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What supports hospital pharmacist prescribing in Scotland? – A mixed methods, exploratory sequential study

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ABSTRACT

While approximately half of all qualified hospital pharmacist independent prescribers (PIPs) in Scotland are active prescribers, there are major differences in prescribing activity across geographical areas. This study aimed to explore, through focus groups, interviews and a questionnaire, hospital PIPs' perceptions of factors associated with prescribing activity and to investigate the infrastructure required to better support active prescribing by PIPs. Findings reinforced the perceived positive impact of supportive pharmacy leadership within the organisation, recognition that prescribing is integral to the clinical pharmacist role and a work environment conducive to prescribing.

1. Introduction

Prescribing by non-medical health professionals (non-medical prescribing) is now established in a wide range of countries including Australia, Canada, Finland, Ireland, Jamaica, New Zealand, South Africa, Spain, Sweden, The Netherlands, United Kingdom (UK) & the United States of America.[1] Internationally, different models of pharmacist prescribing exist with some countries allowing non-medical prescribers (NMPs) to prescribe on an independent basis e.g. UK, Canada, Ireland and New Zealand and some allowing NMPs to prescribe only under the supervision of a doctor e.g. Australia.[1,2]

In 2003, UK legislation enabled pharmacists to practise as supplementary prescribers using a condition specific treatment plan agreed with an independent prescriber (doctor) and patient. In 2006, this extended to independent prescribing, defined as 'prescribing by a practitioner responsible and accountable for the assessment of patients with undiagnosed or diagnosed conditions and for decisions about the clinical management required, including prescribing.'[3,4] Independent prescribing courses in the UK comprise university based and experiential learning mentored by a medical practitioner who assesses competence in prescribing and clinical activities. Currently there are over 19,000 nurse and 3000 pharmacist NMPs registered in the UK equating to 7% of the pharmacist workforce.[5,6] Nearly two-thirds (61%) of pharmacist prescribers in the UK work in hospital.[5]

Service evaluations have reported quality improvements following introduction of pharmacist prescribing including: optimisation of medicines[7,8]; reduced admissions and length of inpatient stay[9]; reduced delays in hospital discharge[9] and freeing up medical time.[10] In the UK, improved patient care and professional development are reported reasons for becoming a pharmacist independent prescriber (PIP).[11] Initially medical colleagues raised concerns about pharmacists taking on prescribing responsibilities due to pharmacists' limited diagnostic skills however these issues appear to have resolved over time and many PIPs are now integrated into the multidisciplinary team.[12]

While most published literature on pharmacist prescribing describes primary care management of chronic conditions such as hypertension and secondary prevention in stroke,[13,14] there is potential to impact patient care and safety in hospital settings.

Studies of prescribing errors by medical staff cite error prevalence at around 7–9% of prescriptions written.[15–17] While there are limited data, one study of pharmacist prescribing in hospitals in England reported error prevalence of 0.3% of prescriptions written.[18] The scope of pharmacist prescribing in hospital is developing continually. Hospital pharmacists prescribe in a diverse range of clinical specialities including acute medicine, antimicrobials, cardiology, diabetes, hypertension, mental health, neurology, pain management, oncology, orthopaedics and respiratory.[5,19]

The Scottish Government strategy, 'Prescription for Excelle-

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nce' states that all pharmacists providing National Health Service (NHS) pharmaceutical care in Scotland will be accredited 'clinical pharmacist independent prescribers' by 2023.[20] To achieve this vision, there is a need to ensure all qualified prescribers are active. In 2012/13 approximately half of all qualified hospital PIPs in NHS Scotland (147/274) were actively prescribing with variations in prescribing activity between NHS Boards (unpublished work).

A further study found that pharmacists' adoption of prescribing was dependent on 'the pharmacist, system readiness, communication and influence (management).'[21] However this study did not examine the infrastructure required to support hospital pharmacist prescribing. A Canadian study suggested that certain personality traits of some pharmacists (e.g. lack of clinical confidence, fear of new responsibility and associated clinical risks) may not link with prescribing activities.[22]

However, a lack of support (financial and time resources), medical staff acceptance and the pharmacy profession itself (adoption, implementation strategy, resources and second pharmacist clinical check) have been listed as barriers to non-medical prescribing, not only in UK but further afield.[2,19] A survey in the North of England identified potential solutions to some of these barriers which included addressing funding issues and the development of a prescribing framework but this was a small regional project and did not investigate the infrastructure required to support hospital PIPs at a national level.[12]

Potential barriers preventing pharmacists from actively prescribing need to be investigated so they can be addressed and the appropriate actions taken to help ensure widescale implementation.

This study aimed to determine and explore hospital PIPs perceptions of factors and behavioural determinants associated with prescribing activity and to investigate the infrastructure required to better support active prescribing by PIPs in NHS hospitals across Scotland.

2. Methods

2.1. Design

This was a mixed methods, exploratory sequential study comprising qualitative methods through focus groups and semi-structured interviews to try and obtain in-depth thoughts and opinions from NHS Boards that informed best practice followed by a cross-sectional survey.

2.2. Setting

The research was conducted within all 14 health boards of NHS Scotland.

2.3. Phase 1: focus groups and 1:1 semi-structured interviews

2.3.1. Inclusion criteria

All active PIPs (n = 65) in the top 3 NHS Boards (in terms of the proportion of qualified PIPs actively prescribing) and pharmacy managers from each of these 3 NHS Boards were included in the study, with no exclusions.

2.3.2. Sample size & recruitment

The Scottish Government provides funding through NHS Education for Scotland (NES) to support the training of NHS employed pharmacists. NHS Education for Scotland manage a pharmacist prescriber database of PIPs (qualified, in-training & registered for a prescribing course) in NHS Scotland. Their prescribing status (active or inactive) and the area in which they prescribe (community pharmacy, primary care or secondary care) is updated annually from each of the 14 NHS Boards, training universities and NES funding data.

Contact information held within the NES database was used to invite participation via email, which also included participant information. Of those responding to the email, a convenience sample of PIPs (n = 25) determined by availability, from a range of specialities, were recruited to hospital-based focus groups and, for logistical reasons, the 3 managers participated in 1:1 semi-structured interviews (2 face-to-face and 1 telephone interview due to manager preference).

2.3.3. Data generation

The study team drew on the experience within the team, which included the national lead for pharmacist prescribing and an experienced PIP, and agreed the focus group prompts and interview schedule, following review of the literature.[1–3,11,12] Focus groups are used to explore participants views and experiences, identify their concerns and priorities and the interaction between the group can stimulate discussion which can generate new ideas and give greater depth to the discussion.[23] They can be less time consuming than interviews with the same number of participants however they can be less useful at examining the thoughts and reasoning of individuals in detail[23] and not all participants will comment on all questions. The focus groups were led by the main investigator with another member of the project team acting as a facilitator, taking notes. The main investigator conducted the 3 interviews. The interviews were semi-structured 1:1 interviews as it was thought this would provide opinions without losing focus. Interviews allow ambiguous responses to be clarified and further questioning about a particular issue raised can take place to give a more detailed response if necessary. Topics for both the focus groups and interviews included departmental infrastructure, pharmacy and multidisciplinary team support and attitudes to prescribing (see Appendix 1). Written consent was obtained from all the participants prior to participation and all discussions were recorded digitally. Recordings were transcribed verbatim and a sample (25%) checked for reliability of transcribing by a pharmacy administrator.

2.3.4. Analysis

Using theory to help understand the action of intervention strategies to change behaviour(s) has been shown to improve the effectiveness of intervention(s).[24] The Theoretical Domains Framework (TDF) was used in this study as a coding framework in analysis of the qualitative data. The TDF draws together, from 33 theories of behaviour, the crucial influences on behaviour and consists of 14 domains (Table 1) e.g. knowledge, skill, professional role and identity and environmental context and resources.[25] TDF was used to provide headings to code the transcripts which were then analysed independently by members of the study team using the Framework Approach. This is a systematic method of categorising large amounts of qualitative data and identifies 'commonalities and differences in qualitative data, before focusing on relationships between different parts of the data, thereby seeking to draw descriptive and/or explanatory conclusions clustered around themes.'[26]

In reporting the results from the focus groups and interviews each PIP was designated a number and a letter denoting the hospital site, for example, PIP 1A. Each manager who participated in the 1:1 interviews was designated a number, for example, M1.

2.4. Phase 2: cross-sectional survey

An on-line questionnaire was developed by constructing items

Table 1
Theoretical domains presented with a definition and sample construct.[25]

Domain	Definition and example of construct
Knowledge	An awareness of the existence of something e.g. procedural knowledge
Skill	An ability or proficiency acquired through practice e.g. ability
Social/professional role & identity	A coherent set of behaviours & displayed personal qualities of an individual in a social or work setting e.g. professional confidence
Beliefs about capabilities	Acceptance of the truth, reality or validity about an ability, talent or facility that a person can put to constructive use e.g. self confidence
Optimism	The confidence that things will happen for the best or that desired goals will be attained e.g. optimism, pessimism
Beliefs about consequences	Acceptance of the truth, reality or validity about outcomes of a behaviour in a given situation e.g. outcome expectancies
Reinforcement	Increasing the probability of a response by arranging a dependent relationship or contingency between the response and a given stimulus e.g. rewards
Intentions	A conscious decision to perform a behaviour or resolve to act in a certain way e.g. stability of intentions
Goals	Mental representatives of outcomes or end states that an individual wants to achieve e.g. goal/target setting
Memory, attention & decision processes	The ability to retain information, focus selectively on aspects of the environment & choose between two or more alternatives e.g. decision making
Environmental context & resources	Any circumstances of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence and adaptive behaviour e.g. resources
Social influences	Those interpersonal processes that can cause individuals to change their thoughts, feelings or behaviours e.g. social pressure
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 e.g. anxiety
Behavioural regulation	Anything aimed at managing or changing objectively observed or measured actions e.g. action planning

in relation to themes identified from the qualitative phase, and with reference to TDF. 5 PIPs, selected from 2 local hospitals who were working in different clinical specialities (2 active and 3 inactive prescribers), reviewed the questionnaire for face and content validity and piloted the functionality of the online mode of delivery. Minor amendments (rewording of two questions to remove ambiguity and one grammatical change) were made to the format.

The questionnaire contained 5 main sections: consideration of local pharmacy services before applying for the prescribing course (5 questions); work place support during the PLP[1] (period of learning in practice) (5 questions); implementation of prescribing - active PIPs only (3 questions); reasons for activity and inactivity (2 questions) and education and training opportunities for PIPs in NHS Scotland (3 questions). The questionnaire contained a variety of question types with the majority of questions based on a 5- point Likert scale ('strongly agree', 'agree', 'neither agree/disagree', 'disagree' and 'strongly disagree). Some closed questions and multiple choice questions (with the allowance of more than one answer & free text comments) were also included in the questionnaire.

2.4.1. Inclusion criteria

All hospital PIPs (including the 5 PIPs who participated in the pilot) in NHS Scotland (n = 274) were included in the study, with no exclusions.

2.4.2. Data collection

The questionnaire, formatted in Survey Monkey®, was distributed via email (containing study information & deadline for completion). Participants were asked to complete the questionnaire within 2 weeks and 2 reminder emails were sent 1 week apart.

2.4.3. Analysis

Data was analysed using descriptive statistics. Chi square was used to test for association between variables, for example, perceptions of prescribing being integral to the role of the pharmacist. Strongly agree and agree were combined, as were strongly disagree and disagree. P-values < 0.05 were considered statistically significant.

[1] PLP is 90 hours of learning in practice mentored by a medical practioner.

2.4.4. Research ethics

NHS Research Ethics Committee approval was not necessary as the study involved NHS employees only. Approval was granted from NHS Scotland Directors of Pharmacy.

3. Results

3.1. Phase 1

29 PIPs agreed to participate in focus groups, with 25 PIPs selected based on availability. Each focus group lasted approximately 50 min. The demographics of the participants are outlined in Table 2. The participants prescribed in a wide range of specialities e.g. respiratory, surgery, cardiology, mental health, rheumatology and acute medicine.

The key themes identified in the focus groups and interviews mapped to the TDF are described in Table 3.

3.1.1. Knowledge

a) Appropriate knowledge to prescribe

All PIPs felt they had the appropriate knowledge to prescribe and were the most appropriate healthcare professionals for this task.

'We have for years come up with prescribing regimes for someone else with less clinical knowledge to sign the bottom and take responsibility and that always felt very wrong for any of us so to take that on was a positive thing.' (PIP 5D)

Active PIPs were aware of their prescribing limitations and identified areas in which they lacked competence hence would not prescribe:

'There are some things they (nurses) kind of think because you're a prescriber you will prescribe the fluids. No chance.' (PIP 2C)

3.1.2. Beliefs about capabilities

a) Competence

Table 2
Demographics of focus group participants.

Participant	Length of time practicing as a prescriber	Frequency of prescribing in clinical practice
Hospital 1		
A	6 years	Daily
B	>5 years	3-5 times/week
C	6 months	Daily
Hospital 2		
A	4 years	Daily
B	5 years	Daily
C	5 years	Daily
D	2 years	Daily
E	3 years	Daily
Hospital 3		
A	7 years	Daily
B	14 months	Daily
C	4 years	Daily
Hospital 4		
A	3.5 years	Daily
B	>5 years	Daily
C	2-3 years	Daily
D	5-6 years	Daily
Hospital 5		
A	7 years	Daily
B	1.5 yrs	Daily
C	6 years	Weekly
D	1.5 yrs	Weekly
E	7 years	Daily
F	4 years	Daily
G	4 years	Daily
H	6 years	Daily
I	3 months	3-5 times/week
J	3 years	3-5 times/week
K	5 years	Weekly

All PIPs felt that they were competent prescribers and that it was more appropriate for them to prescribe rather than recommend prescribing by a doctor who may be acting out-with their competence:

'The doctor would sign whatever you wanted them to so they were taking responsibility for your decisions which is completely unfair so it's more about us being competent and taking responsibility for it.' (PIP 1C)

b) Professional confidence

All PIPs reported that confidence developed over time and as more colleagues took on the prescribing role:

Table 3
Key themes identified in the focus groups & 1:1 interviews mapped to TDF domains.

TDF domains	Themes
Knowledge	a) Appropriate knowledge to prescribe
Beliefs about capabilities	a) Competence
	b) Professional confidence
Environmental context & resources	a) Size of NHS Board
	b) Organisational culture
	c) Pharmacy management support
	d) Multi-disciplinary (MDT) support
	e) Defined career pathway
Social influences	a) Peer support
	b) MDT support
	c) Nurse NMPs
	d) Motivation
Professional role & identity	a) Experts in medicines
	b) Professional development
	c) Integration with MDT
Beliefs about consequences	a) Improved efficiency
	b) Deskilling of junior doctors

'I think once one of you starts in the department there's the confidence that you can do it there are no issues.' (PIP 4A)

One manager highlighted, when pharmacist prescribing was first introduced, PIPs were concerned that there was no professional check carried out by a second pharmacist on discharge prescriptions, but this was no longer a concern as the PIPs gained confidence and experience:

'That was something that there was a lot of concern about (having a second check) but I think that we have moved on now they have more experience.' (M1)

3.1.3. Environmental context & resources

a) Size of NHS board

The NHS Boards participating in the focus groups were 3 of the smaller NHS Boards in NHS Scotland. Some PIPs recognised that the smaller number of staff facilitated good working relationships with the MDT:

'We are a smaller health-board & we work with a smaller group of consultants so you build up better relationships.' (PIP 1B)

The PIPs also commented that working in a smaller NHS Board made it easier to implement a new service (i.e. prescribing) as there were fewer management processes required:

'I think it's the joy of a smaller Board that things can be approved within the ADTC (Area Drug & Therapeutics Committee) quicker, there are less people involved.' (PIP 5H)

b) Organisational culture

Managers ensured they were engaged with the prescribing plans of their pharmacists and expected their pharmacists to prescribe:

'As part of work force planning we look at what we can offer to the team to make the pharmacist role as successful as possible …. the expectation is that they would be prescribers.' (M1)

c) Pharmacy management support

All PIPs felt well supported by pharmacy management during the course, *'there was definitely the overall support to actually become a prescriber' (PIP 3B)* and were given time to attend ward rounds/clinics as part of their PLP:

'they are given support to attend clinics and ward rounds that they wouldn't normally do …..so they can gather the hours for the PLP.' (M2)

d) MDT support

Although 1 PIP encountered resistance from a consultant when she first began to prescribe, after building a relationship with them, there was '*now no resistance what-so-ever*' *(PIP 4C).* All the other PIPs felt well supported by their consultants:

'The consultants were all very supportive and in terms of winning over some of the registrars and junior doctors I think the attendance on ward rounds was probably the best benefit.' (PIP 3A)

e) Defined career pathway

Some PIPs indicated there was high prescribing activity as there was a definite career path at their hospitals:

'The culture is such that you do your stage 2 (vocational training program in NHS Scotland for junior pharmacists), you do your diploma (post-graduate diploma in clinical pharmacy), you do your prescribing, it's a very structured progression.' (PIP - 5H)

3.1.4. Social influences

a) Peer support

All PIPs agreed that peer support was essential when completing the PLP:

'I think peer support is the biggest thing. That has been the biggest help.' (PIP 2C)

Managers encouraged those who had qualified recently as prescribers to mentor those commencing the course:

'We encourage who did the course last to try and have some input for the others doing it next so they are actually getting up-to-date information about how they manage the diary (completed during the PLP) and how they present the evidence.' (M2)

d) MDT support

All PIPs reported that having established relationships with their MDT helped to provide a supportive environment:

'We are quite a stable work force in that the folk that are here have been here for a long time and they (doctors) get confidence in you and you feel a bit more supported.' (PIP 1A)

c) Nurse NMPs

Some PIPs suggested that seeing the progression of nurse prescribers had encouraged them to become NMPs:

'I think it's maybe a case of well if the nurse can prescribe why can't we prescribe?' (PIP 1B)

d) Motivation

All PIPs were motivated to start prescribing once they got the qualification and a manager suggested that once colleagues started to prescribe it had a knock-on effect for others:

'I suppose success breeds success.' (M2)

3.1.5. Professional role & identity

a) Experts in medicines

All the participants considered themselves to be the experts in medicines and would take responsibility for prescribing rather than giving the responsibility to a junior doctor who may not be knowledgeable about the medicine:

'If I'm asking them (junior doctors) not to follow the policy (for prescribing a particular medicine) then I should take responsibility for that. It's my area of expertise so it's more to do with expertise and knowledge.' (PIP 4B)

b) Professional development

All PIPs thought prescribing was the next step to progress the future of pharmacy and if pharmacists did not embrace prescribing, other healthcare professionals would step in and prescribe in the future:

'Prescribing has to be one of the mechanisms to drive the future of our profession so it's really important that … …we find groups of patients we can prescribe in and basically be seen as a useful member of the MDT or the role will be taken by others …. we are the ideal candidates to be doing that.' (PIP 3A)

c) Integration with MDT

All PIPs highlighted several benefits of their prescribing role including increased integration, *'I feel like I'm more integrated with the consultant's team.' (PIP 3B)* and respect in the MDT:

'I think they respect your clinical opinion more.' (PIP 4A)

3.1.6. Beliefs about consequences

a) Improved efficiency

Some PIPs described working more efficiently as prescribers with less time spent contacting junior doctors to make changes to medicines:

'The driving force to become a prescriber was to try and improve efficiencies in the job rather than having to chase a junior doctor to prescribe something that I could prescribe myself.' (PIP 3A)

b) Deskilling of junior doctors

All the PIPs refuted the concerns that junior doctors would be deskilled as a result of pharmacist prescribing:

' … the other advantage of prescribing is that you are a good mentor to the junior doctors. The person that is going to be best at prescribing is the pharmacist and people can see how it is done properly then you're more likely to have a better skilled team.' (PIP 5B)

Some PIPs commented that when they did prescribe, amend or discontinue medicines they usually spoke to the junior doctor so the doctor could learn from this:

'I do tend to go and have a chat with the junior doctor about it but also when I discontinue or start something so they can learn from this.' (PIP 3A)

3.2. Phase 2

The questionnaire was emailed to all 274 hospital PIPs across NHS Scotland. There were 183 responses, 13 of which were incomplete and excluded from the analysis. The response rate was 62% (170/274).

Seventy six percent of responders (130/170) were actively prescribing at the time of the study. Sixty seven percent (130/195) of all active hospital PIPs and 51% (40/79) of all inactive hospital PIPs across NHS Scotland responded. It was noted that these figures showed a higher proportion of active hospital PIPs compared to the beginning of the study when approximately half of all qualified hospital PIPs in NHS Scotland (147/274) were actively prescribing. This could be explained by more hospital PIPs becoming active prescribers between the time the study was initiated and sending

out of the questionnaire (approximately 6 months later). A limit of the NES database, where the figures were obtained from, is that it is continually updated throughout the year with self-reported data by pharmacist prescribers.

The demographic information of the respondents is summarised in Table 4.

The results from the Likert scale statements in the questionnaire are outlined in Table 5. For each statement, the active prescribers' responses are stated in the top line and the inactive prescribers' responses stated in the bottom line. The major findings from the questionnaire were that active PIPs were more likely than inactive PIPs to consider prescribing integral to their role as a pharmacist; 75.4% v 37.5%, $p < 0.0001$. Active PIPs were also more likely than inactive PIPs to have a clear prescribing role agreed with their line manager prior to commencing the course; 65.4% v 45%, $p < 0.05$ and felt better supported by pharmacy management (72.4% v 47.5%), $p < 0.01$ and the multi-disciplinary team (90% v 72.5%), $p < 0.05$.

The reasons given by inactive PIPs for not prescribing are outlined in Table 6.

15 PIPs stated that backfill of their substantive post was the reason for not prescribing. Of those 15 PIPs, 6 had haematology and/or oncology roles which follow the Scottish Government's 'Guidance for the safe delivery of systemic anticancer (SACT)' that all prescriptions for SACT should be clinically checked by a suitably trained pharmacist.[27] This is interpreted as requiring a second pharmacist to check the prescription therefore if a PIP had prescribed chemotherapy then another pharmacist is required to check the prescription which can be difficult depending on the capacity of the oncology/haematology pharmacist workforce. The remaining 9 PIPs worked in a variety of specialities, for example, respiratory, cardiology, acute medicine and surgery where no 'second check' is required hence it is unclear as to why these pharmacists thought backfill of their substantive post was required before they could prescribe.

Other reasons for not prescribing described in free text comments in the questionnaire included:

'I am present for 2–3 hours a day on the ward & feel I cannot commit to taking on a role that is only provided in a limited time frame.' (Inactive PIP – NHS Board 3)

'I work part-time and feel that time is a huge obstacle to me prescribing.' (Inactive PIP – NHS Board 6).

'Even having time released for lunch is a challenge.' (Inactive PIP – NHS Board 7)

4. Discussion

4.1. Key findings

The findings have provided valuable information to help understand the factors which may influence pharmacists to prescribe. 'Environmental context & resources', particularly organisational culture, appeared to influence PIPs prescribing. 'Social influences' including peer, management & MDT support, also resulted in prescribing activity. 'Professional role and identity' were also influential with all active PIPs considering prescribing integral to their role as clinical pharmacists.

Findings from the questionnaire suggest that, in agreement with the focus groups, active PIPs were more likely to consider prescribing as integral to their role as a pharmacist ($p < 0.0001$). Active PIPs were also more likely to have a clear prescribing role agreed with their line manager ($p < 0.05$) and felt better supported by pharmacy management ($p < 0.01$) and the MDT ($p < 0.05$) than inactive PIPs. Backfill of substantive posts was the most common reason given by PIPs for not prescribing but further work is required to explore perceptions of this barrier to prescribing.

4.2. Interpretation of results

Environmental context & resources appeared to influence prescribing particularly organisational culture in the workplace where the expectation from the pharmacy managers in the high prescribing activity NHS Boards is that all qualified PIPs prescribe. For sustained organisational change, there may be a need to address interdisciplinary behaviours and leadership among the prescribing professions. With the increasing pressures on healthcare resources it is essential to ensure there is efficient staffing models involved in planning of the hospital workforce. Hospitals are an ideal setting for pharmacists to prescribe as they have easy access to medical records and laboratory results. By widely implementing pharmacists' prescribing, improvements would be made to patient safety and there would also be improved professional satisfaction. It is essential that pharmacists have a clear prescribing role identified and agreed with pharmacy management prior to applying for prescribing courses. Targeted activities have more chance of being executed and becoming reality if there is a clear shared vision.

Social influences including peer, management & MDT support also resulted in prescribing activity. Active prescribers were more likely to have felt better supported by pharmacy managers during their PLP than those not prescribing ($p < 0.01$). This was in agreement with other studies which stated that pharmacists 'recognised the need and expressed desire' to have management support to take prescribing forward.[12,21] Pharmacy managers set and promote the culture towards education and training in their hospitals and act as role models for colleagues. Their leadership in establishing direction, motivating and supporting their staff are all important both during the PLP and for future service delivery.

Although there was no statistically significant difference between the active and inactive PIPs in terms of local pharmacy peer support being available during implementation of prescribing, there was a trend to suggest that those prescribing perceived there to have been good peer support compared to those not prescribing. There were similar conclusions in previous studies which found that pharmacists who networked with other colleagues and networks had more active prescribing practices.[12,21]

Active PIPs were more likely to have felt well supported by the MDT during their PLP than those not prescribing ($p < 0.05$). It is important that there is support from the MDT during the PLP to ensure successful implementation of prescribing.[12,19,21] In a previous study pharmacists acknowledged that team member support was crucial to their prescribing success and the physician-prescriber relationship was often a primary consideration for pharmacists deciding to prescribe.[21] Pharmacists expressed a

Table 4
Demographic information of respondents to questionnaire.

Demographic	Active PIPs (n = 130)	Inactive PIPs (n = 40)
Number of years, mean ± SD (range)		
- registered as a pharmacist	19.3 ± 7.8 (6–42)	19.3 ± 8.1 (7–37)
- qualified as a PIP	4.6 ± 3.1 (0.5–14)	5.7 ± 3.3 (0.5–10)
Qualification, n (%)		
- supplementary prescriber (n = 12)	2 (17%)	10 (83%)
- independent prescriber (n = 158)	128 (81%)	30 (19%)
Work place, n (%)		
- large teaching hospital (n = 84)	68 (81%)	16 (19%)
- district general hospital (n = 65)	51 (78%)	14 (22%)
- other e.g. specialist oncology centre (n = 21)	11 (52%)	10 (48%)

Table 5
Responses to statements in questionnaire.

Statement (n = 130 active) (n = 40 inactive)	Strongly agree n(%)	Agree n(%)	Neither agree or disagree n(%)	Disagree n(%)	Strongly disagree n(%)	p value (chi square)
Sustainability of existing prescribing pharmacy services is considered locally before supporting applicants for the prescribing course.	4 (3.1) 3 (7.5)	44 (33.8) 9 (22.5)	54 (41.5) 16 (40)	27 (20.8) 10 (25)	1 (0.8) 2 (5)	0.51
Service redesign of existing pharmacy services is considered locally before supporting applicants for the prescribing course.	1 (0.8) 1 (2.5)	32 (24.6) 4 (10)	53 (40.8) 17 (42.5)	41 (31.5) 15 (37.5)	3 (2.2) 3 (7.5)	0.19
Prescribing in secondary care is integral to the clinical pharmacist role.	**37 (28.5) 3 (7.5)**	**61 (46.9) 12 (30)**	**18 (13.8) 12 (30)**	**14 (10.8) 10 (25)**	**0 (0) 3 (7.5)**	**<0.0001**
There is a structured career progression pathway in my hospital that all pharmacists are expected to follow e.g. complete stage 2 training, MSc, independent prescribing.	35 (26.9) 5 (12.5)	56 (43.1) 22 (55)	18 (13.9) 4 (10)	18 (13.9) 8 (20)	3 (2.2) 1 (2.5)	0.58
Before I applied for the course I had a clear prescribing role agreed with my line manager.	**30 (23.1) 7 (17.5)**	**55 (42.3) 11 (27.5)**	**14 (10.8) 11 (27.5)**	**27 (20.8) 7 (17.5)**	**4 (3) 4 (10)**	**<0.05**
During the PLP I was well supported by pharmacy management to meet my identified learning needs e.g. attend ward rounds and/or clinics.	**34 (26.2) 7 (17.5)**	**60 (46.2) 12 (30)**	**18 (13.8) 8 (20)**	**16 (12.3) 12 (30)**	**2 (1.5) 1 (2.5)**	**<0.01**
There was good local pharmacy peer support during the PLP in my hospital.	15 (11.5) 2 (5)	57 (43.9) 19 (47.5)	30 (23.1) 6 (15)	25 (19.2) 10 (25)	3 (2.3) 3 (7.5)	0.28
I felt well supported by the MDT during my PLP.	**53 (40.8) 12 (30)**	**64 (49.2) 17 (42.5)**	**12 (9.2) 11 (27.5)**	**1 (0.8) 0 (0)**	**0 (0) 0 (0)**	**<0.05**
On reflection the activities I completed during my PLP were relevant to my area of prescribing practice at the time of qualification.	43 (33.1) 14 (35)	81 (62.3) 20 (50)	3 (2.3) 3 (7.5)	1 (0.8) 3 (7.5)	2 (1.5) 0 (0)	0.081
There are regular opportunities at my hospital to discuss non-medical prescribing issues.	7 (5.4) 2 (5)	53 (40.8) 10 (25)	32 (24.6) 17 (42.5)	35 (26.9) 9 (22.5)	3 (2.3) 2 (5)	0.07
There was good local pharmacy peer support during implementation of prescribing in my hospital.	8 (6.2) 1 (2.5)	52 (40) 10 (25)	40 (30.7) 13 (32.5)	27 (20.8) 11 (27.5)	3 (2.3) 5 (12.5)	0.055
There is good national support via specialist pharmacy networks for implementing prescribing in my scope of practice.	2 (1.5) 5 (12.5)	44 (33.9) 12 (30)	52 (40) 14 (35)	30 (23.1) 8 (20)	2 (1.5) 1 (2.5)	0.71
When I qualified I had a clear idea of my scope of prescribing practice.	33 (25.4) 6 (15)	75 (57.7) 27 (67.5)	12 (9.2) 2 (5)	8 (6.2) 5 (12.5)	2 (1.5) 0 (0)	0.48
Non-medical prescribing deskills junior doctors.	2 (1.5) 1 (2.5)	21 (16.2) 9 (22.5)	28 (21.5) 13 (32.5)	62 (47.7) 11 (27.5)	17 (13.1) 6 (15)	0.12
Seeing the development of other NMPs has made me want to prescribe.	**14 (10.8) 4 (10)**	**51 (39.2) 18 (45)**	**52 (40) 9 (22.5)**	**12 (9.2) 9 (22.5)**	**1 (0.8) 0 (0)**	**<0.05**

Statistically significant results are shown in bold in Table 5.

reluctance to prescribe if they believed the physician was not supportive of pharmacist prescribing but this was not evident from our study. This previous study also found that in the hospital or ambulatory clinic setting, some pharmacists did not feel there was a need to prescribe themselves as they were well integrated into inter-professional teams where they had sufficient input on prescribing decisions.[21] There was no evidence of this being a factor contributing to inactivity in our study.

Professional role and identity were also influential. The active PIPs were more likely to agree that prescribing in secondary care is integral to the clinical pharmacist's role than those not actively prescribing ($p < 0.0001$) and this is in agreement with an earlier

Table 6
Reasons given by inactive PIPs for not prescribing (respondents could select more than one reason).

Reason for inactivity	Responses from inactive PIPs (n = 40)
Backfill of substantive post	15
Moved job and yet to establish role	10
Moved job to non-patient facing role	8
Recently qualified & awaiting NMP number*	4
Lack of pharmacy peer support	5
Lack of pharmacy management support	5
Lack of MDT support	3
Lack of confidence	3
Other reason(s)	12
Total	**65**

* In NHS Scotland a NMP registration number (obtained from the NHS Board that employs the PIP) is required before a qualified PIP can prescribe.

study.[21] This is not unexpected as those actively prescribing are perhaps more likely to consider it important for pharmacists to extend their role which may include taking on prescribing activities. This outcome suggests there is a need to align NHS pharmacists to the Scottish Government's vision that all pharmacists providing NHS pharmaceutical care will be accredited 'clinical pharmacist independent prescribers' by 2023.[20] Leadership will be required to motivate and inspire people to want to achieve the vision.

Lack of backfill of substantive posts was the most common reason given by PIPs for not prescribing. Prior to funding for the course, pharmacists must demonstrate a prescribing need in the speciality they are working in. Apart from some specialist areas in secondary care, for example in oncology, where in NHS Scotland chemotherapy prescriptions have to be clinically checked by a pharmacist,[27] it is unclear why 'backfill' would be needed for other PIPs based on wards who would be changing drug administration charts and/or discharge prescriptions, rather than getting a junior doctor to make these amendments. These issues regarding 'backfill' therefore require further exploration. If PIPs were organising pharmacist-led clinics to meet a service need then backfill would need to be considered including resource requirements. Current austerity measures within healthcare settings requires redesign of clinical pharmacy services to align activities to vision and policy which incorporates more prescribing activities and removal of other activities of less importance.

A pharmacist may have the prescribing qualification but lack the specialist knowledge and confidence to prescribe as part of their role and this has been highlighted previously as potential reasons as to why not all qualified PIPs routinely prescribe.[5,22,28] In this study only 3/40 inactive PIPs stated that confidence was an issue that contributed to inactivity with lack of specialist knowledge not highlighted as a factor resulting in prescribing inactivity. Previous studies highlighted that some pharmacists had concerns over the risk and liability associated with prescribing which generally lessened with prescribing experience but there were no concerns raised in this study.[21,22] Having time to prescribe has been highlighted as another possible reason for inactivity but only 3/40 inactive PIPs in this study commented that a lack of time resulted in not prescribing.[12,19]

4.3. Further research

Further qualitative work based on the TDF will be undertaken to explore reasons for inactivity in greater depth so that a target behaviour(s) can be identified. Intervention(s) will subsequently be designed using the Behaviour Change Wheel to try and increase prescribing activity.[29]

4.4. Study strengths and weaknesses

The mixed methods sequential design of this study was considered appropriate to gather PIPs' in-depth reflections on prescribing during qualitative enquiry and to quantify issues using a survey based methodology. The use of qualitative data from the focus groups to inform the design of the questionnaire ensured maximum variability, removed investigator bias and assumption and promoted content validity. The themes identified from the focus groups were mapped to a validated framework (the TDF) hence enhancing the robustness and rigour of the study.

Qualitative methods of data collection through sampling to saturation may have been appropriate to achieve the study objectives if a larger number of participants had been recruited. As only 3 NHS Boards took part in the focus groups and 1:1 interviews and there was a 62% response rate to the questionnaire there was potential recruitment and response biases which may reduce the transferability of the qualitative data and the generalisability of the quantitative data. The questionnaire results were based on self-reported perceptions as opposed to observation of actual practice. Another limitation is the potential non-representation of data as only 67% and 51% of active and inactive PIPs respectively in NHS Scotland responded to the questionnaire.

5. Recommendations and conclusions

Through organisational culture changes appropriate strategic planning is required to influence prescribing activity. Continued monitoring of prescribing activity of qualified PIPs will inform progress in addressing changes as a result of organisational cultural changes. Study findings indicate a continued need for pharmacy management support to ensure prescribing activity by pharmacists and a supportive work environment so that pharmacists perceive prescribing as an integral part of their role. This shared vision can become a reality if a clear prescribing role has been identified & agreed with managers and multidisciplinary team members prior to undertaking the prescribing qualification. In tandem with agreement of a prescribing role, service re-design may be necessary to enable capacity for prescribing activity to succeed. Planning is also necessary to enable staff undertaking their PLP to optimise their learning opportunities to prepare them for the identified prescribing role.

Conflicts of interest

None.

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Appendix 1

Table A
Focus group questions.

1	Can you give briefly introduce yourself and outline your area of prescribing, length of prescribing & how often you prescribe?
2	Do you have any ideas why your health-board has a high uptake of active prescribers?
3	What were the driving factors for you applying for the course e.g. personal development plan, service requirements?
4	What support did you get for applying & attending the course & during your PLP (period of learning in practice)?
5	What activities did you do during your PLP that helped implementation?
6	Did you plan your PLP to meet service needs?
7	Was there any additional local training support during your IP training?
8	How did you implement prescribing into your practice – what worked well, not so well & how could it be improved?
9	What support did you receive for implementation – what was the attitude of local management?
10	What were the barriers that you had to overcome for implementation?
11	Is there a local independent prescribing plan/strategy available?
12	Are there local peer support and opportunities for continuing professional development available?
13	Has prescribing had an effect on your relationship within the multi-disciplinary team (MDT)?
14	Do you get feedback from your MDT on your role as a prescriber?
15	Do you get feedback from patients on your role as a prescriber?
16	From the discussions that we have had today is there anything else you would like to add or do you have any additional ideas as to why your health-board has a high uptake of active prescribers?

Table B
1:1 interview questions for pharmacy managers.

1	Compared to other health-boards, there seems to be a high number of 'active' prescribers in your health-board – what do you think are the reasons for this?
2	Is there a local plan/strategy for implementation of pharmacist prescribing – what are the key elements, how was it developed and implemented?
3	Was the pharmacist prescribing implementation strategy developed alongside other non-medical prescribers' strategies?
4	Do you have a process for prioritising who should be trained – does this link to service redesign?
5	What support is given to pharmacists undertaking the course?
6	What support is given to pharmacists for implementing prescribing at your site?
7	How did you plan realigning other duties and responsibilities to allow for pharmacist prescribing implementation?
8	Are there perceived barriers to implementing pharmacist prescribing at your site? How have these barriers been overcome?
9	What are your plans for further developing the service?
10	If a pharmacist is not progressing with prescribing as expected what happens – are there systems in place for monitoring progress for individuals on the course?
11	Are there local peer review meetings for pharmacist prescribers?
12	Is it linked to individuals' personal development plans?

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