experiential learning placements within NHS Scotland. Chapter Seven (ACE) course utilised a similar modality where participants were observed applying their newly acquired skills in practice and collected written feedback on their performance in the form of SLEs. The immersion in clinical practice, clinical supervision, and written feedback, all support the development and enhance the educational experience of the participants. These types of learning conditions augment and evolve autonomous patient-facing skills sets resulting in an individual akin to a modern-day version of an apothecary as outlined in Chapter One.

Learning opportunities like these should be expanded to allow undergraduates exposure to year-long interprofessional placements in clinical settings. Direct supervision and preceptorship models should be commonplace at all levels of pharmacist development, including for SPs and those undertaking postgraduate education. Likewise, IPE, where trainees learn of the interdependencies between their professional groups, must become essential facets of pharmacist training.

8.4.3. Recommendation 3: training programmes and assurance of practice

Training programmes, as part of an established and recognised national career structure, are necessary to assure pharmacist clinician development.

Chapter Five issues a timely challenge to the profession in the UK on the need to reflect on the philosophy of 'what is the role of a contemporary pharmacist?', in the context of imminent legal changes to the scope of practice of new registrants (General Pharmaceutical Council 2021). It goes on to suggest that alignment to the three postgraduate UK-wide RPS curricula – Foundation (Royal Pharmaceutical Society 2021b), Advanced (Royal Pharmaceutical Society 2021a), and Consultant Pharmacist (Royal Pharmaceutical Society 2020) – would seem an entirely appropriate means of using competency-based education (CBE) to assure continuity of practice between nations with similar prescribing rights. These curricula were designed by the RPS to assure the public, patients, and employers that pharmacists with these qualifications have met the expected standard to work at each level. In doing so, this has given definition to the postgraduate career structure within the UK. Each curricula use SLEs to provide observed feedback on application of practice across the four pillars of practice – clinical, leadership, education & training, and research. The utilisation of innovations in education and training at advanced level, such as simulation and ACE courses, will complement and expedite pharmacists' completion of these curricula.

However, these curricula are generic. They may not equip pharmacists with the specific knowledge, skills and behaviours which might be thought of as essential for pharmacist clinicians operating in a specific clinical field. Here it would be useful to consider an example of the APP in GP. The exemplar practice given in section 2.2.1 of Appendix 2 gives some insight into the types of areas which need to be covered to ensure coverage of all clinical systems in GP and, in effect, assure the specialty-specific knowledge of the postholder. While it may not be possible to develop specialty-specific training programmes for every specialty, it should be possible for GP. NHS Scotland workforce data shows there are more managed service pharmacists employed as GPCPs than any other specialism (TURAS and NHS Education for Scotland 2022). Indeed, NES currently have an advanced pharmacist framework for GPCPs which covers learning which is specific to GP (NHS Education for Scotland 2016). It is important when migrating to the new RPS Advanced Curriculum that there is also a well-defined service model. Consideration should be given to the need for mandated knowledge tests, or procedural/clinical skills training – such as the ACE course. This style of training programme would be akin to that seen within the GP curriculum guide for those undertaking membership exams for the RCGP (Riley et al. 2007) i.e. GP trainees undertake a knowledge test, then portfolio of evidence of supervised practice, then clinical skills assessment. Under the present system in pharmacy, there

is only the portfolio of evidence of supervised practice.

8.4.4. Recommendation 4: the need for educational governance of pharmacist education and training

Educational governance structures should be created at an organisational level within the NHS to ensure the quality of the education and training which the NHS delivers to pharmacists.

Investment in education and training by an organisation is an investment in patient safety and the quality agenda. Services urgently need well trained pharmacists and pharmacy staff to deliver and support front-line clinical care within the NHS. The ethos of this is backed up by new legislation within Scotland which places the onus on employers to ensure that their staff are appropriately educated and given adequate training to undertake the role as stipulated in their job descriptions (Scottish Parliament 2019). How Health Boards do this in practice is not currently clear, in part because of a lack of clarity in NHS Scotland over the service models. However, the educational governance established by Health Boards to meet the new legislation should be reportable. Health Education England have come up with an excellent reporting tool called the Maturity Matrix (Health Education England 2022). This tool allows organisations to rate their own systems as to how 'mature' the organisation is in its' thinking around the governance of non-medical advanced practice. A reporting tool such as this should be devised in relation to all teaching programmes from undergraduate to consultant training. Clear pathways and structures should be installed within Scottish NHS Boards which link with HEIs and NES. This is to ensure that the host organisations, where clinical education is taking place, have the necessary governance arrangements to make this new pharmacist education and training environment safe for patients, trainees, and organisations.

8.5. Future research and work

Section 8.4 above gives recommendations in relation to the programme of research presented in this thesis. It makes recommendations that to enable the development of pharmacists as clinicians, education and training opportunities need to be developed and delivered across the continuum of pharmacist practice, from undergraduate to advanced pharmacist practice. This speaks to the benefits of spiral learning and sequential assimilation of clinical and pharmaceutical skills. Beyond this, it also states that pharmacist education should be linked to an accepted career framework and structure and that this be represented by a CBE training programme. Any such programme should then have a significant proportion of its time delivered in clinical practice, preferably with an IPE element. In such an environment, the pharmacist in training should be clinically supervised and offered SLEs to support their learning. Simulation is a useful technique to augment learning in certain clinical scenarios at any career level.

Further work outlined in each of the publications in Chapters Three, Four and Six has already been completed or is underway. Despite the recommendations above, several questions remain, particularly around the utilisation of advanced pharmacist practice skills as highlighted in Chapter Seven (ACE). This area is particularly worthy of the development of a programme of research to explore further as utilisation of these skills in practice is an essential prerequisite of advanced pharmacist practitioner practice (as outlined in Appendix 2). There would appear to be the need to focus on two separate areas in this regard, and outline proposals for these will be discussed below.

8.5.1. Future research proposal A

The ACE paper from Chapter Seven highlighted that the advanced GPCP cohort were unable to implement their newly acquired advanced clinical skills. There were multiple factors for this which led to innovators in this cohort feeling alienated. In particular, the lack of understanding of the potential of these pharmacists with adapted skill sets: either within their clinical teams; management structures; within and external to their own profession; and within national pharmacy leadership structures.

What is not known is the degree to which alienation may be felt in general by pharmacist prescribers who have not been exposed to an ACE course, or whether this is an NHS Scotland only issue. Given the impending 2026 change to pharmacist prescribing legislation, there is a need to explore this with some urgency as critical to the future success of pharmacist clinicians delivering direct autonomous clinical care, is understanding these issues.

Title:

An exploration of the potential for alienation within pharmacist prescribers in the UK

Research aim:

To explore the potential for alienation within prescribing pharmacists in the UK

Ethics:

Ethical Review Panel, School of Pharmacy & Life Sciences, Robert Gordon University and the North of Scotland Research Ethics Committee will be asked for a view on the need for a full ethics submission.

Setting:

Hospital, general practice, and community pharmacy locations in the UK

Inclusion criteria:

Registered pharmacists working in UK Hospitals, GP practices or community pharmacy settings.
Pharmacists with independent prescribing (IP) qualification.
Pharmacists providing patient facing/clinical services to patients.

Exclusion criteria:

Pharmacists without access to patients as part of their job plan/description.

Sampling / recruitment:

Sampling will be done in collaboration with Health Boards and professional leadership bodies.
As part of the electronic completion of the questionnaire, informed consent will be obtained.
An a-priori sample size will not be calculated to obtain a high-participation rate.

Study Design / Data collection:

The research will use a cross-sectional electronic questionnaire underpinned by the TDF.

Development of data collection tools:

Questions will be informed by previous research and TDF, in relation to the research question. Questions will include sections for demographics. Likert scales will be used to determine the degree of alienation and barriers to implementation of skills. Free-text boxes will be added to allow for more detail to be given by participants. The questionnaire will be checked for face validity within the research team before being piloted in at least 10 participants matching the inclusion/exclusion criteria. The questionnaire will be created on Microsoft Office forms.

Data collection:

Questionnaires will be completed electronically.

Data storage:

All data will be stored and processed in accordance with the Data Protection Act (1998) and secured on the host organisation password protected server. Raw data will be checked to ensure validity by members of the research team.

Analysis:

An a-priori plan for the analysis of the data will be written before the dataset is locked. A statistician will be used to process the data. Descriptive and inferential statistics will be used to characterise the sample and analyse the data.

8.5.2. Future research proposal B

In parallel with the work outlined in section 8.5.3 there is a need to also explore whether other pharmacist clinicians within NHS teams are experiencing barriers to the implementation of their advanced clinical skills. Within the ACE paper in Chapter Seven, there was an overview of a programme of research conducted in Northern England exploring the training and impact of pharmacist prescribers with advanced clinical skills in emergency departments (Hughes et al. 2017, Terry et al. 2021, Greenwood et al. 2019). These studies explore the education and training methods undertaken in this setting in England. The NHS in Scotland does not have a training programme currently for the development of advanced pharmacist practitioners or advanced pharmacists in secondary care. However, many hospital pharmacists in Scotland are now undertaking ACE courses in a similar way to GPCPs reported in Chapter Seven. It is not yet known what the behavioural determinants are for the implementation of ACE course advanced clinical skills within the hospital sector of practice. This proposal would look to replicate the work completed in Chapter Seven in a secondary care cohort operating at the advanced pharmacist level.

Title:

Hospital pharmacists' implementation of advanced clinical assessment skills: a qualitative study of behavioural determinants.

Research aim:

To explore potential behavioural determinants influencing the implementation of skills gained from Advanced Clinical Examination and Assessment courses by hospital pharmacists.

Ethics:

Ethical Review Panel, School of Pharmacy & Life Sciences, Robert Gordon University and the North of Scotland Research Ethics Committee will be asked for a view on the need for a full ethics submission.

Setting:

Hospital locations in each NHS Scotland Health Board.

Inclusion criteria:

Registered pharmacists working in Hospitals in NHS Scotland.

Pharmacists with IP qualification.

Pharmacists providing patient facing/clinical services to patient within the hospital setting.

Pharmacists who have completed an ACE course.

Exclusion criteria:

Pharmacists without access to patients as part of their job plan/description.

Sampling / recruitment:

In collaboration with Directors of Pharmacy for each territorial Scottish Health Board, a recruitment call will be designed to identify pharmacists that meet the inclusion criteria.
Informed consent will be obtained.

Study Design / Data collection:

The research will use an interpretivist philosophy and semi-structured qualitative dyadic interviews.

Development of data collection tools:

Semi-structured interview schedules will be informed by previous research and TDF, in relation to the research question. The interview schedule will be checked for face validity within the research team before being piloted in at least 2 participants matching the inclusion/exclusion criteria, to check for content validity. Changes will be made to the interview schedule as appropriate.

Data collection:

Dyadic semi-structured interviews will be conducted on Microsoft Teams and recorded with participants' informed consent using the recording function within the software package. Participants will be allocated at random to dyads. Verbatim transcriptions of the interviews will then be created and check for accuracy. The interview transcriptions will constitute the data to be analysed.

Data storage:

All data will be stored and processed in accordance with the Data Protection Act (1998) and secured on the host organisation password protected server.

Analysis:

Framework analysis will be undertaken using the TDF. Interview codes will be based on the domains of the TDF before being examined for subthemes. Data saturation will be tested using the Francis method. The analysis will be performed by two researchers independently, with disagreements being resolved by research team discussion. Illustrative quotes will be identified by discussion. Qualitative data will be managed using NVivo Software. The COREQ will be followed for the reporting of research findings.

8.6. Conclusions

The research and public outputs presented in this thesis demonstrate a variety of innovative educational techniques and modalities of training to enable pharmacists to develop as clinicians. The training of a clinician suitable for duty on front-line NHS services does not happen solely in the postgraduate, or post-registration space. Early exposure to clinical placements as undergraduates, especially those utilising innovative educational techniques like longitudinal clerkship, simulation and interprofessional learning, will aid the expeditious development of a pharmacist clinician upon graduation. Similarly, in the post-registration space, training programmes should be devised to deliver a defined pharmacist clinician-product, which can be utilised and employed within a widely understood clinical service model. In creation of these training programmes, consideration must be given as to the functionality and need for specific additional qualifications, where any qualification which is mandated by that programme should be critical to the implementation of the behaviours learnt on the qualification. To this end, the research and APP Report included in this thesis would support the use of ACE courses as part of a targeted development for Advanced Pharmacist Practitioner practice within NHS Scotland. Again, educational techniques such as simulation can support the safe development of advanced clinical skills and decision-making to enable the development of pharmacists as clinicians. The changes to prescribing status at point of registration from 2026, and the innovations presented in this thesis, give the profession a unique opportunity to transform education and training to enable pharmacist clinician development in support of front-line NHS healthcare capacity, and most critically, patients.

REFERENCES

ABDELHAKIM, H.E., et al., 2022. Medical and pharmacy students' perspectives of remote synchronous interprofessional education sessions. *BMC Medical Education,* 22(611), pp. 1-10.

AMIN, M.E.K., et al., 2020. Establishing trustworthiness and authenticity in qualitative pharmacy research. *Research in Social and Administrative Pharmacy,* 16(10), pp. 1472-1482.

ANDERSON, S., 2023*. A history of pharmacy in Great Britain*. [online]. Available from: http://www.bshp.org/aboutus/PharmceuticalHistory.asp [Accessed 19 April 2023].

BANDARA, A., 1986. *Social foundations of thought and action: a social cognitive theory.* Englewood Cliffs, NJ: Prentice-Hall.

BAUMGARTNER, L., et al., 2021. Performance on advanced pharmacy practice experiences after implementation of mock acute care patient simulations. *Currents in Pharmacy Teaching and Learning,* 13(12), pp. 1572-1577.

BOWLING, A., 2009. *Research methods in health.* 3rd ed. Maidenhead: McGraw-Hill.

CAMPAGNA, K.D., 1995. Pharmacists' levels of performance in making drug therapy decisions. *American Journal of Health-System Pharmacy,* 52(6), pp. 640-644.

CANE, J., O'CONNOR, D. and MICHIE, S., 2012. Validation of the theoretical domains framework for use in behaviour change and implementation research. *Implementation Science,* 7, pp. 37.

CARAYON, P., 2006. *Handbook of human factors and ergonomics in health care and patient safety.* Boca Raton: CRC Press.

CHRISTENSEN, C.M., GROSSMAN, J.H. and HWANG, J., 2009. *The innovator's prescription: a disruptive solution for health care.* New York: McGraw-Hill.

CHRISTOU, M., et al., 2021. Structured block placements of hospital pre-registration trainee pharmacists in primary care medical practices across the United Kingdom: lessons from a pilot scheme. *Currents in Pharmacy Teaching and Learning,* 13(3), pp. 302-311.

CRESWELL, J., 2012. *Qualitative inquiry and research design: choosing among five approaches.* 3rd ed. Thousand Oaks, CA: Sage.

CROTTY, M., 1998. *The foundations of social research.* London: Sage.

CROWN, J., 1999. *Review of prescribing, supply and administration of medicines. Final report.* London: Department of Health.

DARBY, S., et al., 2023. Development of a value-based care and population health internship for student pharmacists. *Currents in Pharmacy Teaching and Learning,* 15(2), pp. 164-169.

DAWOUD, D., et al., 2011. Pharmacist supplementary prescribing: A step toward more independence? *Research in Social and Administrative Pharmacy,* 7(3), pp. 246-256.

DONABEDIAN, A., 1988. The quality of care: how can it be assessed? *Journal of the American Medical Association,* 260(12), pp. 1743-1748.

DONOVAN, G., et al., 2019. Introducing pharmacy students to the structure and function of general practice through undergraduate placements. *Currents in Pharmacy Teaching and Learning,* 11(10), pp. 1055-1064.

EL NSOULI, D., et al., 2023. The application of Kirkpatrick's Evaluation Model in the assessment of interprofessional simulation activities involving pharmacy students: a systematic review. *American Journal of Pharmaceutical Education,* 87(8), pp. 100003.

FORSYTH, P., et al., 2023. The Collaborative Care Model: Realizing healthcare values and increasing responsiveness in the pharmacy workforce. *Research in Social and Administrative Pharmacy,* 19(1), pp. 110-122.

FORSYTH, P. and RUSHWORTH, G.F., 2021. Advanced pharmacist practice: where is the United Kingdom in pursuit of this 'Brave New World'? *International Journal of Clinical Pharmacy,* 43, pp. 1426-1430.

GEHRKE-BECK, S., et al., 2023. Development of a project for interprofessional collaboration between medical and pharmacy students to improve medication safety in polypharmacy (PILLE). *GMS Journal for Medical Education,* 40(1), pp. 1-18.

GENERAL MEDICAL COUNCIL, 2016. *Promoting excellence: standards for medical education and training.* London: GMC.

GENERAL PHARMACEUTICAL COUNCIL, 2023*. Historic qualifications leading to eligibility to be admitted to the Register and to Membership of the (Royal) Pharmaceutical Society of Great Britain ((R)PSGB)*. [online]. Available from: https://www.pharmacyregulation.org/sites/default/files/document/historic_qualifications_leading_to_the_register_and_to_membership_of_the_rps_of_gb.pdf [Accessed 19 April 2023].

GENERAL PHARMACEUTICAL COUNCIL, 2021*. Standards for the initial education and training of pharmacists*. [online]. Available from: https://www.pharmacyregulation.org/sites/default/files/document/standards-for-the-initial-education-and-training-of-pharmacists-january-2021_0.pdf [Accessed 20 January 2021].

GEORGE, J., et al., 2006. Independent prescribing by pharmacists: a study of the awareness, views and attitudes of Scottish community pharmacists. *Pharmacy World & Science,* 28, pp. 45-53.

GILLIAM, E.H., et al., 2020. A multimethod evaluation of an interprofessional IPPE in an underserved clinic. *Currents in Pharmacy Teaching and Learning,* 12(6), pp. 663-670.

GRAY, D., 1992. History of the Royal College of General Practitioners - the first 40 years. *British Journal of General Practice,* 42, pp. 29-35.

GREENWOOD, D., et al., 2019. The description and definition of emergency department pharmacist practitioners in the United Kingdom (the ENDPAPER study). *International Journal of Clinical Pharmacy,* 41, pp. 434-444.

HAMILTON, D., 2003. *The healers: a history of medicine in Scotland.* 2nd ed. Edinburgh: Meerkat Press Ltd.

HEALTH EDUCATION ENGLAND, 2022*. Governance of advanced practice in health and care provider organisations*. [online]. Available from: https://advanced-practice.hee.nhs.uk/news-and-events/governance-of-advanced-practice-in-health-and-care-provider-organisations/ [Accessed 10 March 2023].

HEPLER, C.D. and STRAND, L.M., 1990. Opportunities and responsibilities in pharmaceutical care. *American Journal of Hospital Pharmacy,* 47(3), pp. 533-543.

HINDI, A.M.K., WILLIS, S.C. and SCHAFHEUTLE, E.I., 2022a. Cross-sector pre-registration trainee pharmacist placements in general practice across England: a qualitative study exploring the views of pre-registration trainees and education supervisors. *Health and Social Care in the Community,* 30(6), pp. 2330-2340.

HINDI, A.M.K., et al., 2022b. Contribution of supervision to the development of advanced practitioners: a qualitative study of pharmacy learners' and supervisors' views. *BMJ Open,* 12(4), pp. e059026.

HOLLOWAY, S.W.F., 1966. The Apothecaries' Act, 1815: a reinterpretation. *Medical History,* 10(2), pp. 107-129.

HUGHES, E., et al., 2017. Future enhanced clinical role of pharmacists in emergency departments in England (PIED-Eng): multi-site observational evaluation. *International Journal of Clinical Pharmacy,* 39, pp. 960-968.

IBRAHIM, A.S.H., et al., 2023. Development of a core set of clinical skills for pharmacist prescribers working in general practice: A Delphi study. *Research in Social and Administrative Pharmacy,* 19, pp. 628-633.

JACOB, S.A., et al., 2022. Competency-based assessment in experiential learning in undergraduate pharmacy programmes: qualitative exploration of facilitators' views and needs (ACTp study). *Pharmacy,* 10(4), pp. 1-14.

JONES, R., 2006. Apothecaries, physicians and surgeons. *British Journal of General Practice,* 56(524), pp. 232-233.

KAHNEMAN, D., 2012. *Thinking, fast and slow.* UK: Penguin.

KAYYALI, R., et al., 2019. Simulation in pharmacy education to enhance interprofessional education. *International Journal of Pharmacy Practice,* 27(3), pp. 295-302.

KERR, A., et al., 2021. Early longitudinal community pharmacy placements: Connection, integration and engagement. *Research in Social and Administrative Pharmacy,* 17(7), pp. 1313-1320.

KIRKPATRICK, D.L. and KIRKPATRICK, J.D., 2006. *Evaluating training programs: the four levels.* 3rd ed. Oakland: Berrett-Koehler Publishers.

KNOWLES, M., 1984. *Andragogy in action: applying modern principles of adult learning.* San Francisco, CA: Jossey-Bass.

KNOWLES, M., 1980. *The modern practice of adult education: from pedagogy to andragogy.* 2nd ed. New York: Cambridge Books.

KNOWLES, M., 1973. *The adult learner: a neglected species.* Houston, Tx: Gulf Publishing.

KOLB, D.A., 1984. *Experiential learning: experience as the source of learning and development.* Englewood Cliffs, NJ: Prentice Hall.

LAVE, J. and WENGER, E., 1991. *Situated learning: legitimate peripheral participation.* New York: Cambridge University Press.

LIAW, S. and PETERSON, G., 2009. Doctor and pharmacist - back to the apothecary! *Australian Health Review,* 33(2), pp. 268-278.

LOUDON, I., 2008. General practitioners and obstetrics: a brief history. *Journal of the Royal Society for Medicine,* 101, pp. 531-535.

MARCUM, J., 2009. The epistemically virtuous clinician. *Theoretical Medicine and Bioethics,* 30, pp. 249-265.

MATHESON, C., et al., 2020. Development of an education and support framework for pharmacists working in GP practice. *International Journal of Pharmacy Practice,* 28(2), pp. 191-199.

MAY, A., 2014. *Constructive alignment in simulation: why we don't simply replicate what happened in the resus room last week*. [online]. Available from: https://scotsimcentre.blogspot.com/2014/01/constructive-alignment-in-simulation.html [Accessed 10 March 2023].

MCCARTNEY, M., 2016. *Farewell Doctor Finlay*. [online]. Available from: https://www.bbc.co.uk/programmes/b07j7nty [Accessed 4 January 2023].

MCINTOSH, T. and STEWART, D., 2016. A qualitative study of UK pharmacy pre-registration graduates' view and reflections on pharmacist prescribing. *International Journal of Pharmacy Practice,* 24, pp. 139-141.

MCINTOSH, T., et al., 2011. A cross sectional survey of the views of newly registered pharmacists in Great Britain on their potential prescribing role: a cautious approach. *British Journal of Clinical Pharmacology,* 73(4), pp. 656-660.

NATIONAL INSTITUTE FOR HEALTH AND CARE RESEARCH, 2023. *Plan your pathway to impact*. [online]. Available from: https://www.nihr.ac.uk/researchers/apply-for-funding/how-to-apply-for-project-funding/plan-for-impact.htm [Accessed 15 May 2023].

NATIONAL INSTITUTE FOR HEALTH AND CLINICAL EXCELLENCE, 2018. *Chronic obstructive pulmonary disease in over 16s: diagnosis and management: NICE guideline*. [online]. Available from: https://www.nice.org.uk/guidance/ng115/resources/chronic-obstructive-pulmonary-disease-in-over-16s-diagnosis-and-management-pdf-66141600098245 [Accessed 1 February 2023].

NHS EDUCATION FOR SCOTLAND, 2020. *Experiential learning for student pharmacists in Scotland*. [online]. Available from: https://www.nes.scot.nhs.uk/our-work/experiential-learning-for-student-pharmacists-in-scotland/ [Accessed 20 April 2020].

NHS EDUCATION FOR SCOTLAND, 2016. *General practice clinical pharmacist: competency and capability framework.* Edinburgh: NES.

NILSEN, P., 2015. Making sense of implementation theories, models and frameworks. *Implementation Science,* 10(53), pp. 1-13.

NOBLE, H. and SMITH, J., 2015. Issues of validity and reliability in qualitative research. *Evidence-Based Nursing,* 18(2), pp. 34-35.

NORRIS, T.E., et al., 2009. Longitudinal integrated clerkships for medical students: an innovation adopted by medical schools in Australia, Canada, South Africa, and the United States. *Academic Medicine,* 84(7), pp. 902.

REID, J., 1972. *Alienation*. [online]. Available from: https://universitystory.gla.ac.uk/documents/UGSD00007.pdf [Accessed 10 March 2023].

RILEY, B., HAYNES, J. and FIELD, S., 2007. *The condensed curriculum guide.* London: RCGP.

RITCHIE, J. and SPENCER, L., 1994. Qualitative data analysis for applied policy research. In: A. BRYMAN and R.G. BURGESS, eds, *Analyzing qualitative data.* Oxon: Routledge, pp. 173-194.

ROBERT GORDON UNIVERSITY, 2022. *Academic regulations. Regulation A6: research degrees 2022-23*. [online]. Available from: https://www.rgu.ac.uk/about/governance/academic-governance/academic-regulations [Accessed 13 May 2023].

ROBERT GORDON UNIVERSITY, 2016a. *Research data management policy.* Aberdeen: RGU.

ROBERT GORDON UNIVERSITY, 2016b. *Research ethics policy.* Aberdeen: RGU.

ROBERT GORDON UNIVERSITY, 2016c. *Research Governance and Integrity Policy.* Aberdeen: RGU.

ROYAL COLLEGE OF GENERAL PRACTITIONERS SCOTLAND and ROYAL PHARMACEUTICAL SOCIETY SCOTLAND, 2016. *RCGP Scotland and RPS Scotland Joint Statement: Breaking down the barriers - how pharmacists and GPs can work together to improve patient care*. [online]. Available from: http://www.rpharms.com/current-campaigns--scotland-pdfs/rpsscotlandrcgpjointstatement.pdf [Accessed 24 February 2017].

ROYAL PHARMACEUTICAL SOCIETY, 2023. *History of the Society*. [online]. Available from: https://www.rpharms.com/about-us/history-of-the-society [Accessed 21 April 2023].

ROYAL PHARMACEUTICAL SOCIETY, 2021a. *Core advanced pharmacist curriculum*. [online]. Available from: https://www.rpharms.com/development/credentialing/core-advanced-pharmacist-curriculum [Accessed 4 November 2021].

ROYAL PHARMACEUTICAL SOCIETY, 2021b. *Post-registration foundation pharmacist curriculum*. [online]. Available from:

https://www.rpharms.com/Portals/0/Foundation%20Curriculum/RPS%20Post-registration%20Foundation%20Curriculum-FINAL.pdf?ver=gPy42LspTywTVu6VgEg4dA%3d%3d [Accessed 3 November 2022].

ROYAL PHARMACEUTICAL SOCIETY, 2020. *Consultant pharmacist curriculum*. [online]. Available from: https://www.rpharms.com/Portals/0/Consultant/Open%20Access/RPS%20Consultant%20Pharmacist%20Curriculum%202020_FINAL.pdf?ver=huDM4dXTEjtXpcaPQD3j8w%3d%3d [Accessed 2 February 2023].

ROYAL PHARMACEUTICAL SOCIETY SCOTLAND, 2022. *Pharmacy 2030: a professional vision*. [online]. Available from: https://www.rpharms.com/Portals/0/RPS%20document%20library/Open%20access/Scotland/Pharmacy%202030%20vision/Pharmacy%202030%20Full%20professional%20vision%20Jan22.pdf?ver=WD2LOOTwG4ejGBfEPC6D0w%3d%3d [Accessed 31 January 2023].

ROYAL PHARMACEUTICAL SOCIETY SCOTLAND and BRITISH MEDICAL ASSOCIATION SCOTLAND, 2023. *Joint RPS and BMA Scottish GP Committee statement on the Pharmacotherapy Service*. [online]. Available from: https://www.rpharms.com/Portals/0/Joint%20BMA-RPS%20pharmacotherapy%20service%2013%20Jan%202023.pdf [Accessed 10 March 2023].

RUSHWORTH, G.F., et al., 2023. *NHS Scotland Advanced Pharmacist Practitioner Short-Life Working Group: final report & recommendations to the NHS Scotland Pharmacist Post-Registration Strategic Group.*

SAUNDERS, M., LEWIS, P., THORNHILL, A. and BRISTOW, A., 2019. Chapter 4: Understanding research philosophy and approaches to theory development. *Research Methods for Business Students.* Harlow: Pearson, pp. 128-171.

SCOTTISH EXECUTIVE, 2002. *The right medicine: a strategy for pharmaceutical care in Scotland*. [online]. Available from: https://www.sehd.scot.nhs.uk/publications/DC20020204RightMed.pdf [Accessed 10 January 2010].

SCOTTISH GOVERNMENT, 2017a. *The 2018 General Medical Services Contract for Scotland*. [online]. Available from: https://www.gov.scot/publications/gms-contract-scotland/ [Accessed 22 August 2021].

SCOTTISH GOVERNMENT, 2017b. *Achieving excellence in pharmaceutical care: a strategy for Scotland*. [online]. Available from: https://www.gov.scot/publications/achieving-excellence-pharmaceutical-care-strategy-scotland/ [Accessed 25 October 2022].

SCOTTISH GOVERNMENT, 2013. *Prescription for excellence: a vision and action plan for the right pharmaceutical care through integrated partnerships and innovation*. [online]. Available from: http://www.scotland.gov.uk/Resource/0043/00434053.pdf [Accessed 20 July 2022].

SCOTTISH PARLIAMENT, 2019. *Health and Care (Staffing) (Scotland) Act 2019*. [online]. Available from: https://www.legislation.gov.uk/asp/2019/6/enacted [Accessed 27 September 2022].

STEWART, D. and KLEIN, S., 2016. The use of theory in research. *International Journal of Clinical Pharmacy,* 38(3), pp. 615-619.

SWANWICK, T., 2010. *Understanding medical education.* Oxford: Wiley-Blackwell.

TERRY, D., et al., 2021. Pharmacists in advanced clinical practice roles in emergency departments (PARED). *International Journal of Clinical Pharmacy,* 43, pp. 1523-1532.

THISTLETHWAITE, J.E., et al., 2013. A review of longitudinal community and hospital placements in medical education: BEME Guide No. 26. *Medical Teacher,* 35(8), pp. e1340-e1364.

TUFFORD, L. and NEWMAN, P., 2012. Bracketing in qualitative research. *Qualitative Social Work,* 11(1), pp. 80-96.

TURAS and NHS EDUCATION FOR SCOTLAND, 2022. *NHS Scotland pharmacy workforce (managed service)*. [online]. Available from: https://turasdata.nes.nhs.scot/data-and-reports/official-workforce-statistics/all-official-statistics-publications/06-december-2022-workforce/dashboards/nhsscotland-pharmacy-workforce-managed-service/?pageid=8103 [Accessed 6 January 2023].

UK RESEARCH AND INNOVATION, 2022. *Defining impact*. [online]. Available from: https://www.ukri.org/councils/esrc/impact-toolkit-for-economic-and-social-sciences/defining-impact/ [Accessed 15 May 2023].

UNIVERSITY OF CAMBRIDGE, 2023. *Philosophy*. [online]. Available from: https://dictionary.cambridge.org/dictionary/english/philosophy [Accessed 10 February 2023].

WAGHORN, J., et al., 2021. Clinical judgement analysis: an innovative approach to explore the individual decision-making processes of pharmacists. *Research in Social and Administrative Pharmacy,* 17(12), pp. 2097-2107.

WILSON, J., et al, 2015. *The metric tide: report of the independent review of the role of metrics in research assessment and management*. [online]. Available from: https://www.ukri.org/publications/review-of-metrics-in-research-assessment-and-management/ [Accessed 15 May 2023].

ZEBROWSKI, B., 2016. *A brief history of pharmacy: humanity's search for wellness.* Oxon: Routledge.

APPENDIX 1: CONFIRMATION OF AUTHORSHIP AND CREDIT STATEMENTS

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Application for Research Degree (PhD) by Public Output Registration

Name of Applicant: Gordon Rushworth

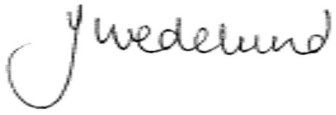
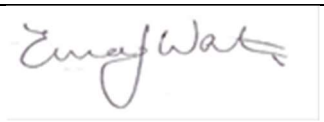
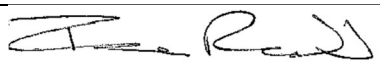
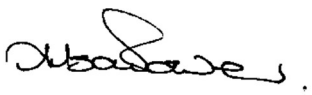
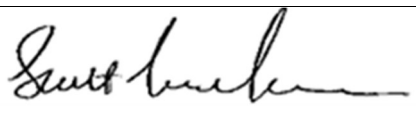
In accordance with Section 11 of University Regulation A6: Research Degrees, I hereby give permission for the applicant to submit the publication listed below as part of a portfolio of published work for consideration by Robert Gordon University for a Research Degree (PhD) by Public Output.

Co-authored article:

Innes C, **Rushworth G**, Addison B, Wedekind Y, Watson E, Rudd I, Power A, Cunningham S. An innovative General Practice based Pharmacy Longitudinal Clerkship: using theory to characterise its development, implementation and initial evaluation. Education in Primary Care. 2021; 33(3): 173-179. *https://doi.org/10.1080/14739879.2021.1996275*

CREDIT authorship statement for GR:

Conceptualization, Funding acquisition; Methodology; Project administration, Writing - review & editing.

Name	Signature	Date
Catriona Innes		28/10/21
Brian Addison		26/10/2021
Yvonne Wedekind		26/10/2021
Emma Watson		26/10/2021
Ian Rudd		26/10/2021
Ailsa Power		26/10/2021
Scott Cunningham		26/10/2021

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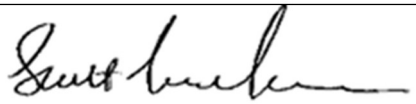
Innes C, Cunningham S, Addison B, Wedekind Y, Watson E, Rudd I, Power A, Karim L, **Rushworth GF**. General practice-based pharmacy longitudinal clerkship: a theoretically underpinned qualitative evaluation. International Journal of Clinical Pharmacy. 2022; 44: 1123-1131. https://doi.org/10.1007/s11096-022-01429-0

CREDIT authorship statement for GR:

Conceptualization, Funding acquisition; Investigation; Methodology; Project administration, Roles/Writing - original draft; Writing - review & editing.

Name	**Signature**	**Date**
Catriona Innes		10/05/2022
Scott Cunningham		10/05/2022
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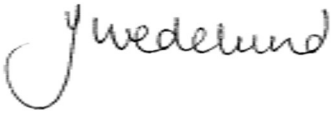
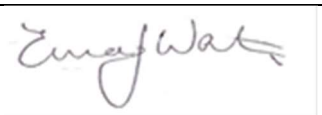
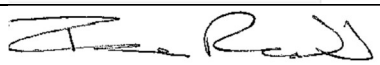
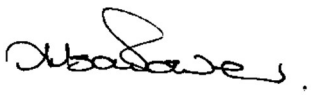
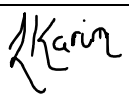
Yvonne Wedekind		10/05/2022
Emma Watson		10/05/2022
Ian Rudd		10/05/2022
Ailsa Power		10/05/2022
Laura Karim		10/05/2022

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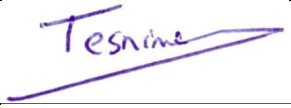
Co-authored article:

Jebara T, Thomas I, Cunningham S, **Rushworth G**. Clinical Teacher. 2022; 19(2): 143-149. *https://doi.org/10.1111/tct.13450*

CREDIT authorship statement for GR:

Conceptualization, Funding acquisition; Investigation; Methodology; Project administration, Roles/Writing - original draft; Writing - review & editing.

Name	**Signature**	**Date**
Tesnime Jebara		11/01/2022
Ian Thomas		5/1/22
Scott Cunningham		5 Jan 22

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Co-authored article:

Rushworth GF, Innes C, Macdonald A, MacDonald C, McAuley L, McDavitt A, Stewart F, Bruce R. Development of innovative simulation teaching for advanced general practice clinical pharmacists. International Journal of Clinical Pharmacy. 2021; 43: 817-824. *https://doi.org/10.1007/s11096-021-01305-3*

CREDIT authorship statement for GR:

Conceptualization, Funding acquisition; Investigation; Methodology; Project administration, Formal analysis; Roles/Writing - original draft; Writing - review & editing.

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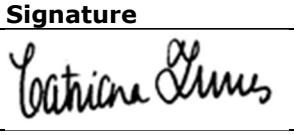
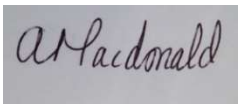
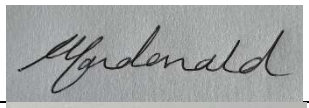
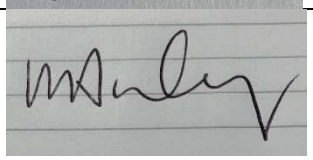
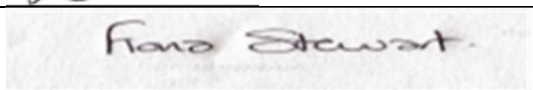
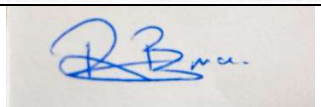
Catriona Innes		28/10/2021
Ailsa Macdonald		27/10/21
Catriona MacDonald		26/10/2021
Laura McAuley		03/11/2021
Anthony McDavitt		26/10/2021
Fiona Stewart		01/11/2021
Rachel Bruce		03/11/2021

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Co-authored article:

Forsyth P, **Rushworth GF**. Advanced pharmacist practice: where is the United Kingdom in pursuit of this '*Brave New World*'?. International Journal of Clinical Pharmacy. 2021; 43: 1426-1430. *https://doi.org/10.1007/s11096-021-01276-5*

CREDIT authorship statement for GR:

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Application for Research Degree (PhD) by Public Output Registration

Name of Applicant: Gordon Rushworth

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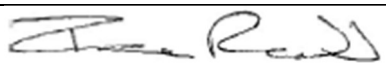
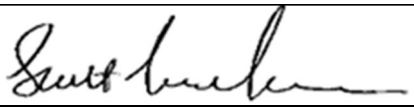
Co-authored article:

Rushworth GF, Jebara T, Tonna AP, Rudd I, Stewart F, MacVicar R, Cunningham S. General Practice Pharmacists' implementation of Advanced Clinical Assessment skills: a qualitative study of behavioural determinants. International Journal of Clinical Pharmacy. 2022; 44: 1417-1424. *https://doi.org/10.1007/s11096-022-01484-7*

CREDIT authorship statement for GR:

Conceptualization, Funding acquisition; Investigation; Methodology; Project administration; Formal analysis; Roles/Writing - original draft; Writing - review & editing.

Name	**Signature**	**Date**
Dr Tesnime Jebara		12/06/2022
Dr Antonella Tonna		20/06/2022
Ian Rudd		13/06/2022
Fiona Stewart		14/06/2022
Prof Ronald MacVicar		10/06/2022
Prof Scott Cunningham		15/06/2022

NHS Scotland APP SLWG Final Report

Application for Research Degree (PhD) by Public Output Registration

Name of Applicant: Gordon Rushworth

In accordance with Section 11 of University Regulation A6: Research Degrees, I hereby give permission for the applicant to submit the publication listed below as part of a portfolio of published work for consideration by Robert Gordon University for a Research Degree (PhD) by Public Output.

Co-authored article:

Rushworth GF, MacVicar R, Garden S, on behalf of the NHS Scotland Advanced Pharmacist Practitioner Short-Life Working Group. NHS Scotland Advanced Pharmacist Practitioner Short-Life Working Group: Final report & recommendations to the NHS Scotland Pharmacist Post-Registration Strategic Group. 2023.

CREDIT authorship statement for GR:

Conceptualization, Methodology; Project administration; Formal analysis; Roles/Writing - original draft; Writing - review & editing.

Name	**Signature**	**Date**
Prof Ronald MacVicar		30/11/2022
Scott Garden		31/01/2023

NHS SCOTLAND
ADVANCED PHARMACIST PRACTITIONER SHORT-LIFE WORKING GROUP

Final Report & Recommendations

to the NHS Scotland Pharmacist Post-Registration Strategic Group

February 2023

FOREWORD

The National Health Service in Scotland is our most cherished public resource. It provides care, free at the point of contact, for all citizens. Generations of patients have been delivered into its care from birth and lived long and supported lives with its help. The constant pressure, under which the NHS operates as a matter of course, is well documented. However, its staff and systems were tested to the extreme at the height of the COVID pandemic and adapted to provide the required care.

In the wake of the pandemic, the NHS needs to rebuild, grow, and transform the services that it offers. The Scottish Government's *NHS Recovery Plan* and the *Health and Social Care Staffing: National Workforce Strategy* call for transformative changes to the workforce in support of the service and *Care and Wellbeing Portfolio.*

In response, a group was established to assess the opportunity for the pharmacist profession to adapt and evolve to meet this need within our NHS. The NHS Scotland Advanced Pharmacist Practitioner Short-life Working Group sought opinion from pharmacist clinicians and service leads from all sectors of the pharmacy profession. The group met four times between February and August 2022 and discussed the following topics relating to the Advanced Pharmacist Practitioner model: understanding & definition; organisational fit; education & training; and operationalisation. The products of these meetings are contained as chapters in this report.

Recommendations follow each of the chapters as described above and have been linked to the NHSS APP SLWG Terms of Reference. The express recommendation from the SLWG is for the establishment of APPs within NHSS to enable pharmacist clinicians to contribute as part of a transformed NHS Scotland workforce. This should be addressed as a matter of priority.

The vision outlined in this report translates into reimagining the limits of pharmacist-delivered care to encompass more expansive clinical care models. Achieving this vision of pharmacist-delivered care will be as challenging as it is pressing.

Prof Ronald MacVicar	Gordon Rushworth	Scott Garden
Chair	Deputy Chair/Prof Secretary	Chair
NHSS APP SLWG	NHSS APP SLWG	NHSS Advanced Pharmacist Group

On behalf of the NHS Scotland Advanced Pharmacist Practitioner Short-Life Working Group

EXECUTIVE SUMMARY

Over the last few years, the NHS has faced an unprecedented test in its delivery of care to the public in response to the COVID pandemic. At its height, the challenge of service provision during the pandemic was keenly and universally felt by all specialties, disciplines, and sectors of the NHS. To cope with the pressure and demands placed on it, the NHS evolved and adapted in real-time to face up to the clinical need of the age. Now, with the country in a post-pandemic recovery phase, the Scottish Government have called upon all NHS services to rethink how they can contribute to the burgeoning NHS workload, backlog, waiting lists and clinical pressure being exerted on NHS Scotland services. The most recent policy documents focused on this task are the NHS Recovery Plan[1] and the Health and Social Care Staffing: National Workforce Strategy[2] in support of the Care and Wellbeing Portfolio[3].

The aim of commissioning the APP SLWG was to seek out representation and views from all stakeholders and sectors of the pharmacist profession within NHS Scotland (see Appendix 1) as to the inception, creation, and implementation of a new model of pharmacy practice within Scotland, termed the Advanced Pharmacist Practitioner (APP). This report presents the findings of the group, in line with the terms of reference (ToR, see Appendix 2). All recommendations have been made in direct response to Scottish Government strategy. A summary of the 14 recommendations made by the SLWG, linked to the NHSS APP SLWG Terms of Reference, are listed in the next section and are linked throughout this report.

Key messages from this report are:

The Definition:

"Advanced Pharmacist Practitioners are accredited advanced pharmacists working in a generalist specialty. In addition to the expected characteristics of an advanced pharmacist, they possess the ability to manage patients through full episodes of care by autonomous application of a suite of advanced generalist clinical assessment, investigative, procedural, communicative, diagnostic, prescribing and decision-making skills, over a wide range of clinical systems and presentations specific to that specialism."

The Service Model:

- APP roles are advanced generalists and this model of practice should primarily be considered for implementation in GP, Acute Adult (e.g. Acute Receiving; Emergency Department; Acute Specialist unit; OOH) and Paediatric populations where a proportion of their work will cover assessment and management of undifferentiated, undiagnosed presentations.
- APPs will predominantly be embedded within clinical specialties/services.

The Need:

- To increase NHS healthcare capacity to aid recovery and remobilisation.
- To address real-time clinical need, as clinicians, embedded within clinical services/specialties.

- To deliver a front-line clinician workforce capable of autonomously managing full episodes of patient care.
- To lead the medicines governance agenda and clinical therapeutics, within their clinical specialty.
- To provide high-quality clinical supervision to develop skills, competence, and confidence, in the pharmacy and wider clinical workforce.
- To deliver a clinician workforce that is responsive to patient/population need and can
- regularly lead service improvement, using research where necessary.

The Training:

- Be designed to meet the needs of the patient group and clinical service which they will work in once completed.
- Be clinically preceptored, and formally accredited using an appropriate competency-based curriculum.
- Cover acquisition of theoretical knowledge and practical skills (assessment and procedural).
- Be supported by a syllabus relevant to the specific clinical service.
- Be delivered in formal training posts.

The Implementation:

- Service visioning work, aligned with national drivers, should be focused on the development of an integrated pharmacy offer in response to Scottish Government policy.
- Part of this visioning should include funding models based on the figures outlined in this report.
- Executive level pharmacy and non-pharmacy sponsorship will be required in support of this work.
- Future Scottish Government policy should include this type of advanced pharmacist practice.

SUMMARY OF RECOMMENDATIONS

The following gives a summary of the recommendations made throughout this report in the context of the ToR for the establishment of the SLWG.

ToR 1- Define the term "Advanced Pharmacist Practitioner" (APP) and make recommendations for reserving its use within NHS Scotland.

Recommendation 1: The following definition of an APP should be accepted for use within NHS Scotland:
"Advanced Pharmacist Practitioners are accredited advanced pharmacists working in a generalist specialty. In addition to the expected characteristics of an advanced pharmacist, they possess the ability to manage patients through full episodes of care by autonomous application of a suite of advanced generalist clinical assessment, investigative, procedural, communicative, diagnostic, prescribing and decision-making skills, over a wide range of clinical systems and presentations specific to that specialism."

Recommendation 2: The term "Advanced Pharmacist (Specialism)" and "Advanced Pharmacist Practitioner (Specialism)" should be reserved for use within NHS Scotland and backed with Scottish Government policy on the use of these titles.

ToR 2 - Consider what would constitute an APP in each sector and define the need for these based on available evidence.

Recommendation 3: APP (Specialism) roles are advanced generalists and this model of practice should primarily be considered for implementation in GP, Acute Adult (e.g. Acute Receiving; Emergency Department; Acute Specialist unit; OOH) and Paediatric populations where a proportion of their work will cover assessment and management of undifferentiated, undiagnosed presentations.

Recommendation 4: Development and implementation of APP (specialism) practice should be understood and accepted as a major contribution:

- To increase NHS healthcare capacity to aid recovery and remobilisation.
- To address real-time clinical need, as clinicians, embedded within clinical services/specialties.
- To deliver a front-line clinician workforce capable of autonomously managing full episodes of patient care.
- To lead the medicines governance agenda and clinical therapeutics, within their clinical specialty.
- To provide high-quality clinical supervision to develop skills, competence, and confidence, in the pharmacy and wider clinical workforce.
- To deliver a clinician workforce that is responsive to patient/population need and can regularly lead service improvement, using research where necessary.

ToR 3 - Undertake a mapping exercise to plot out the skillset and qualifications required of an APP and the necessary steps for the development of an APP training programme within NHS Scotland, exploring the possibility to link credentialing with the RPS Core Advanced Curriculum.

Recommendation 5: Those looking to work at APP (Specialism) level will require additional training and assurance of their skills in order to protect patients, staff and organisations. RPS Core Advanced Curriculum credentialling should provide the base assurance that those operating in these roles are trained to advanced level, but consideration will be required to ensure suitability within each specialist area.

Recommendation 6: Formal training posts, embedded in clinical services/teams, should be created to allow senior pharmacists to train to APP-level. These training posts should lead on to funded posts, with relevant job descriptions, upon completion of training. APPs may be employed directly by clinical services with professional linkage back to DoP.

Recommendation 7: Each APP-trainee in a training post should be supported through a training programme. The training programme should:

- be designed to meet the needs of the patient group and clinical service which they will work in once completed.
- be clinically preceptored, and formally accredited using an appropriate competency-based curriculum.
- cover acquisition of theoretical knowledge and practical skills (assessment and procedural).
- Be supported by a syllabus relevant to the specific clinical service.

Recommendation 8: Employing organisations must consider appropriate educational governance to support APP level practice.

ToR 4 - Propose changes which would be required to Scottish Government policy and subsequent pharmacy strategy/contracts which would be necessary to establish APP-level practice.

Recommendation 9: ***The need*** for APP type practice as outlined in this report, should be accepted as a means of pharmacy contributing to Scottish Government strategy.

Recommendation 10: APP level practice should be included in future Scottish Government healthcare strategy as well as all Scottish Government pharmacy strategy.

Recommendation 11: APP level practice should be included in proposed "Transforming Pharmacy Roles" as a component of advanced pharmacist practice in NHS Scotland.

Recommendation 12: Funding in support of the development of APP practice should be secured to evolve and adapt our workforce in response to the NHS Recovery Plan and National Workforce Strategy.

ToR 5 - To provide recommendations on the strategy and model for Advanced Pharmacist Practitioner implementation in Scotland including detailed proposals to support delivery including indicative timescales.

Recommendation 13: Strong professional leadership is needed within NHS Scotland to establish and develop systemic APP-level practice and posts, as such:

- PPRSG are asked to endorse the recommendations in this report.
- DoPs are asked to endorse the recommendations in this report.
- PPRSG should identify senior pharmacy leaders to gain Executive-level non-pharmacy sponsorship in support of the development of APPs and the recommendations in this report.
- PPRSG should identify senior pharmacy/non-pharmacy leaders to make representation to Scottish Government on behalf of PPRSG and DoPs, in support of the recommendations of this paper.
- PPRSG should ensure the recommendations of this SLWG be represented at the NHS Scotland Workforce Forum.

ToR 6 - Outline the funding required to develop and train an APP workforce.

Recommendation 14: In response to the NHS Recovery Plan and National Workforce Strategy, funding should be sought to train and evaluate an initial cohort of APPs where:

- Funding should be based on the financial costings listed in this report.
- Provision should be made to appropriately fund an academic evaluation.

1. UNDERSTANDING AND DEFINITIONS

Introduction

Chapter 1 presents the understanding which the NHSS APP SLWG have gained from discussions around the developing advanced pharmacist practice landscape in Scotland and other UK nations. The SLWG propose the following definitions to outline the principal patient-facing roles which comprise Advanced Pharmacist Practice. The two main roles being that of the Advanced Pharmacist (Specialism) and the Advanced Pharmacist Practitioner (Specialism).

Chapter linkage to ToR

This chapter will address:

ToR 1 - Define the term "Advanced Pharmacist Practitioner" (APP) and make recommendations for reserving its use within NHS Scotland.

1.1. RPS Advanced Pharmacist Curriculum

The NHS Scotland Pharmacist Post-Registration Strategic Group (PPRSG) have recommended that the Royal Pharmaceutical Society (RPS) Core Advanced Curriculum[4] be used in all sectors to accredit Advanced Pharmacist practice. The RPS Core Advanced has been designed with this in mind with the competencies being generic to cover the application of knowledge, skills and behaviours expected of an Advanced Pharmacist in all sectors. Specialist "top-up" curricula are being developed to cover specific specialist clinical areas where there is expected to be more risk, or where specific criteria have to be covered. Mental health and Critical Care are two such areas in which specialist curricula are being developed by the RPS.

1.2. Advanced Pharmacist (Specialism)

Credentialled Advanced Pharmacists are likely to provide a service to one or more clinical teams, such that they might be thought of as a specialist within their area of clinical expertise. The NHSS APP SLWG propose that those credentialing as Advanced Pharmacists within clinical areas would be designated as *Advanced Pharmacist (Specialism)* [AP (Specialism)] *e.g. Advanced Pharmacist (GP)* or *Advanced Pharmacist (Respiratory)*, or some such wording to be defined by the NHS Scotland Advanced Pharmacist Governance/Development Group.

1.3. Non-medical "Advanced Practitioner" Definition

The term *Advanced Practitioner* has been defined by the Scottish Government where it denotes a highly educated non-medical healthcare professional who has undergone an accredited training programme such that they can safely apply high-level practical clinical assessment and decision-making skills to a wide range of acute and chronic undifferentiated presentations[5].

An *Advanced Practitioner* will be able to make complex autonomous clinical decisions, including diagnosis, based upon their clinical history and examination findings and then initiate an appropriate investigation and management plan, considering the person-centred context, prescribing and referring when necessary.

1.4. Advanced Pharmacist Practitioner (Specialism) Definition

Building on the definitions above, as pharmacists, we are understood by other healthcare professionals and patients alike to have high-level knowledge of medicines and their use.

The *Advanced Pharmacist Practitioner* (APP) role is about capitalising on the synergy gained from the assimilation of advanced-level clinical pharmacology & therapeutics knowledge with the autonomous clinical assessment, management and decision-making skills of an advanced

practitioner. The composite skillset within the APP product offers significant utility within a modern NHS and an array of unique benefits to healthcare teams and patients.

There should not be an expectation that all pharmacists will (or should) get to APP level.

The APP should be a credentialed RPS Advanced Pharmacist (as above) and critically should have additional specific qualifications and training to support the requirements of the service within which they work. Training will be discussed further in chapter 3.

There is no stipulation within the RPS Core Advanced to undertake the APP-specific courses and training pathways. Therefore, only those accredited Advanced Pharmacists that have undertaken additional APP-specific courses and training pathways should use the APP terminology and as such, the term APP should be reserved within NHSS as a governance measure to ensure patient safety.

The APP should be able to function across a wide range of presentations relating to an untriaged and undifferentiated generalist patient group.

It is expected APPs will be embedded in a clinical team, such that they might be thought of as specialist within their area of clinical expertise akin to APs (noting that Generalism is a Specialism within its own right). The NHSS APP SLWG propose that those credentialing as Advanced Pharmacist Practitioners within clinical areas would be designated as *Advanced Pharmacist Practitioner (Specialism)* [APP (Specialism)] *e.g. Advanced Pharmacist Practitioner (GP)* or *Advanced Pharmacist Practitioner (Paediatrics).* Typical areas for APPs to work in include:

- Acute adult e.g. Acute Receiving; Emergency Department; Acute Specialist unit; OOH
- General Practice
- Paediatrics

Proposed Advanced Pharmacist Practitioner Definition:

"Advanced Pharmacist Practitioners are accredited advanced pharmacists working in a generalist specialty. In addition to the expected characteristics of an advanced pharmacist, they possess the ability to manage patients through full episodes of care by autonomous application of a suite of advanced generalist clinical assessment, investigative, procedural, communicative, diagnostic, prescribing and decision-making skills, over a wide range of clinical systems and presentations specific to that specialism."

Figure 4: Proposed Advanced Pharmacist Practitioner Definition

1.5. Relationship between AP (Specialism) and APP (Specialism) roles

The main differentiator between the two roles is that the scope of practice for APP (Specialism) roles will require them to be able to autonomously clinically assess and manage undifferentiated clinical presentations. AP (Specialism) are still reasonably expected to undertake clinical history taking, clinical assessment, examination, investigation, diagnosis, management, referral as per the RPS Core Advanced Curriculum. However, it is expected they will do this over a narrower spectrum of practice/presentations. Therefore, there is not the need for additional and specific training programmes to support their development. Figure 2 gives an example of AP (specialism) vs APP (Specialism) where the AP is based in a single therapeutic area specialism. Figure 4 and Table 1 give the example of an AP (GP) vs APP (GP) role in a generalist specialism.

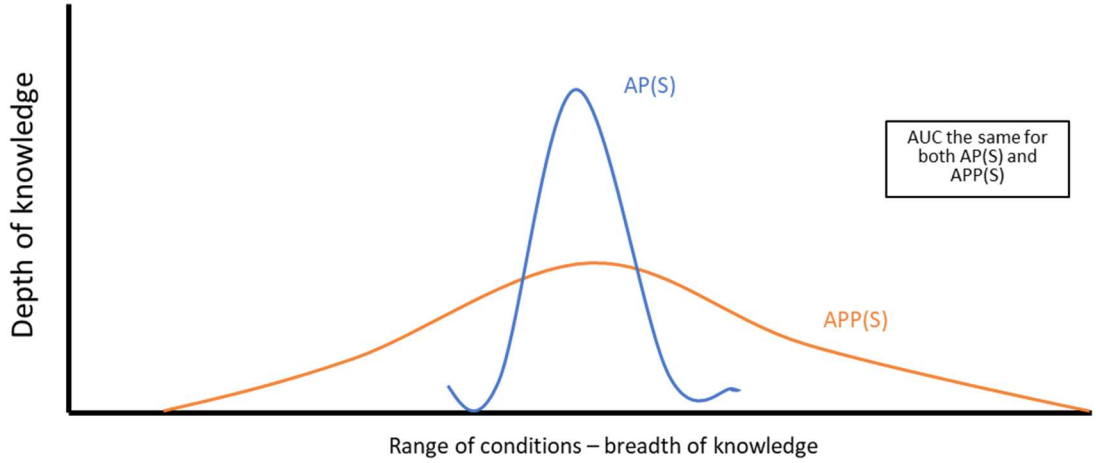


Figure 5: APP (Specialism) vs AP (Specialism) – breadth and depth of knowledge

As a consequence, APP (Specialism) and AP (Specialism) should be thought of as working at the same level of practice i.e. Advanced (see figure 3).

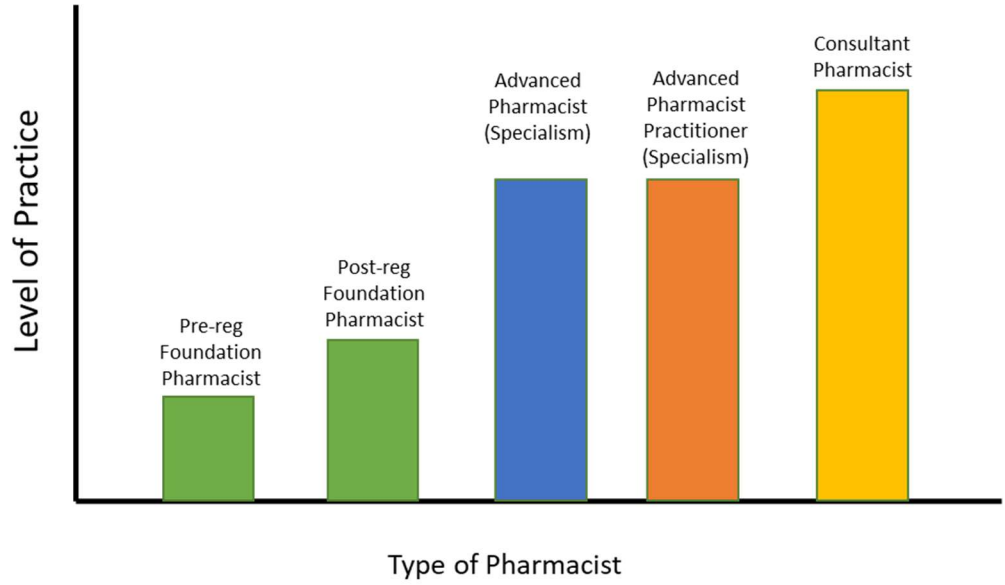


Figure 6: Foundation, Advanced and Consultant level practice

It was thought critical to the role of the APP (Specialism) that additional assurance and accreditation was obtained to practice as an APP. This was especially relevant to the advanced clinical assessment, history taking, investigation and procedural skills which would be required in these posts. It is expected that training programmes will need to be defined for the different specialisms of APP-level

practice to ensure consistency and quality of the product for the health service and to protect patient safety. These training programmes should take the form of specialist "top-up" curricula in addition to the base RPS Core Advanced Curricula. To work as an APP there is a definitive need to have completed an Advanced Clinical Assessment and Examination course (ACE) to equip the APP with the skills required to be able to undertake their role. This is a fundamental difference between the AP and APP roles.

Figure 4 gives an overview of the skill mix within general practice, demonstrating the versatility of the APP (GP) role within a modern general practice setting. The model presented demonstrates integration of the APP role alongside other HCPs and outlines the unique, overlapping and ultimately synergistic roles of the GP, Nurse, AP(GP) and APP(GP) roles. An appropriately trained APP(GP) could cover acute presentations (akin to a GP or an ANP under the Urgent Care Services section of the GMS contract)[6], as well as long term conditions, polypharmacy clinics, prescribing and medicines management duties, as well as the ability to cover specialist disease states and participate in acute and chronic disease reviews over a wide range of conditions. APP(GP) sessional working within general practice, focused on different aspects of this portfolio of clinical work throughout the week, will allow the APP(GP) and medical practice to gain the most from this diverse and unique skillset.

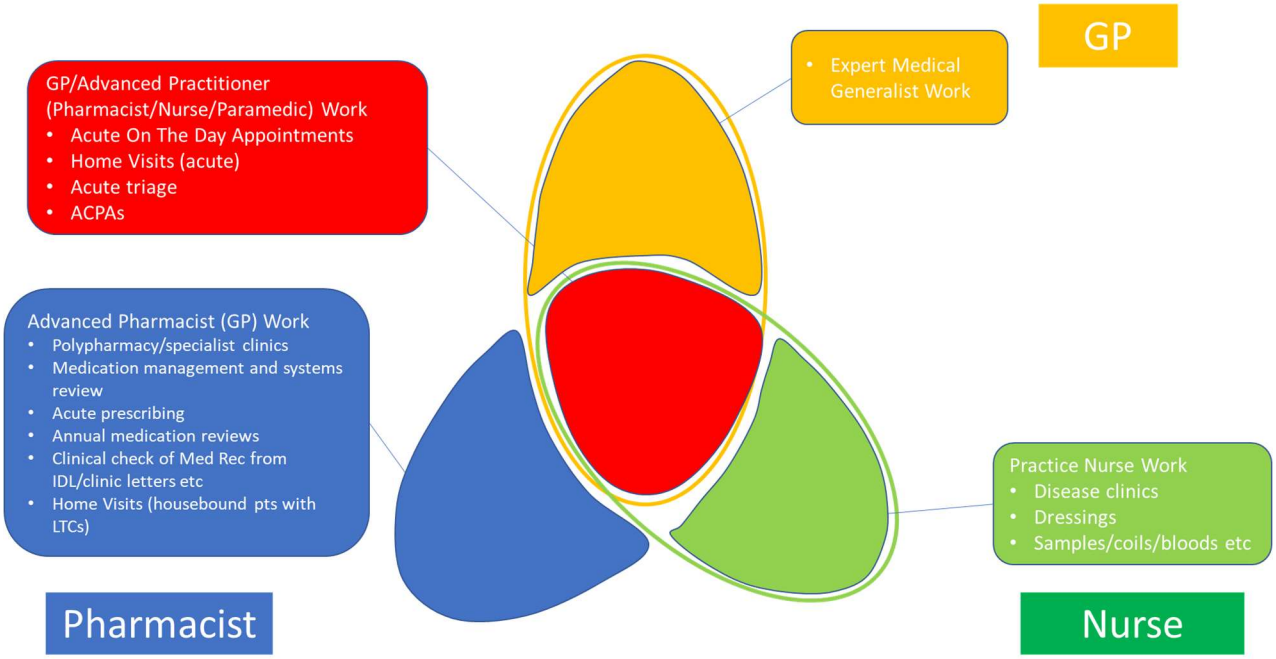


Figure 7: General Practice skill mix & example of Advanced Pharmacist vs Advanced Pharmacist Practitioner roles in GP

Table 1 compares the roles of AP (GP) and APP (GP) within the general practice setting and looks to illustrate not only the difference in training, but the need for it in the context of the scope of practice.

	AP (GP)	APP (GP)
Curricula	RPS Core Advanced	RPS Core Advanced and "top-up" specialist APP (GP) curricula
Additional qualifications	Specifics are undefined. Driven by CPD	To be defined as part of training programme. Advanced Clinical Assessment & Examination (ACE Course) is essential to role.
Training programme	Supervised learning events mapping to RPS Core Advanced Curriculum	Preceptored - with supervised learning events mapping to RPS Core Advanced Curricula and "top-up" Specialist APP(GP) curricula
Scope of practice	• Advanced levels of pharmacotherapy service.[6] • Polypharmacy clinics • Medicines Management • Single disease state clinics	As per AP (GP) but with additional responsibility to manage acute presentations and triage of undifferentiated undiagnosed patients across the age and acuity spectrum.
Examination	Specifics are undefined. • Limited to competence and specific to need of service/role	To be defined as part of training programme. • Extensive – essential is able to undertake full clinical assessment including full clinical histories and the clinical examination of multiple physiological systems including: cardiovascular; respiratory; gastrointestinal; musculoskeletal; neurological; ear, nose & throat; and ophthalmology.
Procedural skills	Specifics are undefined. • Limited to competence and specific to need of service/role • Would be reasonable to expect Advanced Pharmacists to undertake a set of basic observations and act upon their results.	To be defined as part of training programme. • Reasonable to expect: basic observations; venepuncture; administration of oxygen; Basic Life Support; subcutaneous injection; intramuscular injection; • Consideration for cannulation; catheterisation; intravenous administration.
Investigation responsibilities	Specifics are undefined. • Limited to competence and specific to need of service/role. • Able to at least order bloods, interpret results and action.	To be defined as part of training programme. Reasonable to expect the following: • IRMER Trained – able to order a range of radiological investigations e.g. X-ray, ultrasound, DEXA. • ECG – undertake and interpret • Spirometry – undertake and interpret
Advanced knowledge/skills requirements and application	Predominantly around the prescribing of medicines in complex multimorbid individuals where there is risk, uncertainty or limited evidence base.	As per AP(GP) but with the additional significant element of advanced clinical assessment of undifferentiated, undiagnosed presentations to general practice across the age and acuity spectrum, where there is complex multimorbidity and where there is risk, uncertainty or limited evidence base.
Referral	• Able to refer to other sectors of practice as necessary including Urgent Suspected Cancer, Urgent and Routine onwards referral to secondary care. • Able to refer to other members of the primary care team e.g. CHMT, physio, OT, community nurses, social work etc.	As per AP(GP), but additionally expected to be able to admit patients acutely to hospital

Table 6: Comparison of the roles of the Advanced Pharmacist (GP) and Advanced Pharmacist Practitioner (GP)

1.6. Interpretation and Summary

Perhaps the greatest asset of the APP(GP) role is the flexible utility which they can offer within any given care system. Employing an APP(GP) with this type of skill set would allow a general practice the ability to access a dynamic and flexible workforce. It would also allow patients to be safely treated by a high-skilled and trained member of the team. To be able to realise this, there is a necessity for APP(GP)s to be integrated and accepted into clinician teams within individual GP practices and be counted among the clinician numbers.

1.7. Recommendations

ToR 1- Define the term "Advanced Pharmacist Practitioner" (APP) and make recommendations for reserving its use within NHS Scotland.

Recommendation 1: The following definition of an APP should be accepted for use within NHS Scotland:
"Advanced Pharmacist Practitioners are accredited advanced pharmacists working in a generalist specialty. In addition to the expected characteristics of an advanced pharmacist, they possess the ability to manage patients through full episodes of care by autonomous application of a suite of advanced generalist clinical assessment, investigative, procedural, communicative, diagnostic, prescribing and decision-making skills, over a wide range of clinical systems and presentations specific to that specialism."

Recommendation 2: The term "Advanced Pharmacist (Specialism)" and "Advanced Pharmacist Practitioner (Specialism)" should be reserved for use within NHS Scotland and backed with Scottish Government policy on the use of these titles.

2. ORGANISATIONAL FIT

Introduction

Chapter 2 presents a series of vignettes, from all sectors of practice and representing a diverse geographical spread of Boards, to illustrate how Advanced Pharmacist (Specialism) roles and Advanced Pharmacist Practitioner (Specialism) roles can be utilised to benefit patients and clinical service delivery. Beyond this, vignettes from management have been included to illustrate service redesign which has allowed for implementation of these roles. These vignettes are based on the presentations made by group members to the NHSS APP SLWG. Job titles have been aligned to the titles proposed in Chapter 1 to aid clarity for the reader.

Chapter linkage to ToR

This chapter will address:

ToR 2 - Consider what would constitute an APP in each sector and define the need for these based on available evidence.

2.1. Advanced Pharmacist (Specialism) Vignettes

The following 4 vignettes offer exemplar practice within Acute and Community Pharmacy settings based in four different territorial boards in NHS Scotland.

2.1.1. Advanced Pharmacist (Oncology) – Jennifer Morrison - NHS Lothian

Overview/Scope of Practice

Non-medical prescriber (NMP) in oncology. NMPs/AP (Oncology) usually work within a maximum of two tumour groups. The number of cancer patients on systemic anti-cancer therapies (SACT) in combination with the high volume of SACT treatments which are recommended for use by the Scottish Medicines Consortium (SMC) on a monthly basis means that there is always a desire to expand and develop our AP (Oncology) workforce.

Roles and Responsibilities

APs (Oncology) are a well-established model in NHS Scotland and they bring a unique input. They have a wealth of knowledge in terms of how to safely prescribe SACT, manage the side effects/toxicities related to these treatments and also manage the other medications which may be affected by these SACT. APs (Oncology) often work in close partnership with clinical nurse specialists and in some instances in side-by-side clinics with them, allowing for shared skills and a holistic approach to care delivery to cancer patients. They also have a central role in medicines governance in terms of design, implementation and review of SACT protocols.

Training required for the post

Each cancer network has its own NMP framework. Work is ongoing to make a national Non-medical Prescriber (NMP) oncology framework. This will define how we transition as advanced pharmacists to prescribing pharmacists working in advanced roles. The detail within it depicts the skills you should have to undertake this role and sets out a tiered approach to NMP within a cancer setting to allow for development in the role itself.

Application of advanced knowledge & skills (Examination/procedural/investigation/decision-making)

In terms of clinical skills, we analyse patients' treatment response through tumour markers and the tolerability of the SACT in terms of haematological results generically across all tumour groups. Within each specific tumour group we require a certain set of skills to prescribe safely, e.g. when prescribing for lung cancer patients to complete a chest exam, which are not required for every patient group.

2.1.2. Advanced Pharmacist (Hepatology) – Alison Boyle - NHS Greater Glasgow & Clyde

Overview/Scope of Practice

The hepatitis C (HCV) pharmacy team work within the multidisciplinary team to achieve national HCV elimination targets. AP (Hepatology) review and prescribe HCV treatment for patients across GGC and provide expert advice on management of patients with complex drug interactions or who have experienced virological failure on HCV therapy. Within hepatology, medication regimes are often complex and utilise high cost/high risk medicines. Side effects and drug interactions can be serious/life threatening and many have narrow therapeutic indexes.

Roles and Responsibilities

Since 2018, pharmacist-led treatment clinics have been implemented in a variety of settings, including within the Drug Court clinic, alcohol and drug services (ADRS) and paediatric settings. The aim of a pharmacist-led HCV clinic is to allow patients to be assessed, drug interactions managed, treatment regimen selected and start date organised in one visit. The APs (Hepatology) work autonomously, managing a caseload of patients, with MDT discussion if required. The cohort includes patients with a high rate of prior DNAs to other HCV treatment settings and a long duration of infection. Pharmacist consultations include discussion about HCV and transmission, reasons for treatment, management of drug interactions, ordering and interpretation of bloods, contraceptive advice, medication counselling and harm reduction, adherence and follow-up. They provide targeted lifestyle advice for management of liver disease co-factors, such as alcohol use and obesity with signposting to additional services where appropriate.

Also, as the first paediatric HCV centre in Scotland to initiate direct acting antiviral therapy, the AP (Hepatology) has established a national treatment MDT to support other treatment centres to treat their patient cohort.

The AP (Hepatology) role also extends to a wider microelimination project, targeting an area of Glasgow with high rates of socioeconomic deprivation and drug use. It involved point of care testing using Cepheid GeneXpert and Oraquick swabs as well as dry blood spot testing to improve BBV screening rates, alongside multidisciplinary assessment/initiation of treatment.

Primary biliary cirrhosis and autoimmune hepatitis are examples of therapeutic areas where an AP (Hepatology) would be ideally equipped with the relevant knowledge and skills to optimise patients' complex medication regime. This in turn may improve medication compliance, reduce side effect incidence, review polypharmacy need and improve overall patient care/outcome.

Training required for the post

The AP(Hepatology) have undergone FibroScan training allowing them to perform non-invasive assessment of liver fibrosis to enable them to stage liver disease.

Application of advanced knowledge & skills (Examination/procedural/investigation/decision-making)

AP (Hepatology) are expected to be able to complete investigations (FibroScan) and develop expertise in the clinical assessment of liver disease. For patients with cirrhosis, there will be discussion of prognosis and importance of post treatment follow up for cirrhosis monitoring, with onward referral to hepatology services for hepatocellular carcinoma (HCC) surveillance. In paediatric clinics, there are additional considerations such as swallow assessment to ensure appropriate formulation prescribed, weight-based dosing and careful consideration of social and family factors to ensure optimal adherence.

2.1.3. Advanced Pharmacist (Respiratory) – Arlene Shaw - NHS Tayside

Overview/Scope of Practice

The clinical roles completed within this role deliver clinical care to inpatient and outpatient populations covering multiple specialist respiratory conditions.

Roles and Responsibilities

COVID Antiviral Treatment – As an AP (Respiratory) I operate as a Senior Clinical Decision Maker where I get referrals of ultra-high-risk patients who test positive for COVID. I undertake a virtual consultation to assess the patient and offer a suitable treatment where eligible. I also contributed to the set up of this national system.

Severe Asthma Biologic Service - I established and oversee the process for using biologic agents in the management of severe asthma in NHS Tayside including where patients are deemed not suitable for self-administration, then I follow-up these patients regularly for clinical review and on-going prescription of their biologic.

Pulmonary Fibrosis Clinic - I lead the treatment part of our pulmonary fibrosis pathway in NHS Tayside. If diagnosis is agreed by consensus at the MDT (and if they are for treatment) the patient is referred to my clinic to decide the most appropriate treatment for them, and on-going prescription, follow-up and review. A consultant continues to review annually, unless I request a more urgent review between scheduled appointments.

Cystic Fibrosis Modulator Therapy - I lead the management of modulator therapy for our cystic fibrosis patients in NHS Tayside. AP (Respiratory) input involves confirming the most appropriate treatment choice for each individual patients based on their individual genotype, confirming their eligibility for a modulator, checking and addressing the many medicine – medicine interactions, counselling patients, answering questions and obtaining consent, arranging all baseline measures / checks, on-going prescribing and monitoring treatment, responding to adverse reactions and collating real-time patient outcomes from treatment. All of this is done with remote support from a consultant in another Health Board.

Training required for the post

Specialist knowledge: Pharmacist independent prescribing qualification via School of Pharmacy, Postgraduate diploma in respiratory medicine (accredited by University of Hertfordshire), MDT working / shadowing / peer review / private study / conferences and adhoc training events.

Practical: Consultation skills training at various points throughout career. Assessment of a respiratory patient – clinical skills course basic – University of Dundee, specialist modules on respiratory assessment and respiratory examination (University of Hertfordshire), shadowing / peer review.

Application of advanced knowledge & skills (Examination/procedural/investigation/decision-making)

In-depth knowledge and experience of relatively rarely used medicines, with application of specialist pharmacological knowledge to practice, for the benefit of improving patient outcomes.

2.1.4. Advanced Pharmacist (Community Pharmacy) – Sam Falconer - NHS Ayrshire & Arran

Overview/Scope of Practice

AP (CP) who is able to demonstrate evidence of four pillar working including development of prescribing and assessment skills in others. Works as a prescribing pharmacist in community pharmacy offering a range of additional services to patients which go to the limit, if not beyond, of the current community pharmacy contract.

Roles and Responsibilities

- Community pharmacy contractor
- Independent prescriber
- Pharmacy First + services
- Runs a NES Common Clinical Conditions teach & treat for other community pharmacists to learn from, with, and about how to autonomously manage common presentations within the community pharmacy setting
- Has previously offered services as a satellite clinic of a GP practice to clinically assess, manage and treat patients with specific list of presentations who had presented to the GP practice. Had read-write access to patient notes as a satellite clinic within the pharmacy and worked closely with GP colleagues as an integrated clinician as part of the wider healthcare team.

Training required for the post

Independent prescribing; NES Consultation skills course; NES Common Clinical Conditions course.

Application of advanced knowledge & skills (Examination/procedural/investigation/decision-making)

The AP(CP) role allows the individual to clinically assess common clinical presentation to the community pharmacy, undertaking clinical assessment (auscultation of chests, ENT assessment) as necessary including history taking and examination.

2.2. Advanced Pharmacist Practitioner (Specialism) Vignettes

The following 4 vignettes offer exemplar practice within GP and Acute settings.

2.2.1. Advanced Pharmacist Practitioner (General Practice) – Jordan West - Finlayson Street Surgery, Fraserburgh

Overview/Scope of Practice

The Scope of this APP (GP) practice has already been depicted in section 1.5, Table 1 and Figure 3. The APP (GP) provides pharmaceutical and practitioner-type service in the general practice setting.

Roles and Responsibilities

Acute triage of undifferentiated, undiagnosed patients across the age and acuity spectrum. Takes the lead for the management of patients with long-term conditions (LTC) within the practice. Runs multiple LTCs clinics within the practice. Is seen as a point of contact for advice by other members of the healthcare team. Provides a clinical service to a community hospital where the APP(GP) would clinically review patients and be expected to initiate their own clinical management plans. Treats patients across the spectrum of general practice presentations including:

- Acutely ill people
- Children & young people
- Women's Health
- Men's Health
- Sexual Health
- Older Adults
- Palliative and end of life care
- Mental Health
- Cardiovascular presentations
- Respiratory presentations
- Alimentary presentations
- Neurological presentations
- Musculoskeletal and rheumatological presentations
- Dermatological presentations
- Substance misuse
- ENT presentations
- Ophthalmology presentations
- Metabolic presentations
- Renal, Ureter, bladder presentations
- Haematological and thrombotic presentations
- Infections
- Population health, vaccination and primary prevention

Training required for the post

Independent prescribing, ACE course, preceptored inhouse training. NES GPCP APF – advanced 2 level.

Application of advanced knowledge & skills (Examination/procedural/investigation/decision-making)

Utilises clinical assessment skills to reassure/treat patients over the phone, undertake face to face assessment or visit within their own homes. Will undertake a full clinical assessment autonomously, acting upon their own clinical findings to determine the appropriate investigation, procedure, treatment, management, or onward referral.

2.2.2. Advanced Pharmacist Practitioner (Emergency Department) – Lisa McDermott - NHS Lanarkshire

Overview/Scope of Practice

The APP (ED) role is based in an Emergency Department (ED) of a District General Hospital. The APP (ED) is considered to be a clinician working as part of the MDT in ED. They autonomously assess and manage coming into the department in all areas including resus, major and minor injuries.

Roles and Responsibilities

The role of the advanced pharmacist practitioner as part of the EM-ACP team (taken from the RCEM EC ACP Curriculum V2 2018)[7] includes:

- Looking after patients with a wide range of pathologies from life-threatening to the self-limiting
- Identifying the critically ill and injured, providing safe and effective immediate care
- Having expertise in resuscitation and are skilled in the practical procedures needed
- Establishing a diagnosis and differential diagnosis rapidly, and initiate or plan for definitive care
- Working with all inpatient and supporting specialties as well as primary care and prehospital services
- Being able to correctly identify those who needs admission and those who can be safely discharged

Training required for the post

Formal qualifications include independent prescribing; Advanced Clinical Assessment and Examination (ACE); post graduate certificate in urgent care and minor injuries, and completion of the Advanced Specialist Training in Emergency Medicine (ASTEM) course at Manchester University. The ASTEM course is designed for pharmacists making the transition to ACP, topping up previous post graduate masters qualification. Finally, completion of the Royal College of Emergency Medicine (RCEM) advanced clinical practitioners (ACPs) working in Emergency Medicine curriculum.[7] This credentialing curriculum provides an opportunity for standardisation and consistency across the ACP workforce and provides a framework for training. The required standards are to be achieved through completion of an e-portfolio which will take between 3 to 5 years and should demonstrate clinical competence and four pillar working.

Application of advanced knowledge & skills (Examination/procedural/investigation/decision-making)

As per roles and responsibilities/training – to have an autonomous clinician able to see the wide variety of patients presenting at the ED who has evidenced competence through the RCEM portfolio and underwent consultant examination including MiniCex, case-based discussions (CBD), Direct observation of practice (DOPS) and ACATs (Acute care assessment Tool).

The additional benefits of employing a pharmacist in an APP/ACP role is evident during non-clinical time (NCT). The RCEM credentialing framework will ensure that all ACPs have skills and clinical competence regardless of academic background, but it is within the non-clinical time (NCT) where the specialist training and knowledge provides additional benefit to the whole ED team. Therefore, an APP will lead on all things medicines which include medicines governance including guideline/protocol development, writing PGDs, teaching sessions on medications and Quality Improvement Projects. Since regulatory changes were made in 2019 the APP can now also be the Designated Prescribing Practitioner (DPP) for the department's non-medical prescribing students which can take some workload from the EM consultants and as a daily source of medicines information this builds a strong and competent team which is multi-faceted. This approach and skill-mix improves patient care.

2.2.3. Advanced Pharmacist Practitioner (Women's Health – Obstetrics & Gynaecology) – Gayle Anderson - NHS Grampian

Overview/Scope of Practice

My role as an APP (Obs & Gynae) focuses on how I can improve the patient journey whilst in my care through utilisation of the 4 pillars of advanced practice.

Roles and Responsibilities

The majority of my practice is patient facing. I am involved with the patient throughout their unscheduled or elective secondary care journey from admission to discharge requiring me to practice autonomous complex clinical decision making. I see a range of presentations to obstetrics and gynacology.

Training required for the post

Independent prescribing; MSc in Advanced Clinical Pharmacy including Advanced Clinical Assessment and Examination (ACE) course. In-house preceptored training programme.

Application of advanced knowledge & skills (Examination/procedural/investigation/decision-making)

- Clerking-in patients by taking a full clinical history
- Physical examination, if required
- Phlebotomy/ECGs/cannulation
- Requesting appropriate haematological and radiological investigations and interpretation of results
- Independently formulating differential diagnoses
- Treatment plan in collaboration with the patient
- Referral to specialist services, if required, including but not limited to Early Pregnancy Unit, Endocrine, Haematology (work continues to develop understanding of the APP role allowing autonomous referrals). Referring to local, board or regional specialist services or pathways such as a DGH consultant anaesthetist in a patient with complex pain management, an ARI senior on call for haematology for a pregnant woman who develops a DVT or the regional specialist service for embryonic histology.
- Post operative symptom management such as pain and nausea
- IV fluid prescribing
- Medicines reconciliation and prescribing regular medicines on the Patient Administration Record (PAR). Prescribing and deprescribing of medications, if required. Due to the specialist nature of prescribing in pregnancy and breastfeeding, these consultations focus heavily on reaching a consensus with the patient due to the risk: benefit nature of prescribing in these conditions. Often this involves using medications off license and providing specialist information to supplement the PIL which may give conflicting advice
- Recognition and escalating the care of the deteriorating patient
- Specialist intervention, as described above, for patients on different clinician's caseloads. This constitutes an element of prescribing support to other clinicians.
- Documentation in medical and midwifery notes (Badgernet) ensuring care of the patient is appropriately communicated
- Discharge planning and the discharge of the patient. Provision of information to patients and Primary Care colleagues to ensure effective handover of care. Again, this may include an element of specialist prescribing support.

2.2.4. Advanced Pharmacist Practitioner (Paediatrics and Child Health) – Stephen-Andrew Whyte - Great Ormond Street Hospital, London

Overview/Scope of Practice

An advanced clinical practitioner role specialising in the care of children and young people from birth to 18 years of age, mapped to the four pillars of advanced clinical practice. Current scope is in a medical substitution role on a registrar level 2 (ST6-8) rota. Previously held a part-time leadership role within Health Education England as Lead Pharmacist for Urgent & Emergency Care in England.

Roles and Responsibilities

Involved in the unscheduled care of children and young people (0-18 years) attending a co-located paediatric emergency department in a London major trauma centre. Due to the nature of paediatrics and hospital attendance patterns this includes the full spectrum of primary care, majors, trauma, and critical care. The role has been described by The Royal College of Emergency Medicine (RCEM EC ACP Curriculum V2 2018)[7] as follows:

• Looking after patients with a wide range of pathologies from life-threatening to the self-limiting
• Identifying the critically ill and injured, providing safe and effective immediate care
• Having expertise in resuscitation and skilled in the practical procedures needed
• Establishing a diagnosis and differential diagnosis rapidly, and initiate or plan for definitive care
• Working with all inpatient and supporting specialties as well as primary care and prehospital services
• Being able to correctly identify those who needs admission and those who can be safely discharged

Training required for the post

Independent Prescribing, MSc Advanced Clinical Practice, Unscheduled care of the acutely ill/injured child or young person (Level 7 module), Advanced Paediatric Life Support, Level 1 Ultrasound Course, Ionising Radiation (Medical Exposure) Regulations course, Safeguarding Children Level 4 (Named Professional), Clinical skills: venepuncture/cannulation/line insertion under ultrasound guidance, intubation, ventilation, non-invasive respiratory support, wound closure, casting, x-ray interpretation (chest, abdomen, limbs, head and neck).

Application of advanced knowledge & skills (Examination/procedural/investigation/decision-making)

Autonomous management of the whole patient encounter in most cases:

- History taking/physical examination
- Requesting investigations (laboratory, ECG, imaging) where necessary
- Generation of differential/working diagnosis
- Management planning and monitoring
- Safe discharge or onward admission

Advice and intervention from a medical consultant (either paediatrician or emergency medicine physician) is sought when relevant and in all infants under 6 weeks. Pharmaceutical expertise is particularly useful in situations where deprescribing is necessary (quite common in paediatrics) and in the case of toxic ingestion. Contribute to the development of guidelines, protocols and prescriber training within the department (including the role of Designated Prescribing Practitioner).

2.3. Organisational Fit Vignettes

The following 2 vignettes offer exemplar service management strategies from GP and Acute settings.

2.3.1. Remote and Rural General Practice - APP (GP) – Jane Hall, Associate Director of Pharmacy – NHS Ayrshire & Arran

The pharmacotherapy service has been developing in Ayrshire & Arran since 2018 and the ambition is to provide a clinical pharmacy service to all 53 GP practices. There are small pockets of rurality within the board area, including two islands, the largest being Arran. Providing a high quality, sustainable service to an island comes with its own unique challenges. The aspiration is to develop both pharmacists and technicians to become embedded members of the GP practice team. This will ensure the GP practice teams are able to fully utilise the pharmacy team's expert knowledge and skills to provide a service that meets the needs of their local population. To do this they need to spend at least part of their working week within the team. The pandemic fast tracked the ability to provide remote support to practices however practices benefit most from a mixed model of delivery.

Arran is a large island with a relatively small population of around ~5000 list size. Demographically it has a higher cohort of elderly patients compared with Scottish average. There is a small community hospital which is also supported by the GP practice team and up until now they have had limited pharmacy support within the hospital. Travelling to the island is time consuming, costly, and in winter the ferries are frequently disrupted meaning that staff are either stuck on the mainland or stuck on the island. This creates difficulties in providing a reliable service. The cost of living on the island is also higher and houses are difficult to purchase and can be very expensive. So, to provide a service in this unique situation required a unique solution.

The current workforce plan in A&A indicated that this GP practice team required around 1.1wte pharmacy support to provide the pharmacotherapy service. There is also a small amount of funding from the HSCP to provide a clinical service to the community hospital which amounted to 0.2wte band 7 pharmacist support.

There is currently a 1.0wte pre-registration technician living and working on the island, and after the retirement of their pharmacist last year and several unsuccessful attempts to recruit to replace him I realised we had to do something different. This led me onto developing an Advanced Pharmacist Practitioner post. This will be a blended role - provision of a pharmacotherapy service alongside our technician with an additional element where they will develop advanced clinical practitioner skills to manage a caseload of patients. Development of this advanced practitioner post enabled me to justify a higher band, a full-time position and hopefully attract someone to live and work on the island.

The vision for this role is the development of a pharmacist who can not only prescribe and provide specialist advice on use of medicines, but is also able to manage undifferentiated diagnosis and deliver complete episodes of care. They will provide resilience to the clinical team – house visits, potentially contribute to the out of hour's service and support to the management of patients in the community hospital. There is opportunity for the GP's on Arran to really shape this role and flexibility to modify the service they deliver depending on the current or acute needs of their service. The potential benefits to this remote and rural team and the local community cannot be underestimated.

2.3.2. Acute – APP (Women's Health - Obstetrics & Gynaecology) – Lesley Giblin - Lead Pharmacist & Head of Patient Safety and Clinical Risk Management, Dr Gray's Hospital, Elgin - NHS Grampian

The role of APP (Obs & Gynae) has been tested in Women's & Children's Services in Dr Gray's Hospital (DGH) since August 2018 with significant success. For the first six months of the role this was delivered without junior medical staff, providing the bridge between the patient and the Consultant leading their care.

Advanced Pharmacist vs Advanced Pharmacist Practitioner – what's the difference?

Many areas currently benefit significantly from regular input from a generalist Clinical Pharmacist (encompassing all grades and experience from foundation to advanced). At DGH, by necessity, all pharmacists across all grades mostly practice generalism to provide the flexibility needed to deliver a responsive service on a smaller scale.

The clinical pharmacy team provide pharmaceutical care to a diverse range of patients across a variety of specialisms and locations on the hospital site. All clinical pharmacists, while usually having a "regular" area, are assigned to wards based on the available staffing and acuity of patients across the hospital. The dynamic decision-making process on how to best use this limited resource relies on a model where the resource in its entirety is considered and is allocated from a central, pharmacy led, point.

In contrast, the priority of the APP (Obs & Gynae) is to deliver holistic generalist clinical care in addition to excellent pharmaceutical care. The APP resource belongs solely to the designated clinical team and is without exception held there. They take an active role on consultant-led ward rounds and share the clinical workload of the day with other members of the MDT. In addition, the APP will see patients triaged by midwife colleagues, independent of medical supervision unless escalation of care to a consultant obstetrician is indicated. The specifics of the clinical role of the APP (Obs & Gynae) have been discussed in Section 2.2.3 above.

There is a high degree of crossover in the role carried out by the APP (Obs & Gynae), a middle grade doctor and Advanced Nurse Practitioner, with the APP (Obs & Gynae) bringing additional advanced pharmaceutical knowledge that benefits the entire team. To maximise this benefit, this particular model is approximately 70% clinical and 30% educational.

The APP model uses an advanced pharmacist's existing pharmaceutical knowledge and skills to uniquely provide care in a health landscape where commonly the use of medicines is the single biggest care intervention made. Under the model tested at DGH, the intended outcome of reducing reliance on a medical staffing model was achieved.

2.4. Interpretation & Summary

The vignettes presented here continue to show an emerging difference between AP (Specialism) practice and APP (Specialism) practice, despite both types of practice being set at the advanced pharmacist level. The main differentiator is the need for accreditation of the breadth of advanced clinical assessment skills, especially in undifferentiated and undiagnosed patients. Also emerging is the need for AP (Specialism) to have in-depth clinical assessment skills specific to their area of practice.

The need for APP type practice has been discussed in relation to organisational fit and is in response to the NHS Recovery Plan. The specific needs are:

- To increase NHS healthcare capacity to aid recovery and remobilisation.
- To address real-time clinical need, as clinicians, embedded within clinical services/specialties.
- To deliver a front-line clinician workforce capable of autonomously managing full episodes of patient care.
- To lead the medicines governance agenda at a higher-level pertaining to the safe and effective use of medicines, and clinical therapeutics, within their clinical specialty.
- To provide high-quality clinical supervision to develop skills, competence, and confidence, in the pharmacy and wider clinical workforce.
- To deliver a clinician workforce that is responsive to patient/population need and can regularly lead service improvement, using research where necessary.

2.5. Recommendations

ToR 2 - Consider what would constitute an APP in each sector and define the need for these based on available evidence.

Recommendation 3: APP (Specialism) roles are advanced generalists and this model of practice should primarily be considered for implementation in GP, Acute Adult (e.g. Acute Receiving; Emergency Department; Acute Specialist unit; OOH) and Paediatric populations where a proportion of their work will cover assessment and management of undifferentiated, undiagnosed presentations

Recommendation 4: Development and implementation of APP (specialism) practice should be understood and accepted as a major contribution:

- To increase NHS healthcare capacity to aid recovery and remobilisation.
- To address real-time clinical need, as clinicians, embedded within clinical services/specialties.
- To deliver a front-line clinician workforce capable of autonomously managing full episodes of patient care.
- To lead on the medicines governance agenda at a higher-level pertaining to the safe and effective use of medicines, and clinical therapeutics, within their clinical specialty.
- To provide high-quality clinical supervision to develop skills, competence, and confidence, in the pharmacy and wider clinical workforce.
- To deliver a clinician workforce that is responsive to patient/population need and can regularly lead service improvement, using research where necessary.

3. EDUCATION & TRAINING

Introduction

In Chapter 3, we explore the common features of the education and training (E&T) experiences of those who are currently working in advanced pharmacist practitioner-type (APP) roles. The SLWG found there were broadly similar approaches to the education and training at this level, regardless of discipline or sector of practice. Without exception, all APPs had sought out, or were put through, a training programme of some sort to support their development. Some were formally accredited programmes, others comprised of in-house training. Common features of this E&T will now be discussed, before summarising and giving recommendations.

Chapter linkage to ToR

This chapter will address:

ToR 3 - Undertake a mapping exercise to plot out the skillset and qualifications required of an APP and the necessary steps for the development of an APP training programme within NHS Scotland, exploring the possibility to link credentialing with the RPS Core Advanced Curriculum.

3.1. Feature 1: Immersion/inclusion of the APP trainee in the clinical environment and clinical team

Pharmacists operating in APP roles reported inclusion within the clinician workforce of their clinical service. This inclusion was usually by either direct employment or line management within that clinical service, rather than in the managed pharmacy service. This was thought to be critical to the success of their training. Furthermore, because the organisational drivers for training of these pharmacists to APP-level came from within the clinical service/team (and out with managed service pharmacy) this proved to have a positive correlation with the success of the adoption of the APP role, and integration of those advanced clinical skills sets, upon completion of training. Many reported specific organisational drivers within clinical services as being: workforce recruitment challenges – particularly for doctors; skill mix – professional diversity; right place – right time – right person. Beyond this, pharmacists operating in APP roles suggested managers of clinical services were more exposed to the pressing clinical need to adapt their services in order to maintain continuity of clinical services. This was felt to be a positive enabler for change.

3.2. Feature 2: Advanced Clinical Examination and Assessment training

Different training programmes exist around the UK to train non-medical healthcare professionals in advanced clinical examination and assessment skills (clinical history-taking, examination & clinical decision-making skills).

The Chief Nursing Officer for the Scottish Government has written policy to support the requirements for working as an Advanced Nurse Practitioner (ANP) in a variety of care settings.[5] As part of the educational governance for these roles, all ANPs are required to complete a Master's level advanced course.[8] Advanced Clinical Examination & Assessment (ACE) courses are taught as modules within these MSc programmes and teach advanced clinical history taking and clinical examination of various physiological systems i.e.: cardiovascular; respiratory; gastrointestinal; musculoskeletal; neurological; ear, nose & throat; and ophthalmology. ACE courses also teach advanced clinical decision-making, such that practitioners can act on the finding of their clinical history and examination. ACE courses are available from numerous Higher Education Institutions.

Most are multidisciplinary in their class composition. They usually involve a residential period to learn the skills before undertaking some supervised learning in practice using supervised learning events (SLEs). These SLEs are collated into a portfolio submission before being independently assessed. Finally, competency of clinical examination and assessment was assessed by OSCE. These courses comprise essential training for all NMAHP advanced practitioner roles in NHS Scotland.

Within NHS England there exists the HEE Multiprofessional Framework for Advanced Clinical Practice.[9] This is a competency-based framework, over the 4 domains of practice, suitable for the development of an Advanced Clinical Practitioner workforce. Advanced clinical skills are developed as part of this process.

3.3. Feature 3: Role-specific Courses

There were noted to be additional courses to support the discipline specific learning in some specialties – i.e. emergency department, paediatrics and general practice. In Scotland, there is no APP type role formally recognised as yet; however, some pharmacists working in general practice have utilised the NES GPCP APF to support their development to APP-level in GP and attaining Advanced Level II accreditation. What is significant about these specific courses is that they are designed with the sole intent of producing a product of the course (the advanced practitioner) who is capable of a specific role and within a specific clinical environment.

3.4. Feature 4: Competency-based learning in practice

Central to all learning programmes, regardless of discipline or sector of practice, was the need to generate SLEs as part of a portfolio of evidence – usually to support competence against a framework or curriculum (ACE course/NES GPCP APF [10]/Royal College of Emergency Medicine[7] etc). Most of these programmes relied on those in training to be clinically supervised on any given day where they were working clinically. It was up to that clinical supervisor to be the point of contact for any clinical queries, and it was also their responsibility to complete SLEs with the APP-trainee. The clinical supervisor could be a pharmacist, but due to the paucity of pharmacists working at APP-level, this was usually a doctor. The concept of a preceptorship model (where a trainee is observed longitudinally) fits with this model of clinical supervision.

For those going through a training programme, some were given an educational supervisor who could guide their progress and help them to navigate the programme and its demands more efficiently.

3.5. Feature 5: Procedural skills development

Most APPs trained for a specific role, regardless of whether there was a role-specific curriculum available. It was unlikely that an APP who trained in one discipline could then jump to another without incurring the need for some additional training. This concept is well understood by medical colleagues transferring between specialties or even between subspecialties e.g. cardiologist vs interventional cardiologist. Beyond the advanced clinical assessment skills, there was a need for APPs to develop procedural skills. The procedural skill set an individual APP required was dictated in part by the clinical specialty and the needs of the service i.e. what is the APP's role and what is it the service needs them to be able to do autonomously. Procedural skills ranged from everything from venepuncture to intubation. Many reported the need to be able to request radiological imaging and undertake ECG. The specific list of procedural skills for an APP was therefore thought to be linked to

the individual clinical role and the needs of the service. However, there is likely to be a “core range” of procedural skills which should be expected within these roles.

3.6. Feature 6: Theoretical learning

Some reported incorporating formal structured learning into their training programme, generally as part of a postgraduate MSc. However, in most cases, there did not appear to be specific courses that overtly linked to their clinical specialty (especially at APP-level) and no syllabus was deemed to exist for specific specialties/disciplines. In all cases, APPs reported having to undertake significant CPD, often in response to feedback given by clinical supervisors in the form of SLEs, to upskill their knowledge and to seek out and address potential unknown unknowns in their clinical knowledge. All noted that they required clinical knowledge that transcended clinical pharmacology and therapeutics, in order to autonomously do the job that was required of them.

3.7. Interpretation & Summary

All APP-type pharmacists that presented to the SLWG reported undertaking a training programme of some sort. All reported these as critical to their development. These training programmes had common features. They were generally conducted by pharmacists who were: embedded within clinical teams rather than pharmacy teams; underpinned by competencies; clinically supervised in practice with SLEs; had additional layering of theoretical knowledge; and had procedural skills relating to specific skills required within a specialty/role.

Overarching principals (of any level of pharmacist practice) are outlined in the GPhC Professional Standards[11] and those working at advanced level are expected to submit revalidation records. However, pharmacist advanced practice is currently not regulated by the GPhC. While most of these APPs reported an E&T structure to support their development which included in-house governance including clinical supervision and external sign-off of competencies, there is an expectation that more needs to be done at an organisational and system level to support the educational governance around APP training and practice. The establishment of formal training posts within specialties should be designed to enable the development of APPs to the required clinical level.

3.8. Recommendations

ToR 3 - Undertake a mapping exercise to plot out the skillset and qualifications required of an APP and the necessary steps for the development of an APP training programme within NHS Scotland, exploring the possibility to link credentialing with the RPS Core Advanced Curriculum.

Recommendation 5: Those looking to work at APP (Specialism) level will require additional training and assurance of their skills in order to protect patients, staff and organisations. RPS Core Advanced Curriculum credentialling should provide the base assurance that those operating in these roles are trained to advanced level, but consideration will be required to ensure suitability within each specialist area.

Recommendation 6: Formal training posts, embedded in clinical services/teams, should be created to allow senior pharmacists to train to APP-level. These training posts should lead on to funded posts, with relevant job descriptions, upon completion of training. APPs may be employed directly by clinical services with professional linkage back to DoP.

Recommendation 7: Each APP-trainee in a training post should be supported through a training programme. The training programme should:

- be designed to meet the needs of the patient group and clinical service which they will work in once completed.
- be clinically preceptored, and formally accredited using an appropriate competency-based curriculum.
- cover acquisition of theoretical knowledge and practical skills (assessment and procedural).
- Be supported by a syllabus relevant to the specific clinical service.

Recommendation 8: Employing organisations must consider appropriate educational governance to support APP level practice.

4. OPERATIONALISATION

Introduction

In this final chapter, we will discuss the opportunities to the wider NHS Scotland organisation of adopting and implementing APP roles.

Chapter linkage to ToR

This chapter will address:

ToR 4 - Propose changes which would be required to Scottish Government policy and subsequent pharmacy strategy/contracts which would be necessary to establish APP-level practice.

ToR 5 - To provide recommendations on the strategy and model for Advanced Pharmacist Practitioner implementation in Scotland including detailed proposals to support delivery including indicative timescales.

ToR 6 - Outline the funding required to develop and train an APP workforce.

4.1. Strategic policy drivers

NHS Recovery Plan[1]

Of immediate importance to the health of the Scottish population is the expeditious recovery and remobilisation of the NHS in Scotland following the COVID pandemic. In every specialty in the system there is a critical need to evolve services, enhance professional roles and deliver effective and efficient healthcare to the millions in need of it. Never in the history of the NHS has the demand and backlog for care and treatment been higher. More than half a million patients are currently on NHS Scotland waiting lists, while the length of many theatre lists are measured in years.[12] Meanwhile, ED waiting times are some of the longest recorded, while the workload in Primary Care is ever more advanced, diverse and expanding. This is all in the context of a 5-year trend in falling life expectancy in Scotland, with areas of deprivation having the lowest life expectancy – and a gap which is growing.[13]

Pharmacists are the third largest healthcare professional group after nurses and doctors. Potentially, the pharmacist profession could have a major clinical impact in delivering the NHS Scotland Recovery Plan if it is able to evolve to meet the need. The Scottish Government have outlined the NHS Scotland Recovery Plan in a strategy document setting the expectation that innovation and evolution be central to recovery and remobilisation.

> *"We will support innovation in and redesign of services to ensure that more patients receive person centred care in the right place, at the right time, and in a way and that helps staff deliver high quality care and treatment."* [1]

Never in our profession's history has there been such an opportunity to put forward a bold plan as to a redefined professional clinical role and scope of practice for pharmacists such that they can increase healthcare capacity to aid recovery and remobilisation within NHS Scotland. Advanced Pharmacist Practitioner roles, as defined and outlined here, should form a critical part of that plan.

Health and Social Care: National Workforce Strategy[2]

The Health and Social Care: National Workforce Strategy published in March 2022 by the Scottish Government, outlines the vision for the health and social care workforce in Scotland. It supports the ambition for recovery, growth and transformation of the workforce while looking to implement the legislation set out in the Health and Care (Staffing) (Scotland) Act 2019[14].

> *"The challenges identified in this Strategy and the projected demand for workforce over the next decade make it clear that as we live through and learn to live with COVID, we will need to grow the workforce at the same time as transforming how we work to further increase capacity."* [2]

Actions outlined within the strategy include: increasing the number of medical students places by 500; recruiting an additional 800 GPs; and investing over £230 million per annum in nursing and midwifery training. Overt mentions of funding or increases in pharmacist workforce include: increasing the number of NHS pre-registration places by 31 in 2020/21, then a further 89 in 2024/25; further increases in pharmacist and pharmacy technician support for the pharmacotherapy service; national clinical skills for pharmacists programme supporting community pharmacists to become independent prescribers.

Beyond this, there are more generic calls within the strategy to look at ways of upskilling and transforming the workforce which should be thought of as policy drivers to implement change within the pharmacist career pathway in support of APP roles:

> "*Promote career pathways and deliver policies on upskilling and developing the Health and Social Care workforce.*" (Summary of short-term actions for the "Train" domain)[2]

A review of the pharmacy workforce by means of a National Workforce Forum is underway within NHS Scotland at present. Given the potential impact in terms of clinical service provision that APP roles outlined within this paper have made to existing service delivery, there is a need for those APP roles to be discussed and endorsed for roll out across NHS Scotland as part of that work.

Care and Wellbeing Portfolio[3]

The Care and Wellbeing Portfolio (CWP) from the Scottish Government will link various Government systems to deliver a coherent series of integrated reform programmes aimed at improving the health of our population and reducing health inequalities. The CWP is being designed to promote innovation and new ways of working; redesigning systems around people; and ultimately prioritising prevention, improving population health and reducing inequality. The Government recognise that systematic inequalities, made worse by COVID, need to be urgently addressed, especially for those in our communities who suffer poor health disproportionately.

There is a need to develop clear service models that will go on to describe different levels of pharmacist practice and ultimately define the need for different roles, including APP. This service visioning work, aligned with national drivers should be focused on the development of an integrated pharmacy offer across Prevention and Proactive Care; Integrated Planned Care and Integrated Unscheduled and Urgent Care as set out in the CWP. NHS reform, workforce reform and innovation CWP priorities all align well with the work proposed in this report.

Right Care - Right Place[15]

Right Care - Right Place guidance has been issued by the Scottish Government informing patients and the public of the variety of healthcare service on offer to them.[15] The main differentiator used in that guidance is the service rather than individual professional roles e.g. when to approach community pharmacy vs general practice vs NHS111 vs Emergency Department. However, the same general principles also apply to the healthcare professional offering advice within each of those organisations. The APP examples outlined in this paper show intraprofessional diversification of roles, responsibility and scope of practice can lead to changes in the division of labour within a service. Ultimately this extends the Right Care – Right Place guidance to also ensuring that we have the right workforce skill mix fit for purpose in a modern NHS Scotland.

4.2. Other non-policy drivers

Independent prescribers at point of registration

From 2026 onwards, new GPhC standards will allow all newly qualified pharmacists the legal right to function as independent prescribers from the point of registration.[16] What this should represent for the pharmacist profession is a mindset change in our own professional identity. There are now the legislative changes in place to deliver a clinical workforce at point of registration. However, the pharmacy service has yet to describe the clinical roles of these new prescribing pharmacists with sufficient clarity for the wider NHS workforce to understand how they envision redesigning services to enable the embedding pharmacists with these skill sets.

Digital transformation – automation & algorithm

Beyond the legislative changes around prescribing, there are other enablers which can act as drivers for the transformation and evolution of pharmacist roles. Solutions to system bottlenecks and workforce capacity can likely be found by application of improved digital systems, including robotic process automation, artificial intelligence (AI), and improved algorithms and workflows. AI has also been identified within the Scottish Government workforce strategy as a key action in need of assessment and development in the NHS Recovery:

> "*Assess and identify the role of AI in delivering Health and Social Care services to address demand and capacity issue."*[2]

There are challenges to pharmacist identity with the inevitable encroachment of hardware (machines) and software (computers) on what has been the traditional role of a pharmacist in dispensing, supply, and medicines reconciliation. It is likely that current pace of modern technology development, and economic drivers (workforce, capital) will revalue many of those traditional pharmacist dispensing, supply and physician-ancillary checking roles and render them obsolete within a generation. It will mean supply and checking functions are no longer an appropriate use of resource for an independent prescribing pharmacist workforce, and there is a need to free up pharmacist time by empowering other members of the pharmacy team to take on these roles. In doing so, this will release capacity for pharmacists with appropriate skill sets to develop into Advanced Pharmacist (AP) and APP type practice roles.

Recruitment and retention of staff

Horizontal skills integration in terms of four pillar working (clinical practice; leadership; education & training; research) results in higher levels of professional agency.[17] These four pillars of practice are supported in all non-medical professional advanced programmes and are advocated for the development of APPs. Beyond the breadth of horizontal skills, there is an obvious need for vertical

skills integration (assimilation of new skills to existing pharmacist advanced skill sets such that we can increase the autonomy) especially within clinical practice. Both facets are hoped to provide the foundation for more meaningful clinical careers in which pharmacists can operate as clinicians.

In recent years, the advent of graduate entry medicine courses like ScotGEM[18] have offered pharmacists, dissatisfied and with the lack of advanced pharmacist clinical roles and opportunity, an alternative route to those roles. But one which requires them to leave the pharmacy profession and retrain as a doctor, to deliver care to patients – presenting a net loss of viable pharmacist workforce in Scotland, and a gap out of practice for a minimum of four years before returning as a junior medical professional. The APP role defined in this report offers a tangible alternative that looks to retain and grow our existing pharmacist workforce. It also reduces the time to realise outcomes for patients by working through a more time-effective role development programme. Depending on age of entry to other professional training routes, workforce attrition to other professions presents a net loss of up to 8 years of pharmacist development (undergraduate and post-graduate), and potentially 25 or more years of future pharmacist resource.

4.3. Learning from Advanced Clinical Assessment Skills Course (ACE) Research paper[19]

Recently published research from within NHS Scotland reported on the behavioural determinants of implementation of advanced clinical assessment and examination (ACE) course skills in General Practice Clinical Pharmacists (GPCPs) from 8 territorial health boards (see appendix 4). Key findings related to the three main themes.

Factors influencing implementation of advanced clinical skills by pharmacists

The ACE course allowed participants to develop knowledge and advanced clinical skills capabilities beyond the scope of traditional pharmacist roles. Those able to use the skills in practice, post-course, reported managing patients with a higher degree of clinical autonomy. Participants described the need to be embedded in an MDT environment and for supervised triangulation of clinical skills and decision-making in practice to aid implementation.

Social and environmental influences affecting opportunities for pharmacists in advanced clinical roles

Participants expressed frustration about a range of factors that hindered implementation which were out with their control. There was a clear feeling that Government policy was required to support advanced pharmacist practice. To optimise the opportunity for utilisation of pharmacists' augmented advanced clinical skillsets, there is a need for senior leadership at local and national level to define and normalise these roles.

Perceptions of pharmacist professional identity for advanced practice roles

A widespread limited understanding of advanced pharmacist professional identity was seen as a significant barrier to integration and implementation of these roles into current clinical care teams and demotivating in terms of development of advanced practice roles. This has left some of these innovators feeling a degree of alienation within the profession and wider healthcare team.

Research conclusions

The research demonstrated that GPCPs can be supported to augment their existing clinical skills sets with advanced generalist clinical assessment and examination skills gained from ACE courses. However, the implementation of these advanced skills sets were hampered by a variety of factors. Principal among them was a lack of understanding of the pharmacist-product of these courses, how to support their ongoing development, and how to utilise these pharmacists in a redesigned healthcare system. ACE courses were thought to be a prerequisite to type of training that would be

required to produce an APP clinician as defined in chapter 1 of this report. Senior leadership at local and national level, including Scottish Government policy, was called for to define and normalise these roles.

Beyond the research

This research was conducted in 2021 with 14 GPCP participants of the 17 known to have completed ACE qualified at that time within NHS Scotland. Table 2 below shows the increasing numbers of pharmacists who are being funded by NES to undertake this training. As yet, no service implementation plan has been agreed at a national level to support integration and implementation of these skills upon ACE course completion and to address the barriers to implementation and operationalisation as found in the research by Rushworth et al.

	2021	2022
Primary Care	9	12
Acute	0	5
Community	1	0
Unknown	0	2
Total	10	19

Table 7: Number of pharmacists on NES funded ACE courses in NHS Scotland

The conclusions from this research have been considered by the group and solutions are offered in the recommendations made in this report in support of the establishment and operationalisation of APP roles in NHS Scotland.

4.4. Further considerations for success

Chapter 2 gave an overview of a wide range of AP (Specialism) and APP (Specialism) roles already actively contributing the recovery and remobilisation of healthcare service across NHS Scotland. The following were thought to be conditions for success of any future role development:

- Executive level non-pharmacy and pharmacy sponsorship is critical to ensure advocacy of these roles at a higher level within Health Boards and Government. Multiple members of the SLWG spoke of the inter and intraprofessional difficulties many have in understanding the concept of pharmacists in advanced practitioner roles. This was thought to be indicative of how reserved the pharmacy profession has been as a whole in adapting to modern healthcare challenges at a patient-facing clinician level. There is an urgent need to seek non-pharmacy sponsorship in support of these role developments. It was not thought to be enough to solely rely on unilateral, monoprofessional advocacy from within the profession at any level (DoPs, CPO and RPS). More expansive support for models of healthcare kinship should be actively sought to support.
- APP (Specialism) roles should be integrated within clinical teams rather than within current managed service pharmacy. Pharmacy offers an ancillary service to medicine rather than being fully integrated with it. Understanding the APP role in front-line service delivery, as outlined in this report, leads to an understanding that to deliver a co-ordinated clinical service where APPs are held among the clinician numbers for that service, they need to report to the line manager for that clinical service. Professional leadership links should be maintained with senior pharmacy leads.
- Need to look beyond managed service pharmacy to ensure the development and delivery of these roles.

- Need standard job descriptions for each APP (Specialism) group – again, this was thought to promote the concept of a defined product and equitable service.
- Need to make a formal approach to RPS on the behalf of NHS Scotland to design "top-up" specialist curricula. If that request is declined, then the proposal should be to link to the Advanced Practice Academies within NHS Scotland, administered via NES, to ensure the educational governance of this type of practice.

4.5. Funding required to create APPs

Funding models will be different in different sectors of practice and will have to be brokered and agreed centrally with the relevant stakeholders. However, the following model has been worked up as an example of the funding required to train an APP (GP).

Duration of training and banding

It is expected that the Whole Time Equivalent APP (GP) would take up to 2 years to train. According to mapped national job profiles, an advanced pharmacist would likely be appointed at Agenda for Change (AfC) 8a – 8b range upon completion of training.[20] Note that this banding is different from that of a multidisciplinary Advanced Clinical Practitioner role which would sit at band 7.[21] The difference here relating to the higher baseline education, training and skill set which a pharmacist bring to these roles.

As these are training posts, the pay and banding are subject to Agenda for Change Terms and Conditions - Annex 21: arrangements for pay and banding of trainee, which state the following:

> "2*(iii) trainees who enter the NHS and undertake all their training whilst an employee. Typically, these staff develop their knowledge and skills significantly during a period of time measured in years. Given the significant change in knowledge and skills during the training period the use of job evaluation is not appropriate. Pay should be determined as a percentage of the pay for qualified staff.*
> *3. For trainees covered by paragraph 2(iii), where periods of training last for between one and four years, pay will be adjusted as follows:*
> *(i) up to 12 months prior to completion of training: 75 per cent of the pay band maximum of the fully qualified rate;*
> *(ii) more than one but less than two years prior to completion of training: 70 per cent of the pay band maximum of the qualified rate;"*

Once qualified, employees will revert to 100% of the relevant pay point.

Year 1 @70% of top of 8a band with oncosts = £50,557/pharmacist
Year 2 @75% of top of 8a band with oncosts = £54,168/pharmacist

2 Year Total = **£104,725**

Costs for comparison – indicative costings are given below for various alternative methods of employment and banding while training, for information only.

1) 100% of bottom of 8a band with oncosts = £66,820/pharm/yr or £133,640/pharm for 2 years. Costs +£28,915 on option listed above.
2) 100% of top of 7 with oncosts = £63,286/pharm/yr or £126,572/pharm for 2 years. Costs +£21,847 on option listed above.

Curriculum and assessment

They would need clinical and non-clinical time to get through their RPS Core Advanced and Advanced Pharmacist Practitioner (General Practice) Specialist top up curriculum (to be developed). Likely working 8-9 clinical sessions and 1-2 non-clinical development sessions per week. These non-clinical development sessions would allow them time to develop competencies in the leadership, E&T, and research domains and while in-training, would afford the trainee APPs some study time. Organisations have a legal responsibility under the Health and Social Care Staffing (Scotland) Act 2019 to ensure their staff are appropriately trained to undertake their role.[14] There will be a fee associated with the assessment of the RPS Core Advanced curriculum and specialist top up curriculum. The details of the cost for this have not yet been released, but we will use the Consultant Pharmacist Curriculum assessment fee as an indicative cost.

Projected RPS Assessment Fee = **£450**

Clinical Supervision

Within contracted services such as General Practice, consideration also needs to be given as to a fee for clinical supervision of APPs in training. The following costs are calculated based on the current GP Trainer's Grant which GP receive quarterly from NES for supervision a GP Registrar.

Current NES GP Trainer's Grant is £10,374/year, therefore for 2 years = **£20,748**

ACE Course

There a variety of Higher Education Institutions offering ACE courses which would be suitable for the purpose of developing an APP (GP). These costs range from around £600-1700. A cost representative cost will be used here.

ACE Course = **£1000**

Total cost of training posts for APP over 2 years = £126,923/APP (GP)

Considerations around funding and value to service

Value is important to the NHS given the extensive fiscal restraints. The model above meets the challenges set out in the NHS Recovery Plan as well as outlining how pharmacist services can transform as part of the National Workforce Strategy. We believe this offers significant value to the NHS in terms of what pharmacists in this role, as defined in Chapter 1, can offer to service in relation to other professions. While GPs are critical, and pivotal clinicians at the head of the primary care team, it is likely that a high percentage of their clinical tasks could be completed by fully trained APP(GP)s such that they could cover a significant part of the GP clinical workload, working alongside those GP colleagues. The exact figures should be subject to research, but it is expected that APP(GP)s could perhaps cover 50% plus of GP clinical workload at this time. We believe this offers considerable value to front-line service capacity and provision. Given that we feel these individuals, if supported appropriately, could be produced in approximately 2 years, we suggest this is also a much faster way of allowing pharmacists to cover large proportions of GP clinical workload instead of having to wait on completion of full medical degrees or expedited graduate entry programmes. At best, graduate entry medical programmes would still take at least 9 years (4 years of ScotGEM, then at least a further 5 years of postgraduate medical training) to provide a service with a viable General Practitioner, with subsequent inherent risks of retention of the graduates within the Scottish health system.

Other factors which are not covered in the costings here are: indemnity; equipment (stethoscope, diagnostic set, sphygmomanometer etc – likely to cost around £500); other training course

attendance, as necessary; cost to NES and employing organisation of educational governance arrangements.

4.6. Interpretation and summary

Extensive interpretation has been offered contemporaneously throughout this chapter and does not need further expounding here.

4.7. Recommendations

Recommendations are linked to all relevant Scottish Government policy relating to recovery, growth and critically, transformation of the pharmacist workforce such that it can contribute to the recovery and remobilisation of NHS Scotland post-pandemic.

ToR 4 - Propose changes which would be required to Scottish Government policy and subsequent pharmacy strategy/contracts which would be necessary to establish APP-level practice.

Recommendation 9:	***The need*** for APP type practice as outlined in this report, should be accepted as a means of pharmacy contributing to Scottish Government strategy.
Recommendation 10:	APP level practice should be included in future Scottish Government healthcare strategy as well as all Scottish Government pharmacy strategy.
Recommendation 11:	APP level practice should be included in proposed "Transforming Pharmacy Roles" as a component of advanced pharmacist practice in NHS Scotland.
Recommendation 12:	Funding in support of the development of APP practice should be secured to evolve and adapt our workforce in response to the NHS Recovery Plan and National Workforce Strategy.

ToR 5 - To provide recommendations on the strategy and model for Advanced Pharmacist Practitioner implementation in Scotland including detailed proposals to support delivery including indicative timescales.

Recommendation 13:	Strong professional leadership is needed within NHS Scotland to establish and develop systemic APP-level practice and posts, as such: o PPRSG are asked to endorse the recommendations in this report. o Directors of Pharmacy (DoPs) are asked to endorse the recommendations in this report. o PPRSG should identify senior pharmacy leaders to gain Executive-level non-pharmacy sponsorship in support of the development of APPs and the recommendations in this report. o PPRSG should identify senior pharmacy/non-pharmacy leaders to make representation to Scottish Government on behalf of PPRSG and DoPs, in support of the recommendations of this paper. o PPRSG should ensure the recommendations of this SLWG be represented at the NHS Scotland Workforce Forum.

ToR 6 - Outline the funding required to develop and train an APP workforce.

Recommendation 14: In response to the NHS Recovery Plan and National Workforce Strategy, funding should be sought to train and evaluate an initial cohort of APPs where:

- Funding should be based on the financial costings listed in this report.
- Provision should be made to appropriately fund an academic evaluation.

APPENDIX 1: ADVANCED PHARMACIST PRACTITIONER SHORT LIFE WORKING GROUP MEMBERS

Name	Role	Representing
Professor Ronald MacVicar	Chair Retired GP. Retired NES NoS Postgraduate Dean for Medicine	N/A
Gordon Rushworth	Deputy Chair/Professional Secretary Programme Director, HIPER - NHS Highland ACE course completer - APP, General Practice	N/A
Professor Scott Cunningham	Professor of Pharmacy Practice & Education	School of Pharmacy (RGU)
Gazala Akram	Senior Teaching Fellow, Course Director for MSc in Clinical Pharmacy	School of Pharmacy (UoS)
Fiona Stewart, (Dr Rachel Bruce, Deputising)	Associate PG Pharmacy Dean, NES (Principal Lead for Prescribing & Clinical Skills, NES)	NES
Gillian Elkin	Lead Pharmacist E&T, NHS Borders	NHS Scotland Education & Training Leads Group
Stephen Docherty (Joseph Oakley, Deputising)	Advanced Practice Lead, RPS (Associate Director, Education & Professional Development)	RPS
Laura Fraser	Director for Scotland, GPhC	GPhC
Adam Osprey	Community Pharmacist	CPS
Jane Hall	Associate Director of Pharmacy, Primary Care, NHS A&A	SP3A
Jennifer Morrison	Advanced Cancer Care Pharmacist NHS Lothian	NAPs
Arlene Shaw	Lead Clinical Pharmacist (Medicine Division and COVID) Specialist Clinical Pharmacist (Respiratory Medicine) NHS Tayside	NAPs
Alison Boyle	Advanced Pharmacist, BBV NHS GGC	NAPs
Scott Garden	Director of Pharmacy, NHS Lothian Chair of Advanced Pharmacist Group	DoP Advanced Pharmacist Group Chair
Tony McDavitt	Director of Pharmacy, NHS Shetland & NHS Orkney Advanced GPCP with ACE Course	DoP Service Lead with experience of APP-type service
Lesley Giblin	Service Lead – Dr Grays. NHS Grampian	Service Lead with experience of APP-type service
Anne Thomson	Lead Pharmacist, Clinical Services, NHS GGC	Service Lead with experience of APP-type service
Paul Forsyth	Lead Pharmacist Cardiology, NHS GGC	Accredited Consultant Pharmacist
Sam Falconer	(Community Pharmacy) NHS A&A locality NES Common Clinical Conditions, T&T lead	Community Pharmacist
Dr Joan MacLeod	(GP) – Practice Employed Advanced GPCP. Cairn Medical Practice, NHS Highland.	Learner (undertaking ACE course)
Jordan West	(GP) – Practice Employed. Fraserburgh Medical Practice	ACE course completer
Peter Campbell	(GP) – Practice Employed. Bute Medical Practice	ACE course completer
Leanne Black	(GP) NHS GGC, Care Homes	ACE course completer
Gayle Anderson	(Acute – obs & gynae) Dr Gray's, NHS Grampian	ACE course completer
Lisa McDermott	(Acute – Emergency Department) NHS Lanarkshire	ACE course completer
Stephen-Andrew Whyte	(Acute – paediatrics) Professional Lead for Advanced Practitioner Practice, Great Ormond Street Hospital, London.	NHS England perspective Pharmacist & Non-pharmacist perspective
Dr Mark Cooper	Consultant Nurse – Advanced Practice, NHS GGC	Non-pharmacist - Advanced Practice

APPENDIX 2: NHSS APP SLWG TERMS OF REFERENCE

Through effective engagement and consultation with key stakeholders - and taking into account current regulatory requirements, professional standards and relevant reports - the Group should:

- **ToR 1:** Define the term "Advanced Pharmacist Practitioner" (APP) and make recommendations for reserving its use within NHS Scotland.
- **ToR 2:** Consider what would constitute an APP in each sector and define the need for these based on available evidence.
- **ToR 3:** Undertake a mapping exercise to plot out the skillset and qualifications required of an APP and the necessary steps for the development of an APP training programme within NHS Scotland, exploring the possibility to link credentialing with the RPS Core Advanced Curriculum.
- **ToR 4:** Propose changes which would be required to Scottish Government policy and subsequent pharmacy strategy/contracts which would be necessary to establish APP-level practice.
- **ToR 5:** To provide recommendations on the strategy and model for Advanced Pharmacist Practitioner implementation in Scotland including detailed proposals to support delivery including indicative timescales.
- **ToR 6:** Outline the funding required to develop and train an APP workforce.

Subject to SG agreement and policy regarding an Advanced Pharmacist Practitioner strategy and model, and the availability of the required resources, work with key stakeholders to support implementation of an Advanced Pharmacist Practitioner model within Scotland.

APPENDIX 3: OVERVIEW OF MEETINGS

The group met four times between February and August 2022. Each meeting was focused on a single theme thought to be essential to execute the functions of the ToR. At each meeting, to grow understanding within the SLWG of the level and functionality of this type of clinical practice, clinician and managerial members were selected to share 'best-practice' vignettes outlining the implementation of APP practice into their services (these have been curated in Chapter 2).

Meeting 1 focused on understanding & definition; vignettes were given by clinicians working within general practice and an emergency department in APP-type roles. Discussions focused on the commonalities and conditions in support of these roles. Discussions were also had on the overlap and differentiation between emerging APP roles and advanced pharmacist roles.

Meeting 2 focused on organisational fit; vignettes were given by managerial service leads in primary and secondary care as to how integration of APP practice could provide the NHS with a unique clinician within the NHS workforce. The group heard how these operational plans were made in response to recruitment issues within other clinician workforces leading to gaps in service for patients.

Meeting 3 focussed on education & training (E&T); further clinical vignettes were heard from community pharmacy expounding on how adaptation and enhancement of clinical skillsets developed a more responsive workforce. A clinical vignette was also heard from outwith Scotland where the Lead for Advanced Practice at Great Ormond Street Hospital in London talked about their APP role in paediatrics, as well as their role working for the Regulator in Fitness-to-Practice cases. Recently published research from within NHS Scotland on the implementation of Advanced Clinical Examination and Assessment (ACE) course skills in GPCPs was also discussed. The commonality between training for APP (Specialism) roles was discussed in the context of safe and effective E&T to support delivery.

Meeting 4 focussed on operationalisation; the group heard a presentation from a senior service leader and a Director of Pharmacy about the challenges and opportunities for establishing APP level service within NHS Scotland, in the context of the current policy drivers. The group was in support of APP type practice within NHS Scotland.

APPENDIX 4: ACE COURSE RESEARCH IN GPCPs

<CHANGE TO ORIGINAL REPORT FOR INCLUSION IN THESIS – a copy of ACE paper removed as already included in chapter 8 of this thesis, so the original copy or the citation below has been removed>

Rushworth GF, Jebara T, Tonna AP, Rudd I, Stewart F, MacVicar R, Cunningham S. General Practice Pharmacists' implementation of Advanced Clinical Assessment skills: a qualitative study of behavioural determinants. International Journal of Clinical Pharmacy. 2022; 44: 1417-1424. https://doi.org/10.1007/s11096-022-01484-7

APPENDIX 5: INDEX OF TABLES AND FIGURES

<CHANGE TO ORIGINAL REPORT FOR INCLUSION IN THESIS – see main thesis index for index of tables and figures within Appendix 5 report>

REFERENCES

1. NHS Scotland Recovery Plan. Available at: https://www.gov.scot/publications/nhs-recovery-plan/. Accessed Sept 23rd, 2022.
2. Health and social care: national workforce strategy. Available at: https://www.gov.scot/publications/national-workforce-strategy-health-social-care/. Accessed Sept 27th, 2022.
3. Care and Wellbeing Portfolio Board. Available at: https://www.gov.scot/groups/care-and-wellbeing-portfolio-board/. Accessed Dec 16th, 2022.
4. Core Advanced Pharmacist Curriculum. Available at: https://www.rpharms.com/development/credentialing/core-advanced-pharmacist-curriculum. Accessed Nov 4th, 2021.
5. Scottish Government. Paper 07: Transforming Nursing Roles - Advanced Nursing Practice - Phase II: Transforming nursing, midwifery and health professions' (NMaHP) roles: pushing the boundaries to meet health and social care needs in Scotland. 1st ed. Edinburgh: Scottish Government; 2021.
6. The Scottish Government. The 2018 General Medical Services Contract for Scotland. Edinburgh: Scottish Government; 2017.
7. Advanced Clinical Practitioner (ACP) Curriculum. Available at: https://rcem.ac.uk/acp-curriculum/. Accessed Sept 23rd, 2022.
8. Scottish Government. Paper 02: Transforming nursing, midwifery and health professions roles: advance nursing practice. 1st ed. Edinburgh: Scottish Government; 2017.
9. Health Education England. Multi-professional framework for advanced clinical practice in England. 1st ed. London: HEE; 2017.
10. NHS Education for Scotland. General Practice Clinical Pharmacist: Competency and Capability Framework. 1st ed. Edinburgh: NES; 2016.
11. General Pharmaceutical Council. Standards for Pharmacy Professionals. 1st ed. London: GPhC; 2017.
12. NHS waiting times - stage of treatment. Available at: https://publichealthscotland.scot/publications/nhs-waiting-times-stage-of-treatment/stage-of-treatment-waiting-times-inpatients-day-cases-and-new-outpatients-22-february-2022/. Accessed Sept 23rd, 2022.
13. Life expectancy continues to fall in Scotland. Available at: https://www.nrscotland.gov.uk/news/2022/life-expectancy-continues-to-fall-in-scotland. Accessed Sept 23rd, 2022.
14. Health and Care (Staffing) (Scotland) Act 2019. Available at: https://www.legislation.gov.uk/asp/2019/6/enacted. Accessed Sept 27th, 2022.
15. Right care right place. Available at: https://www.gov.scot/publications/right-care-right-place-2/. Accessed Sept 23rd, 2022.
16. Standards for the initial education and training of pharmacists. Available at: https://www.pharmacyregulation.org/sites/default/files/document/standards-for-the-initial-education-and-training-of-pharmacists-january-2021_0.pdf. Accessed Jan/20th, 2021.
17. Forsyth P, Radley A, Rushworth GF, Marra F, Roberts S, O'Hare R, et al. The Collaborative Care Model: Realizing healthcare values and increasing responsiveness in the pharmacy workforce. Research in Social and Administrative Pharmacy 2022; Available online 2 September 2022;.
18. Scottish Graduate Entry Medicine (ScotGEM) MBChB. Available at: https://www.st-andrews.ac.uk/subjects/medicine/scotgem-mbchb/. Accessed Sept 27th, 2022.
19. Rushworth GF, Jebara T, Tonna AP, Rudd I, Stewart F, MacVicar R, et al. General practice pharmacists' implementation of advanced clinical assessment skills: a qualitative study of behavioural determinants. Int J Clin Pharm 2022; Accepted - In Press.

20. National job profiles: pharmacy. Available at: https://www.nhsemployers.org/sites/default/files/2021-06/pharmacy-profiles.pdf. Accessed Sept 28th, 2022.
21. National job profile: clinical practitioner (multidisciplinary). Available at: https://www.nhsemployers.org/sites/default/files/2021-10/Clinical-practitioner-multidiciplinary-roles.pdf. Accessed Sept 28th, 2022.

APPENDIX 3: GORDON RUSHWORTH FULL PUBLICATION LIST

The highlighted publications below have been selected for submission as part of this PhD by Public Output.

Google Scholar page: *https://scholar.google.co.uk/citations?user=H03evYaJppYC&hl=en&oi=ao*

h-index = 14 [accessed 09/06/2023] i10-index = 19 [accessed 09/06/2023]
citations = 1052 [accessed 09/06/2023]

Original Research

1. Mahmoud F, Mullen A, Sainsbury C, Rushworth GF, Yasin H, Abutheraa N, Mueller T, Kurdi A. Quantifying Factors Associated with Antidiabetic Drug Prescribing for Type 2 Diabetes Mellitus: A Systematic Review and Meta-analysis. European Journal of Clinical Investigation. 2023 [Accepted]
2. Jebara T, Youngson E, Drummond N, **Rushworth G**, Pfleger S, Rudd I, MacLeod J, Wilson M, Bailey N, Cuningham S. A qualitative exploration of chronic pain management of older adults in remote and rural settings: behaviours, views and experiences. International Journal of Clinical Pharmacy. 2023 [Accepted]
3. **Rushworth GF**, Jebara T, Tonna AP, Rudd I, Stewart F, MacVicar R, Cunningham S. General Practice Pharmacists' implementation of Advanced Clinical Assessment skills: a qualitative study of behavioural determinants. International Journal of Clinical Pharmacy. 2022; 44: 1417-1424. *https://doi.org/10.1007/s11096-022-01484-7*
4. Innes C, Cunningham S, Addison B, Wedekind Y, Watson E, Rudd I, Power A, Karim L, **Rushworth GF**. General practice-based pharmacy longitudinal clerkship: a theoretically underpinned qualitative evaluation. International Journal of Clinical Pharmacy. 2022; 44: 1123-31. *https://doi.org/10.21203/rs.3.rs-1283929/v1*
5. Cunningham S, Jebara T, Stewart D, Smith J, Leslie SJ, **Rushworth GF**. Using the theoretical domains framework to explore behavioural determinants for medication taking in patients following percutaneous coronary intervention. International Journal of Pharmacy Practice. 2022; 1-8. *https://doi.org/10.1093/ijpp/riac039*
6. Eddleston M, Sandilands E, Rees J, Raja K, Dhaun K, Morrison E, Hickson K, Wraight J, Gray T, Briody L, Cameron S, Thompson A, Johnston N, Uren N, Goddard J, Treweeke A, **Rushworth G**, Webb D, Bateman N, Norrie J, Megson I Acetylcysteine has No Mechanistic Effect in Patients at Risk of Contrast-Induced Nephropathy. A Failure of Academic Clinical Science. Clinical Pharmacology & Therapeutics. 2022; 111(6); 1222-1238.
7. Jebara T, Thomas I, Cunningham S, **Rushworth GF**. Pharmacy and medical student interprofessional education placement week. Clinical Teacher. 2022; 1-7. *https://doi.org/10.1111/tct.13450*
8. Innes C, **Rushworth G**, Addison B, Wedekind Y, Watson E, Rudd I, Power A, Cunningham S. An innovative General Practice based Pharmacy Longitudinal Clerkship: using theory to characterise its development, implementation and initial evaluation. Education for Primary Care. 2021; 33(3): 173-179. *https://doi.org/10.1080/14739879.2021.1996275*
9. **Rushworth GF**, Innes C, Macdonald A, MacDonald C, McAuley L, McDavitt A, Stewart F, Bruce R. Development of innovative simulation teaching for advanced general practice clinical pharmacists. International Journal of Clinical Pharmacy. 2021; 43: 817-824. *https://doi.org/10.1007/s11096-021-01305-3*

10. Callum KJ, Hall L, Jack S, Farman C, **Rushworth GF**, Leslie SJ. External Loop Recorders: Primary Care Placement is Noninferior to Hospital-Based Cardiac Unit. Journal of Primary Care & Community Health. 2020; 11: 1-11. *https://doi.org/10.1177/2150132720946147*
11. Thomson P, Angus NJ, Andreis F, **Rushworth GF**, Mohan AR, Chung ML, Leslie SJ. Longitudinal evaluation of the effects of illness perception and beliefs about cardiac rehabilitation on quality of life of patients with coronary artery disease and their caregivers. Health and Quality of Life Outcomes. 2020;18:158. *https://doi.org/10.1186/s12955-020-01405-0*
12. Stewart D, **Rushworth G**, Bailey N, Pfleger S, Jebara T, Munro K, Youngson E, Wilson M, MacLeod J, Cunningham S. A cross-sectional survey of the perspectives of older people in the Scottish Highlands on the management of their chronic pain. Age & Ageing 2020; 00:1-7. [online first] *https://doi.org/10.1093/ageing/afz181*
13. Thomson P, **Rushworth GF**, Andreis F, Angus NJ, Mohan AR, Leslie SJ. Longitudinal study of the relationship between patients' medication adherence and quality of life outcomes and illness perceptions and beliefs about cardiac rehabilitation. BMC Cardiovascular Disorders. 2020; 20(71). *https://doi.org/10.1186/s12872-020-01378-4*
14. Generalova D, Cunningham S, Leslie SJ, **Rushworth G**, McIver L, Stewart D. Prescribers' views and experiences of using direct acting oral anticoagulants in the management of nonvalvular atrial fibrillation: A survey in remote and rural Scotland. Br J Clin Pharmacol. 2019; 85: 2414-22. *https://doi.org/10.1111/bcp.14069*
15. Buist E, McLelland R, **Rushworth GF**, Stewart D, Gibson-Smith K, MacLure A, Cunningham S, MacLure K. An evaluation of mental health clinical pharmacist independent prescribers within general practice in remote and rural Scotland. *Int J Clin Pharm.* 2019: *https://doi.org/10.1007/s11096-019-00897-1* [online first]
16. Creaney C, Barkat K, Durey C, Gallagher S, Campbell L, MacAden A, Findlay P, **Rushworth GF**, Leslie SJ. Non-prescription of anticoagulants in patients discharged with stroke and atrial fibrillation. Br J Cardiol. 2019;26:23–6doi:*10.5837/bjc.2019.007*
17. Stewart D, Cunningham S, Strath A, MacLure A, Gibson-Smith K, **Rushworth GF**, Dreischulte T, Nicolson C, Pfleger D, Tiernan D, MacLure K. A theoretically informed survey of the views and experiences of practicing pharmacists on research conduct, dissemination and translation. *Research in Social and Administrative Pharmacy.* 2019; 15:1298-1308. *doi.org/10.1016/j.sapharm.2018.12.005*
18. Knoery CR, Ecker V, **Rushworth GF**, Rudd I, Ortner A, et al. Risk Factors Influencing Long Term success of Electrical Cardioversion for Patients with Atrial Fibrillation–A Retrospective Service Evaluation. J Cardiovas Disea Medic. 2018; 1(1): 71-75.
19. Stewart D, Gibson-Smith K, Cunningham S, Pfleger S, **Rushworth G**. A qualitative study of the perspectives of older people in remote Scotland on accessibility to healthcare, medicines and medicines-taking. *International Journal of Clinical Pharmacy.* 2018; 40: 1300-1308. *https://doi.org/10.1007/s11096-018-0684-y*
20. Kamona A, Addison B, **Rushworth GF**, Call A, Bloe C, Innes A, Bond RR, Peace A, Leslie SJ. Comparing ST-segment elevation myocardial infarction care between patients residing in central vs remote locations: a retrospective case series. Rural and Remote Health. 2018; 18(1). *https://doi.org/10.22605/RRH4618*
21. **Rushworth GF**, Cunningham S, Pfleger S, Hall J, Stewart D. A cross-sectional survey of the access of older people in the Scottish Highlands to general medical practices, community pharmacies and prescription medicines. *Res Social Adm Pharm.* 2017; *http://dx.doi.org/10.1016/j.sapharm.2017.01.002*

22. Kitz TM, Burnand N, Ortner A, Rudd IG, Sampson R, **Rushworth GF**, Leslie SJ. Unexpected deaths in cardiology outpatients - what can we learn from case review? *J Royal Soc Med Open.* 2016; 7(12): 1-8. *https://doi.org/10.1177/2054270416669301*
23. **Rushworth GF**, Diack, L, MacRobbie A, Munoz S-A, Pfleger S, Stewart D. Access to medicines in remote and rural areas: a survey of residents in the Scottish Highlands & Western Isles. *Public Health.* 2015; 129: 244-251.
24. **Rushworth GF**, Diack L, Rudd IG, Stewart D. General practitioner views of an electronic high-risk medicine proforma to facilitate information transfer. *International Journal of Clinical Pharmacy.* 2015; 37: 4-7.
25. **Rushworth GF**, Bloe C, Diack HL, Reilly R, Murray C, Stewart D, Leslie SJ. Pre-hospital ECG e-transmission for patients with suspected myocardial infarction in the Highlands of Scotland. *International Journal of Environmental Research & Public Health.* 2014; 11: 2340-60.
26. Maskrey BH, **Rushworth GF**, Law MH, Treweeke AT, Wei J, Leslie SJ, Megson IL, Whitfield PD. 12-hydroxyeicosatraenoic acid is associated with variability in aspirin-induced platelet inhibition. *Journal of Inflammation.* 2014; 11: 33. *https://doi.org/10.1186/s12950-014-0033-4*
27. **Rushworth GF**, Connelly J, Laing W, Maskrey BH, Nicholas F, MacRury SM. Review of clinical use of glucacon-like peptide-1 in the management of type 2 diabetes. *Practical Diabetes.* 2014; 31(7):287-90.
28. Choo WK, Fraser S, Padfield G, **Rushworth GF**, Bloe C, Forsyth P, Cross SJ, Leslie SJ. Dabigatran improves the efficiency of an elective direct current cardioversion service. *British Journal of Cardiology.* 2014;21:(1).
29. Chapman AR, **Rushworth GF**, Leslie SJ. Aspirin desensitization in patients undergoing percutaneous coronary intervention: A survey of current practice. *Cardiology Journal.* 2013; 20(2): 134-8. doi: 10.5603/CJ.2013.0025.
30. Mort AJ, **Rushworth GF**. Exploration of key stakeholders' preferences for pre-hospital physiologic monitoring by emergency rescue services. *Journal of Clinical Monitoring and Computing.* 2013. *https://doi.org/10.1007/s10877-013-9475-0*
31. Treweeke AT, Winterburn TJ, MacKenzie I, Barrett F, Barr C, **Rushworth GF**, Dransfield I, MacRury SM, Megson IL. N-acetysteine inhibits platelet-monocyte conjugation in patients with type 2 diabetes with depleted intraplatelet glutathione: a randomised controlled trial. *Diabetologia.* 2012; 55(11): 2920-8.
32. **Rushworth GF**, Cunningham ITS, Mort AJ, Rudd IG, Leslie SJ. Patient-specific factors relating to medication adherence in a post-percutaneous coronary intervention cohort. *International Journal of Pharmacy Practice.* 2012; 20: 226-37. *https://doi.org/10.1111/j.2042-7174.2011.00185.x*

Review Articles

33. Generalova D, Cunningham S, Leslie SJ, **Rushworth GF**, McIver L, Stewart D. A systematic review of clinicians' views and experiences of direct-acting oral anticoagulants in the management of nonvalvular atrial fibrillation. Br J Clin Pharmacol. 2018; 84: 2692-703.
34. Ecker V, Knoery C, **Rushworth G**, Rudd I, Ortner A, Begley D, Leslie SJ. A review of factors associated with maintenance of sinus rhythm after elective electro cardioversion for atrial fibrillation. Clin Cardiol. 2018; 1-9. DOI: 10.1002/clc.22931. *https://onlinelibrary.wiley.com/doi/epdf/10.1002/clc.22931*

35. Stewart D, Generalova D, Cunningham S, Leslie S, **Rushworth G**, McIver L. Healthcare professional and patient views, behaviours and experiences surrounding novel oral anticoagulants (NOACs) for the management of non-valvular atrial fibrillation (AF): a systematic review protocol. *PROSPERO.* 2016:CRD42016003840.
36. Pisano U, Deosaran J, Leslie SJ, **Rushworth GF**, Stewart D, Ford I, Watson AJM. Nicorandil, gastrointestinal adverse drug reactions and ulcerations: a systematic review. *Advances in Therapy.* 2016. https://doi.org/10.1007/s12325-016-0294-9
37. **Rushworth GF**, Megson IL. Existing and potential uses for N-acetylcysteine: the need for conversion to intracellular glutathione for antioxidant benefits. *Pharmacology & Therapeutics.* 2014; 141: 150-9.
38. Lambrakis P, **Rushworth GF**, Adamson J, Leslie SJ. Aspirin hypersensitivity and desensitization protocols: implications for cardiac patients. *Therapeutic Advances in Drug Safety.* 2011; 2(6): 263-270.
39. **Rushworth GF**, Lambrakis P, Leslie SJ. Ivabradine: a new rate-limiting therapy for coronary artery disease and heart failure. *Therapeutic Advances in Drug Safety.* 2011; 2(1): 19-28.
40. Clark LF, **Rushworth GF**, Leslie SJ, MacRury S. New advances in blockade of the renin-angiotensin system - the role of direct renin inhibition. *Current Hypertension Reviews.* 2010; 6(4): 222-231.

Case Reports/Articles/Comment

41. Forsyth P, Radley A, **Rushworth GF**, Marra F, Roberts S, O'Hare R, Duggan C, Maguire B. The Collaborative Care Model: realising healthcare values and increasing responsiveness in the pharmacy workforce. Research in Social & Administrative Pharmacy. 2022. https://doi.org/10.1016/j.sapharm.2022.08.016
42. Forsyth P, **Rushworth GF**. Advanced pharmacist practice: where is the United Kingdom in pursuit of this '*Brave New World*'?. International Journal of Clinical Pharmacy. 2021: 43; 1426-1430. *https://doi.org/10.1007/s11096-021-01276-5*
43. **Rushworth GF**. A portfolio role: Programme Director, Highland Pharmacy Education & Research Centre. J Pharm Man. 2020; 36(2): 59-61.
44. **Rushworth, G**. Pharmacist-led care in medical practice. Primary Care Fund: Pharmacists in GP Practices - Supporting Information Pack. Scottish Government, NHS Scotland; May 2016.
45. Mort A, Eadie L, Regan L, Macaden A, Heaney D, Bouamrane M-M, **Rushworth G**, Wilson. Combining transcranial ultrasound with intelligent communication methods to enhance the remote assessment and management of stroke patients: Framework for a technology demonstrator. *Health Informatics Journal.* 2015: 1-11. *https://doi.org/10.1177/1460458215580353*.
46. **Rushworth G**. Community pharmacy intervention for diabetes improved glycaemic control. News. *Pharmaceutical Journal.* 332;291:2013.
47. **Rushworth GF**. Evolution of a pharmacist prescriber involvement in a diabetes clinic. *Clinical Pharmacist.* 2013; 5: 26-7.
48. Rudd I, **Rushworth G**. Preparing mAbs: improving care and protecting staff. *Hospital Pharmacy Europe.* 2012; 65: 35-7.
49. **Rushworth GF**, Leslie SJ, Forsyth P, Vincent C. Evidence-based case report: multiple thrombotic episodes associated with lenalidomide and dexamethasone therapy for multiple myeloma. *Therapeutic Advances in Drug Safety.* 2012 *https://doi.org/10.1177/2042098611433773*

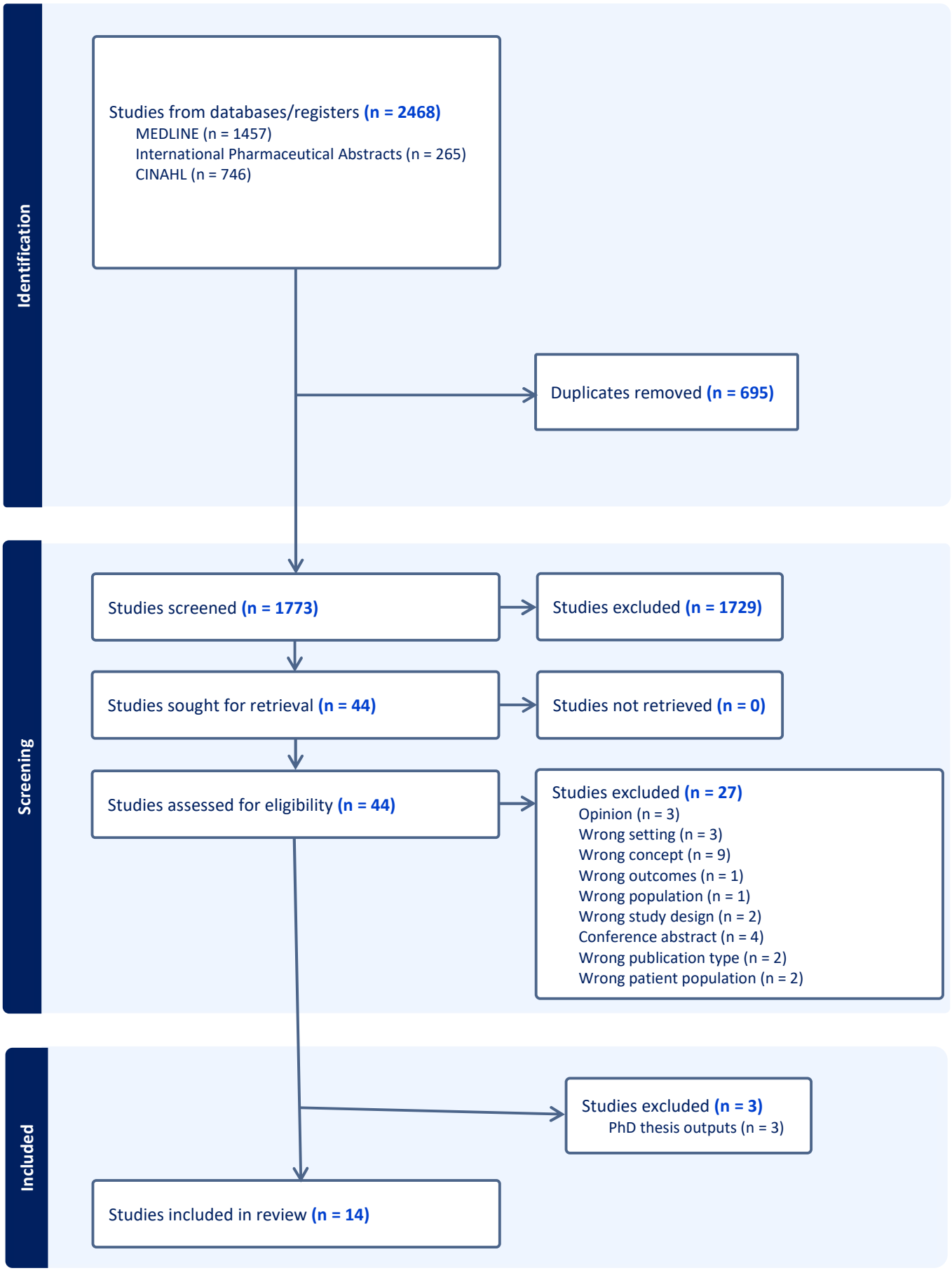
APPENDIX 4: CONTEMPORARY LITERATURE SEARCH STRATEGY AND PRISMA CHART

Name:	**Gordon Rushworth**
Matriculation Number:	**0712736**
Supervisor:	**Prof. S Cunningham**

Project title / Search Aim:	
Innovations in education and training to enable development of pharmacists as clinicians.	
Databases	
Articles for review should be selected from electronic databases. Details of potential search engines available can be found on the RGU Library web site	
1. CINAHL	2. MEDLINE
3. International Pharmaceutical Abstracts	4.
NOTE: This is **NOT** exhaustive. Speak with you supervisor to identify the most relevant data bases for **YOUR** proposal.	
Eligibility Criteria:	
You should identify relevant criteria for your proposal. Think about not only what you wish to include but content you wish to exclude. Those included are examples only. YOU NEED TO IDENTIFY RELEVANT PARAMETERS FOR YOUR PROJECT.	
Date/year All dates	2019-2023
Inclusion criteria (e.g.)	**Exclusion criteria** (e.g.)
Studies that include: **POPULATION:** Primarily qualified pharmacist professionals and student pharmacists. Other key stakeholders may be considered if relevant to provision if multidisciplinary services. Increasingly there is more of a clinical focus in pharmacy on use of clinical skills and expertise that utilises knowledge and understanding of medication for advanced practice services.	
CONCEPT: Matter relating to the education and training designed to facilitate the development of pharmacists as clinicians with a focus on interprofessional education, simulation-based	

learning, longitudinal clerkships and experiential learning, advanced clinical examination and assessment.	
CONTEXT (Country / Sector / Speciality): International / Primary Care / General Medical practice	**Exclusion:** the focus for this review was on pharmacy practice within the primary care-based sector and specifically general medical practices and therefore publications solely based on community pharmacy services and other healthcare sectors were excluded. However, papers in mixed settings that include community pharmacy were considered for inclusion.
LANGUAGE: English only	
EVIDENCE TYPE: Full text peer reviewed original papers, RCTs, cross-sectional and cohort studies, papers reporting empirical data from primary research, review articles including systematic reviews / scoping reviews /narrative reviews.	Grey literature, conference abstracts, protocols, book reviews, opinion articles and editorial reviews excluded
DATE RANGE: 2019-2023	

Core term	Sub-terms or MESH* terms	MEDLINE	IPA	CINAHL	TOTAL
1. Clinicians	Multidisciplinary team Patient care team (MESH) Clinicians	**172735**	**2609**	**41275**	**216619**
2. Pharmacists	Pharmacists (MESH) Pharmacist Student, pharmacy (MESH) Pharmacy student Clinical pharmacist Advanced clinical pharmacist Advanced pharmacist Advanced pharmacist practitioner	**39842**	**37433**	**25228**	**92503**
3. Primary care	Primary care Primary health care (MESH) General practice (MESH) Family practice (MESH)	**312608**	**6486**	**138279**	**332921**
1 OR 2		**209883**			**209883**
(1 OR 2) AND 3		**15236**			**15236**
4. Advanced practice	Advanced practice Advancing practice Advanced pract*	**9166**	**219**	**21327**	**30712**
5. Simulation-based learning	Simulation-based learning Simulation training (MESH) Patient simulation (MESH	**11801**	**9**	**4428**	**16238**
6. Longitudinal Clerkships	Longitudinal clerkship* Clinical clerkships (MESH)	**5765**	**1**	**20**	**5786**
7. Interprofessional Education	Interprofessional education (MESH) Health education (MESH) Interprofessional learning IPE IPL	**72466**	**123**	**34994**	**107583**
8. Education and training	Education and training Education (MESH) Education, pharmacy (MESH) Health education (MESH)	**121196**	**595**	**57702**	**179493**
4 OR 5 OR 6 OR 7 OR 8		**181289**			**181289**
4 OR 5 OR 6 OR 7 OR 8 AND [(1 OR 2) AND 3]		**181289 AND 15236 = 3567**	**1426**	**1964**	**6957**
4 OR 5 OR 6 OR 7 OR 8 AND [(1 OR 2) AND 3]		**1457**	**265**	**746**	**2468**



Appendix 4 – Contemporary Literature Search Strategy