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Stakeholders' Views and Experiences of Pharmacist Prescribing: a Systematic Review

Running Title: Views and Experiences of Pharmacist Prescribing: a Systematic Review

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Abstract

Aim: The aim of this systematic review was to: (1) critically appraise, synthesise, and present the available evidence on the views and experiences of stakeholders on pharmacist prescribing and; (2) present the perceived facilitators and barriers for its global implementation.

Methods: Medline, CINAHL, International Pharmaceutical Abstracts, PsychArticles, Google Scholar databases were searched. Study selection, quality assessment, and data extraction were conducted independently by two reviewers. A narrative approach to data synthesis was undertaken due to heterogeneity, the nature of study types and outcome measures.

Results: Sixty-five studies were identified, mostly from the United Kingdom (n=34), followed by Australia (n=13), Canada (n=6), United States (n=5). Twenty-seven studies reported pharmacists' perspectives, with fewer studies focusing on patients' (n=12), doctors' (n=6), the general public's (n=4), nurses' (n=1), policymakers' (n=1), multiple stakeholders' (n=14) perspectives. Most reported positive experiences and views, regardless of stage of implementation. The main benefits described were: ease of patient access to healthcare services, improved patient outcomes, better utilisation of pharmacists' skills and knowledge, improved pharmacist job satisfaction, and reduced physician workload. Any lack of support for pharmacist prescribing was largely around: accountability for prescribing, limited pharmacist diagnosis skills, lack of access to patient clinical records, and issues around organisational and financial support.

Conclusion: There is an accumulation of global evidence of the positive views and experiences of diverse stakeholder groups and their perceptions of facilitators and barriers to pharmacist prescribing. There are, however, organisational issues to be tackled which may otherwise impede the implementation and sustainability of pharmacist prescribing.

Keywords: prescribing, clinical pharmacy, systematic review

What is already known about the subject

- Many countries around the world are implementing legislation, policies and practices relating to pharmacist prescribing
- Systematic reviews have documented some evidence of effectiveness and safety of non-medical prescribing

What this review adds

- Synthesis of data from a large number of studies in many countries from the perspectives of diverse groups of stakeholders provides further evidence of the positive views and experiences around pharmacist prescribing
- There are organisational issues of role recognition, access to patient clinical information and financial support which could impede the implementation and sustainability of pharmacist prescribing

Introduction

While prescribing has traditionally been restricted to medical practitioners (doctors and dentists), the rapid advancements in healthcare policies and practices have led to the introduction of models of non-medical prescribing in several countries, with others exploring its potential [1, 2]. Non-medical prescribing is most developed in the United Kingdom (UK), with legislative changes enabling the implementation of supplementary prescribing (SP) in 2003 and independent prescribing (IP) in 2006, as described in Table 1.

Implementation is most advanced in Scotland, and particularly for pharmacists, where approximately 40% of pharmacists in 2017 were either prescribers registered with the General Pharmaceutical Council or undertaking an approved training programme [7]. Developments in Scotland are supported by the policy driven approach of the Scottish Government, articulated in 2013 with the publication of “Prescription for Excellence: a vision and action plan for the right pharmaceutical care through integrated partnerships and innovation” [8]. This outlined the goal that “all patients, regardless of their age and setting of care, receive high quality pharmaceutical care from clinical pharmacist independent prescribers” [8]. The aspiration is that all patient-facing pharmacists will be clinical pharmacist independent prescribers by 2023. This commitment to developing the clinical prescribing role of pharmacists in all practice settings was reaffirmed in 2017 with publication by the government of “Achieving Excellence in Pharmaceutical Care” [7]. Details of other models of pharmacist prescribing which have been implemented in the United States (US), Canada, and New Zealand are given in Table 2, highlighting the diverse scope of prescribing rights. There is increasing evidence of the effectiveness and safety of pharmacist prescribing. A recently published Cochrane review of 46 studies (37,337 participants) of prescribing by pharmacists (20 studies) and nurses (26 studies) compared to medical prescribing for a range of acute and chronic conditions included meta-analyses of surrogate clinical markers [13]. The review concluded that non-medical prescribers, practising with varying but high levels of prescribing autonomy, in a range of settings, were as effective as usual care medical prescribers. Non-medical prescribers recorded comparable outcomes for systolic blood pressure, glycated haemoglobin, low-density lipoprotein cholesterol, medication adherence, and health-related quality of life . There is

also emerging evidence of safety with pharmacist prescribers in Scotland performing well in pilot studies of the UK Prescribing Safety Assessment [14].

This evidence of effectiveness has the potential to support pharmacist prescribing developments across the world. In addition, feedback from key stakeholder groups in terms of their views and experiences about pharmacists prescribing is vital in order to determine the possible factors influencing its implementation and thus inform the development and realisation of such initiatives in other countries. Such 'stakeholders', are defined in the context of health and associated research by the Agency for Healthcare Research and Quality [15] as, "persons or groups that have a vested interest in a clinical decision and the evidence that supports that decision". Examples of health stakeholders include patients, clinicians, advocacy groups, and policymakers, all of whom have roles in developing, implementing, delivering, experiencing or evaluating non-medical prescribing interventions.
The aim of this systematic review was to critically appraise, synthesise, and present the available evidence on the views and experiences of stakeholders on pharmacist prescribing, including potential facilitators and barriers, regardless of implementation status.

Methods

A systematic review protocol was developed, in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocol (PRISMA-P) standards, and registered on International Prospective Register of Systematic Reviews (PROSPERO) at the Centre for Reviews and Dissemination in the UK (CRD42016048072) [16].

Inclusion criteria

Studies reporting views and/or experiences of any stakeholder group (e.g. patients, general public, physicians, nurses, pharmacists) pertaining to pharmacist prescribing, irrespective of the stage of implementation (pre or post), model of prescribing (e.g. supplementary, independent or collaborative), with no date or language limit up to November 2017, were included in this systematic review. All peer-reviewed, primary research studies were included, while literature reviews, narrative reports, and editorials were excluded. The

inclusion process was performed by TJ and reviewed by DS.

Search strategy

The search string applied to Medline is given in Box 1; and adapted for Cumulative Index to Nursing and Allied Health Literature (CINAHL), International Pharmaceutical Abstracts (IPA), PsychArticles, and Google Scholar. The reference lists of all identified articles in the full text screening were searched manually for potentially eligible studies meeting the review criteria.

Assessment of methodological quality

Quality assessment was undertaken by two independent reviewers using the Mixed Methods Appraisal Tool (MMAT) [17], which permits the appraisal of qualitative, quantitative, and mixed methods studies. Consensus was reached through discussion or by a consultation with a third reviewer.

Data extraction

Data extraction was performed by two independent reviewers, with a third included if any disagreement occurs. Data items extracted were: stated aim/objective, phase of implementation (pre vs post), country of focus, model of prescribing, stakeholder group, study design, and key findings.

Data synthesis

Due to heterogeneity of phase of implementation, models of prescribing, study designs, and variability of data collection tools, a meta-analysis approach of quantitative findings was not possible. Hence, a narrative approach to data synthesis was applied. Pooling of qualitative research findings involved the aggregation or synthesis of findings to generate a set of statements that represented that aggregation, through assembling and categorising findings based on similarity in meaning.

Results

The electronic search yielded 331 studies. Removal of duplicates resulted in 273 articles, 226 of which were excluded based on title, abstract, or full-text review. An additional 18 studies were identified from other sources (e.g. reference lists)

resulting in 65 eligible studies for quality assessment and data extraction. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram is provided in Figure 1.

Quality of included studies

Most studies employed quantitative designs, largely questionnaire-based survey methodology (n=41) [18-58], with fewer qualitative designs (n=21) [59-79]. The remaining three studies were sequential explanatory mixed methods studies all with survey followed by either focus group discussions [80, 81] or interviews [82]. Quality assessments given in Figure 2 highlight the largely robust and rigorous nature of the studies reviewed.

The key limitations of the survey studies were the lack of details around sampling strategies and the stages of questionnaire development, review, and piloting. Only 14 studies had achieved the MMAT target response rate of 60% [19, 22-26, 29, 32, 36, 39, 40, 52, 54, 57]. Qualitative studies lacked details of approaches to ensuring data trustworthiness and the mixed methods studies provided limited information on integrating quantitative and qualitative data. However, all the 65 studies had sufficient robustness and rigour to be included in the stages of data extraction and synthesis.

Characteristics and key findings of included studies

The extracted data are summarised in Tables 3, 4, and 5 for the quantitative, qualitative, and mixed methods studies respectively.

Of the 65 studies, 29 (45%) were conducted prior to the implementation of pharmacist prescribing in the country of study [18, 38-57, 74-79, 81, 82], while the remaining 35 (54%) were conducted post-implementation [19-37, 58, 59, 61-73, 80]. Only one study explored views and experiences pre- and post-registration [60].

Most of the included studies were conducted in the UK (n=34, 52%) [21-31, 33-35, 37, 40-44, 59-69, 71, 73, 80], followed by Australia (n=13, 20%) [18, 45-48, 51, 54-55, 74, 77, 79, 81, 82], Canada (n=6, 9%) [32, 36, 49, 58, 70, 76], US (n=5, 8%) [19-20, 38-39, 72], Nigeria (n=4, 6%) [50, 52, 56, 78], and one each for Ireland [53], India [57], and New Zealand [75].

The main stakeholder group studied was pharmacists (n=27, 42%), including those registered as prescribers [22, 26, 29, 63, 67, 80], non-prescribers [23, 24, 30, 32, 44-48, 51, 55, 56, 73-74] or mixed prescribers and non-prescribers [19, 20, 37, 58, 60, 66, 70]. Fewer studies investigated the perceptions of patients (n=12, 19%) [18, 25, 27, 31, 34, 36, 38, 52, 54, 64, 68, 71], doctors (n=6, 9%) [21, 40, 42, 61, 75, 82], the general public (n=4, 6%) [28, 33, 49, 57], nurses (n=1, 2%) [43], or policymakers (n=1, 2%) [76]. Fourteen studies reported multiple stakeholder perspectives [35, 39, 41, 50, 53, 59, 62, 65, 69, 72, 77-79, 81].

While most studies (n=41, 63%) provided a standardised or legislative definition of pharmacist prescribing, 24 (37%) did not [19, 21, 25, 30, 31, 36, 37, 38, 40-43, 46, 49-50, 52-54, 57, 73, 77-80].

For quantitative studies, the sample size ranged from 105 to 4158, with response rates of 6.4% to 87%. On the other hand, qualitative studies included between 8 and 82 participants. For mixed methods studies, the sample size in the quantitative element ranged from 15 to 179, with response rates of 15% to 100%, while the number of participants in the qualitative element ranged from 8 to 10.

Stakeholders' views and experiences of pharmacist prescribing

The majority of both pre- and post-implementation studies included reported support for prescribing pharmacists.

Pre-implementation studies

a. General public:

Two studies investigated the public's perceptions of granting pharmacists the authority to prescribe in Canada and India. Respondents were generally supportive of prescribing by pharmacists who received training in specific situations, which included: the physician having made the diagnosis, prescribing from a limited range, in emergency situations, prescribing alternative medicines for the same medical condition, renewing prescriptions, or modifying the strength or frequency of medicines prescribed by a physician [49, 57].

b. Patients:

Studies of patients and patient group representatives reported support for pharmacist prescribing [18, 38, 52, 54, 78, 79], which was perceived as likely to improve access to healthcare generally and consultation with a trained health professional making better use of pharmacists' skills [18, 52, 54, 79]. Respondents in several studies noted the need for the pharmacist prescribers to have undertaken additional training, after a physician's diagnosis, and that prescribing should be from a restricted list of medicines [18, 52, 79].

c. Pharmacists:

Pharmacists themselves were generally supportive of a prescribing role, which they perceived as a logical development given their expertise in medicines, their existing over-the-counter prescribing related activities, and their increasingly evolving clinical roles as part of the multidisciplinary team in secondary care. Moreover, they anticipated that outcomes would include quicker and easier patient access to medicines, promoting better utilisation of their skills with resultant enhanced status, as well as increased job satisfaction [41, 46-48, 50, 51, 53, 74, 78, 79, 81]. There was agreement that they required additional training prior to assuming a prescribing role [41, 45, 46, 55, 56, 79].

There were diverse views on the models and scope of prescribing which ranged from prescribing within an agreed clinical management plan (CMP), repeat prescribing for stabilised chronic conditions, and modifying treatment based on the results of laboratory tests ordered by themselves [56, 74, 81]. Many respondents also viewed IP as appropriate for pharmacists, noting that it will be safe, effective, and improve patient access to medicines. They generally held the view that physicians would be in favour of pharmacist prescribing [51, 55].

d. Doctors:

Studies conducted pre-implementation of pharmacist prescribing reported a range of views from doctors (n=9). In one study conducted in the UK, the majority of respondents were supportive, provided that additional postgraduate education/training was undertaken [41]. In other studies, physicians were more cautious in their support, but acknowledged that a model of pharmacist

prescribing for limited conditions, such as minor ailments, was a logical development [40, 50, 53, 75, 78].

Other studies reported physicians' concern over: pharmacists' lack of clinical assessment and diagnosis skills, lack of access to individual patient medical records, legal considerations such as division of clinical responsibility of care, a potential negative effect on the physician-patient relationship, and issues around communication between the pharmacist prescriber and other members of the multidisciplinary team [42, 53, 82].

e. Nurses:

Two UK studies reported the perspectives of nurses with respondents considering pharmacist prescribing for existing or new therapy very useful due to their knowledge in pharmacology and a belief that it will be clearer and safer [41, 43].

f. Policymakers:

Government and pharmacy policymakers from the US, Canada, and Nigeria anticipated benefit to pharmacist prescribing in terms of improved continuity of care, better patient outcomes, reduced prescribing costs, and reduced physician workload [39, 76, 78]. Concerns were, however, expressed by medical policymakers in relation to the need for additional training and access to individual patient medical records, without which there could be fragmented care [76].

Post-implementation studies

a. General public:

Two studies reported the perspectives of samples of the public, both exposed to pharmacist prescribing and not exposed to it, in the UK. Findings highlighted general support, particularly for the management of minor ailments and issuing repeat prescriptions. There were some concerns around pharmacists' training in diagnosis, lack of access to patients' medical records, and potential lack of privacy and confidentiality within a community pharmacy setting [28, 33].

b. Patients:

Nine studies assessed the experience of patients who were exposed to pharmacist prescribing, while Hobson et al. included exposed and unexposed patients in the UK [64] and Feehan et al. had US patients who had never been exposed to pharmacist prescribing [72].

The majority of those patients who had consulted with a pharmacist prescriber were highly satisfied with the consultation overall, particularly the pharmacist's competence and capability, considering their prescribing to be as effective and safe as their physician. They also gave positive feedback relating to the pharmacist's personality, knowledge and communication skills as well as the consistency, accessibility, length and outcome of the care received [25, 27, 31, 34-36, 62, 64, 68, 71].

In a recent study of prescribing by community pharmacists in the US, patients who had yet to experience pharmacist prescribing were of the view that pharmacists should only dispense and provide medicines information other than a possible role in prescribing for minor conditions [72].

c. Pharmacists:

Twenty-four studies researched the perspectives of pharmacists post-implementation of prescribing rights mainly in the UK (n=18), US (3), and Canada (3). The pharmacists sample in these studies included either prescribers [22, 26, 29, 35, 59, 62, 63, 65, 67, 69, 80], non-prescribers [23, 24, 30, 32, 72, 73], or both [19, 20, 37, 58, 60, 66, 70]. Pharmacists positively perceived this expanded professional role and reported that drivers to undertake pharmacist prescribing include developing a clinical role, better patient management, personal development, enhancing job and patient satisfaction, improving self-confidence as well as reducing cost of therapy [19, 20, 22-24, 26, 29, 30, 32, 35, 37, 58-60, 62, 63, 65-67, 69, 70, 73, 80].

Studies also concluded that implementing pharmacist prescribing was easier in secondary care compared to primary or community care due to logistics related to access to medical records and networking environment [29, 59, 65, 70, 80].

Negative attitudes towards prescribing pharmacists were mainly related to increased liability, lack of time to engage in prescribing, and lack of experience in diagnosis in addition to medical resistance and difficulties in developing a CMP for every patient [19, 29, 30, 59, 60, 65, 66, 70].

Due to liability and diagnosis-related issues, pharmacists preferred SP or prescribing for minor and chronic conditions [63, 66, 72]. However, other studies reported that SP was not believed to significantly save physicians' time or improve patient care due to the limited list of drugs they can prescribe under the CMP. Thus, IP will have a better impact [24, 29, 35, 62, 63, 65, 67].

d. Doctors:

Seven studies explored doctors' perceptions of this new role for pharmacists, all of which were conducted in the UK. Of those, six studies reported the perspectives of doctors who had worked alongside pharmacist prescribers. The majority supported pharmacist prescribing across the studies with some benefits highlighted including more holistic and continuous patient care, better utilisation of pharmacists' skills, effects of enhancing physicians' medicines knowledge, and drug cost saving [59, 61, 62, 65, 69]. While physicians reported reduced direct-patient workload, the need to develop individual patient CMPs for SP was burdensome hence the impending implementation of IP was welcomed [35].

The only study that investigated doctors who were not exposed to prescribing pharmacists reported that, with time, doctors are more likely to accept this new role [21].

e. Policymakers:

Only one study from the US explored the perceptions of policymakers involved in medical services coverage or formulary policies after the realisation of pharmacist prescribing. The main findings were that these decision-makers responded positively to pharmacist prescribing due to pharmacists' knowledge about drugs and their mechanisms of action [72].

Facilitators of and barriers to pharmacist prescribing implementation

Many studies (n=27, 42%) reported facilitators and barriers to the implementation of pharmacist prescribers as perceived by the different

stakeholder groups [22-24, 26, 29, 37, 45, 46, 48, 50, 51, 56, 58-60, 62, 64, 65, 67, 69, 70, 72, 73, 77, 78, 80, 81] which are summarised in Table 6.

The major facilitators to this role include pharmacist personal qualities (enthusiasm, communication skills, experience and training), practice setting (working in an interprofessional team), organisational, managerial and medical colleagues' support as well as infrastructure and resources (number of pharmacist available, space and access to medical records) [22, 23, 58, 59, 67, 69, 70].

The main barriers reported are pharmacists' poor clinical skills if not prescribing collaboratively and issues relating to resources (access to medical records, shortage in pharmacy workforce, funding, time), support (doctors opposition), logistics (accountability, conflict of interest, referral process) and poor recognition of pharmacy profession [22, 24, 26, 29, 45, 46, 48, 50, 51, 56, 58-60, 62, 64, 65, 69, 72, 73, 77, 78, 80, 81].

Discussion

This systematic review summarises the evidence around the views and experiences surrounding pharmacist prescribing from the perspectives of a diverse range of stakeholders in a range of countries and settings.

The majority of studies pre- and post-implementation reported positive views and experiences with main benefits described as: increased access to healthcare services, perceptions of enhanced patients' outcomes, better utilisation of pharmacists' skills and knowledge, improved job satisfaction, and reduced physicians' workload. However, concerns were noted around issues of: liability, limited pharmacists' diagnosis skills, access to medical records, and lack of organisational and financial support. While review findings are derived from many studies of generally high methodological quality, there is a lack of mixed-methods approaches. These are being used increasingly within healthcare and allow both quantification of findings and in-depth exploration of key issues [83].

Healthcare policies in countries such as the UK are supporting the expansion of pharmacist prescribing and indeed there is a move to increase the number of pharmacists practicing within primary care practices [84]. The positive findings of this systematic review, together with previous reviews of effectiveness and

safety [13, 85-88], provide evidence to support such developments. Furthermore, such review findings are important in those countries and settings starting to explore and develop models of pharmacist prescribing [2].Interpretation and extrapolation of findings from studies conducted pre-implementation are limited in that participants may not be fully aware of the aim, nature, and scope of the intervention and may be influenced by experiences of similar or diverse interventions. This is apparent in terms of concerns around independent prescribing models in the UK and pharmacists' limited training in diagnosis. While this does allow assessment and prescribing of undiagnosed conditions, this must be within the prescribers' competence and indeed most pharmacist independent prescribers practise with patients in whom diagnosis has already been established by the doctor [6]. Concerns such as liability and skills which were voiced pre-implementation were less common post-implementation as such studies allow participants to reflect on their real-life experiences. For example, doctors who had worked alongside pharmacist prescribers and patients managed by the pharmacists were very supportive of their professionalism and skills.

While lack of access to medical records is an issue, most notably within community pharmacy settings, this is being addressed within the UK with pharmacists having access to specific limited sections of the electronic medical record [89]. Many of the barriers and indeed facilitators can be explained by theories of implementation. It is therefore notable that only three of the 65 studies incorporated any mention of theory within the study design, conduct, and reporting [18, 58, 70]. There is a need for implementation studies to focus on theory to allow more systematic and comprehensive investigation of facilitators and barriers. Similarly, those planning implementation should include key theoretical elements at the outset in order to heighten the facilitators and lessen the barriers such as inadequate funding, access to resources, etc. The Consolidated Framework for Implementation Research (CFIR) is an integrative framework derived from many different theories. It is described in five domains of: intervention characteristics, outer setting, inner setting, characteristics of the individuals involved, and the process of implementation [90]. All barriers identified post-implementation of pharmacist prescribing (e.g. funding, access issues, etc.) would be eliminated in advance by employing CFIR since it can

serve as a guide for implementing an innovation. However, it is likely that these barriers reflected the stage of implementation and are likely to have been resolved over time.

Previous reviews have been limited in nature and rigour (thematic and scoping reviews), focused on pre-implementation, lacked quality assessment of included studies, and focused on limited ranges of stakeholders in specific countries (UK and Canada) [88, 91, 92]. This systematic review was conducted according to best practices and is reported in accordance with the PRISMA Statement standards [93]. Furthermore, it was not limited to a specific country, setting, stakeholder group, or implementation stage. However, the generalisability or transferability of findings to other countries or cultures may be limited given that almost all studies were conducted post-implementation in the western world and mainly focused on pharmacists' perspectives. Moreover, several of these studies were conducted several years ago hence may no longer accurately reflect the current situation in those countries. While many implementation studies have been reported, it is still necessary to conduct such investigations in any country or setting planning to establish pharmacist prescribing to learn from the evidence-base. Future developments and studies should pay attention to theories of implementation and adopt mixed methods approaches with an inclusive range of stakeholders.

Conclusion

A large number of studies have reported stakeholders' views and experiences of pharmacist prescribing, pre- and post-implementation. While studies were from a limited number of countries, the overwhelming finding was positive, particularly in relation to increased access to healthcare services, perceptions of enhanced patients' outcomes, better utilisation of pharmacists' skills and knowledge, improved job satisfaction, and reduced physicians' workload. Concerns were largely identified pre-implementation and were around organisational issues and perceived lack of pharmacists' diagnosis skills.

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Figure Legends:

Figure 1: Study selection process (PRISMA flow diagram)

Figure 2: Cumulative quality assessment of the 65 studies, grouped according to study design

Table Legends:

Table 1: Characteristics of supplementary and independent prescribing in the UK [3, 4]

Table 2: Summary of pharmacist prescribing models globally

Table 3: Characteristics and key findings of included quantitative studies (n=41)

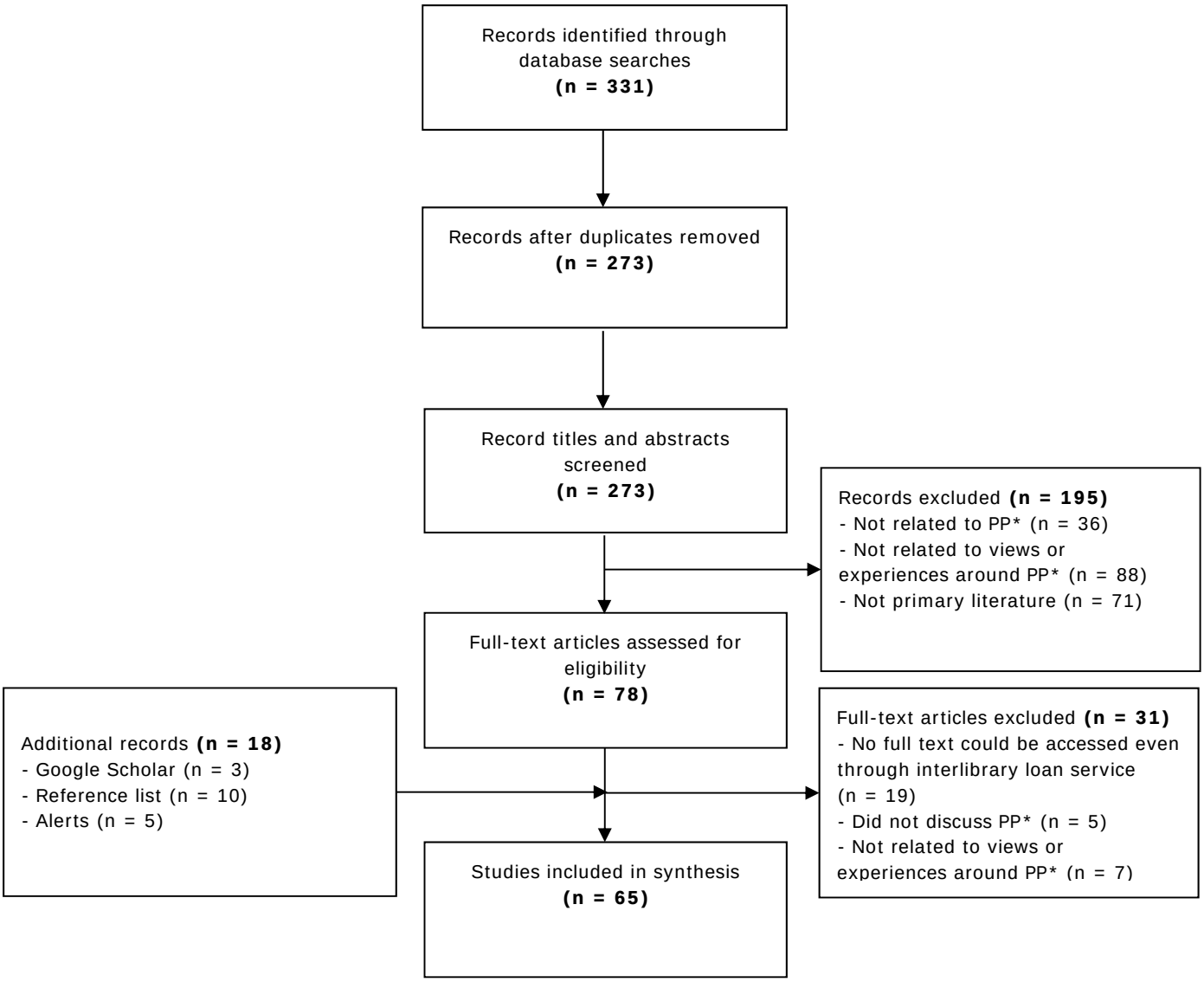
Table 4: Characteristics and key findings of included qualitative studies (n=21)

Table 5: Characteristics and key findings of included mixed-methods studies (n=3)

Table 6: Facilitators and barriers to pharmacist prescribing

Box Legends:

Box 1: Search string applied to Medline (title, abstract, keywords, subject heading)



*PP: Pharmacist Prescribing

Figure 1: Study selection process (PRISMA flow diagram)

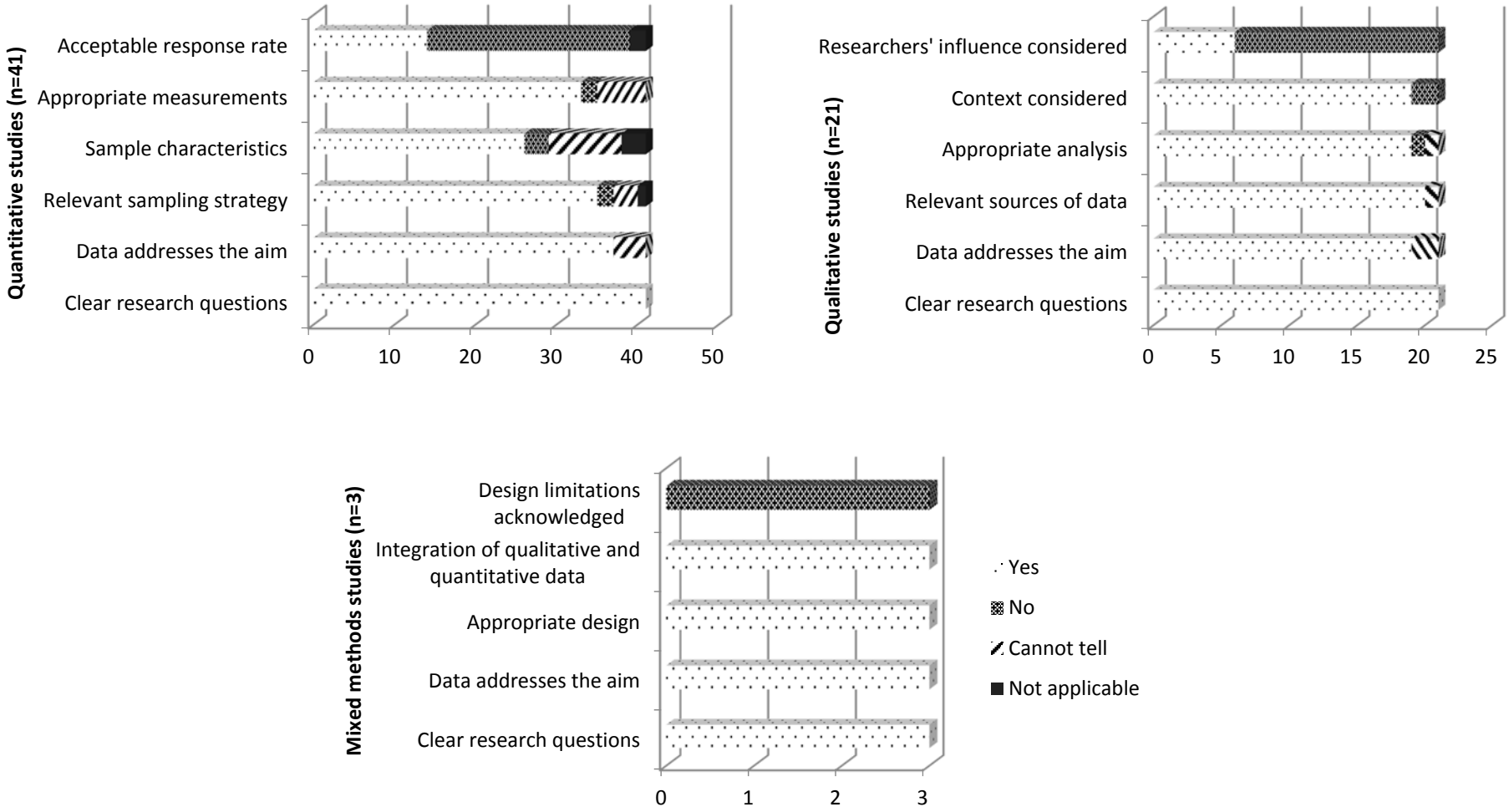


Figure 2: Cumulative quality assessment of the 65 studies, grouped according to study design

Table 1: Characteristics of supplementary and independent prescribing in the UK [3, 4]

	Supplementary Prescribing	**Independent Prescribing**
Year of Introduction in the UK	2003	2006
Definition	"A voluntary partnership between an independent prescriber (doctor or dentist) and a supplementary prescriber to implement an agreed patient-specific clinical management plan (CMP) with the patient's agreement" [5]	"The prescribing by a practitioner (e.g. doctor, dentist, nurse, pharmacist) responsible and accountable for the assessment of patients with undiagnosed or diagnosed conditions and for decisions about the clinical management required, including prescribing" [6]
Eligible health professionals	Dieticians, nurses, optometrists, pharmacists, physiotherapists, podiatrists, radiographers	Nurses, optometrists, pharmacists, physiotherapists, podiatrists, therapeutic radiographers
Clinical conditions managed	Any, within their clinical competence	Any, within their clinical competence
Diagnosis responsibilities	A doctor (or dentist) must diagnose the condition before prescribing can commence	The independent prescriber can assess and manage patients with diagnosed or undiagnosed conditions
Need for a Clinical Management Plan (CMP)	A written or electronic patient-specific CMP must be in place before prescribing can commence	No need for a CMP
Need for formal agreement	The CMP must be agreed with the doctor (or dentist) and patient before prescribing can commence	No need for any formal agreement
Drugs prescribed	Any, within their clinical competence	Any licensed medicines within their clinical competence. Nurse- and pharmacist-independent prescribers in particular can prescribe unlicensed medicines and controlled drugs

Table 2: Summary of pharmacist prescribing models globally

Country	Prescribing Model	Description
United States of America (USA)	Collaborative Drug Therapy Management (CDTM)	Defined by the American College of Clinical Pharmacy (ACCP) as "a collaborative practice agreement between one or more physicians and pharmacists wherein qualified pharmacists working within the context of a defined protocol are permitted to assume professional responsibility for performing patient assessments; ordering drug therapy-related laboratory tests; administering drugs; and selecting, initiating, monitoring, continuing, and adjusting drug regimens" [9, 10]. According to the Centers for Disease Control, in 2012, majority of states allow CDTM for health conditions as specified in a written provider protocol in any setting (Alaska, Arizona, Arkansas, California, Colorado, Connecticut, District of Columbia, Florida, Georgia, Hawaii, Idaho, Indiana, Iowa, Kentucky, Louisiana, Maryland, Massachusetts, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Jersey, New Mexico, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Dakota, Utah, Vermont, Virginia, Washington, Wyoming), some limit it to certain health settings (New Hampshire, New York, Nevada, North Dakota, Texas, West Virginia) while others authorise extremely limited collaborative practice for pharmacists under protocol such as immunisations and emergency contraception regardless of setting (Delaware, Illinois, Kensas, Maine, Wisconsin) [10].
Canada	The types and scope of pharmacist prescribing practice is variable according to province	Legislations in Canada now allow pharmacists to prescribe within their area of competence and with sufficient clinical knowledge of the patient. The prescribing practice differ from one province to another. Pharmacists with additional training are able to prescribe any schedule 1 drug (except drugs under the Controlled Drugs and Substances Act) or alter another prescriber's original prescription independently only in Alberta and under a collaborative agreement in Alberta, Saskatchewan, Manitoba, New Brunswick, and Nova Scotia. Moreover, they can change a drug's dosage, formulation or regimen across the country, except in Northwest Territories, Yukon, and Nunavut. Furthermore, in Alberta, Manitoba, Quebec, and Nova Scotia, pharmacists are allowed to order and interpret laboratory tests [11].
New Zealand	Pharmacist Prescriber (Collaborative Prescribing)	According to Pharmacy Council of New Zealand [12], "pharmacist prescribers work in a collaborative health team environment with other healthcare professionals and are not the primary diagnostician. They can write a prescription for a patient in their care to initiate or modify therapy (including discontinuation or maintenance of therapy originally initiated by another prescriber). They can also provide a wide range of assessment and treatment interventions which includes, but is not limited to: • ordering and interpreting investigation (including laboratory and related tests) • assessing and monitoring a patient's response to therapy • providing education and advice to a patient on their medicine therapy"

Box 1: Search string applied to Medline (title, abstract, keywords, subject heading)

((view* OR perspective* OR perception* OR opinion* OR attitude* OR belief* OR thought* OR feel* OR impress* OR stance* OR viewpoint* OR standpoint* OR position* OR support* OR concern* OR confiden* OR expect*)

OR

(experience* OR satisf* OR reflect* OR react* OR content* OR understand* OR encounter* OR evaluat* OR feedback))

AND

"pharmacist* prescrib*"

Table 3: Characteristics and key findings of included quantitative studies (n=41)

Author (Year of publication)	Aim(s)/Objective(s)	Definition and model of PP discussed	Country of focus	Stakeholder population studied (sample size)	Study design and methods	Key findings
Pre-implementation of pharmacist prescribing						
Pennock et al. (1988) [38]	Explore to what extent will pharmacist prescribing be accepted by consumers	No standardised definition provided	USA	Consumers (n=400, response rate (RR) 53%)	Questionnaire	Consumers' relationships with pharmacists is important in determining acceptance of prescribing role.
Segal and Grines (1988) [39]	Identify attitudes of organised pharmacy, organised medicine and pharmaceutical industry about prescribing authority for pharmacists	Models of PP in each US state presented	USA	Different pharmacy and medical associations and boards, Pharmaceutical Manufacturers Association (PMA), manufacturers and non-PMA-member generic manufacturers (n=307, RR 63%)	Questionnaire	Hospital pharmacy associations/boards to a lesser extent in support; non-PMA-member generic manufacturers/US state pharmacy associations relatively neutral. Medical associations/PMA-member companies in opposition.
Spencer and Edwards (1992) [40]	Ascertain GPs' attitudes to an extended role for community pharmacists	No standardised definition provided	UK	Doctors (n=1087, RR 68.4%)	Questionnaire	Pharmacists are too influenced by commercial pressures, should stick to dispensing and not supervise repeat prescriptions. However, GPs supported pharmacists prescribing nicotine chewing gum.
Child, Hirsch and Berry (1998) [41]	Identify the attitudes of hospital-based healthcare professionals involved in drug therapy towards prescription writing and initiation of drug treatment ("prescribing") by the pharmacist, explore the perceived barriers to PP, and to examine the potential future role of the pharmacist in drug therapy management	No standardised definition provided	UK	Doctors (n=195, RR 48.7%), nurses (n=200, RR 57.5%), pharmacists (n=87, 77%)	Questionnaire	Postgraduate education/training and attachment to clinical area are important requirements for PP. Barriers are pharmacists' willingness to accept this role, education/training and accountability.
Child and Cantrill (1999) [42]	Examine the reasons behind hospital doctors' perceived barriers to PP in the UK	No standardised definition provided	UK	Hospital doctors (n=193, RR 49%)	Questionnaire	Awareness of clinical and patient details, communication, doctor writing initial prescription, clinical responsibility and review of treatment were reported.

Child (2001) [43]	Examine hospital nurses' perceptions of PP in the UK	No standardised definition provided	UK	Nurses at five NHS teaching hospitals (n=200, RR 57.5%)	Questionnaire	Pharmacists' knowledge, review of treatment, pharmacists' workload, communication and accountability issues were discussed.
George et al. (2006b) [44]	Investigate community pharmacists' awareness, views and attitudes relating to IP by community pharmacists and their perceptions of competence and training needs for the management of some common conditions	Provided definition of UK models	UK	Community pharmacists (n=500, RR 43.4%)	Questionnaire	Confidence in abilities to IP, training, consultation skills and communication were highlighted. Facilitators include practising more hours/week as a pharmacist, training, and involvement in Scottish Executive pharmaceutical care model schemes.
Kay, Bajorek and Brien (2006) [45]	Identify Australian pharmacists' awareness of their international colleagues' prescribing practices and explore their views about the feasibility and utility of PP privileges within the scope of their current practice	Provided definition of dependent prescribing	Australia	Pharmacists (n=4158, RR 6.4%)	Questionnaire	74% and 52% supported dependent and independent prescribing respectively. 86% believed they could justify their prescribing while 73% believed they would benefit from prescribing authority.
Nguyen and Bajorek (2008) [46]	Explore the clinical utility and capacity of pharmacists to undertake prescribing functions in anticoagulation management in the hospital setting (Pilot study)	No standardised definition provided	Australia	Pharmacists (n=16), graduates (n=2) and final year pharmacy students (n=6)	Questionnaire	Inpatient PP can be useful but outpatient and dependent models were more appropriate. 58% of prescribing was clinically inappropriate. Barriers include training, experience and doctors' opposition.
Weeks and Marriott (2008) [47]	Explore the views of Society of Hospital Pharmacy Australia pharmacist members on collaborative prescribing and the extent of de facto prescribing at their institution	Provided definition for collaborative and de facto prescribing	Australia	Pharmacists (n=1367, RR 40%)	Questionnaire	95% thought collaborative prescribing could circumvent hospital delays with timely service delivery. If a framework existed, 75% would consider PP.
Hoti et al. (2010) [48]	Evaluate the views of Australian pharmacists on expanded PP roles and identify important drivers and barriers to its implementation	Current practice of Australian pharmacists presented	Australia	Pharmacists (n=2592, RR 40.4%)	Questionnaire	83.9% supported PP and 97.1% needed training. Inadequate training in patient assessment, diagnosis and monitoring were barriers to PP.
Hoti, Hughes and Sunderland (2011) [18]	Examine the views of regular pharmacy clients on PP and employ agency theory in considering the relationship between the stakeholders involved	Current practice of Australian pharmacists presented	Australia	Patients (n=1153, RR 34.7%)	Interview (Quantitative approach)	71% trusted PP, while 66% supported doctor diagnosing first. Pharmacist diagnosing and prescribing was limited to pain management and antibiotics. 64%

						highlighted improved access to prescription medicines with PP.
Perepelkin (2011) [49]	Better understand public perceptions of pharmacists, and the acceptance of possible expanded roles for pharmacists, including prescribing authority	No standardised definition provided	Canada	General public (n=1283, RR 31.4%)	Questionnaire	Emergency situations, renewal of long-term medications and changing medications' frequency or strength were the most accepted scenarios for PP.
Erhun, Osigbesan and Awogbemi (2013) [50]	Determine the views of pharmacists and physicians on PP, appropriateness and the possible contribution to the healthcare system if pharmacists prescribe	No standardised definition provided	Nigeria	Pharmacists (n=300, RR 61%) and physicians (n=400, RR 40%)	Questionnaire	77.5% of pharmacists supported while 74.4% of physicians opposed PP. However, if there was no doctor, some physicians supported PP. Reasons for opposition were legal provision and professional incompetence.
Hoti, Hughes and Sunderland (2013) [51]	Compare the attitudes of hospital and community pharmacists regarding an expanded prescribing role	An overview of international models presented	Australia	Pharmacists (n=2592, RR 40.4%)	Questionnaire	Community pharmacists supported IP and emergency prescribing. Hospital pharmacists supported SP for heart failure and anticoagulant therapies; and IP for anticoagulant therapies.
Auta et al. (2014) [52]	Explore the views of patients of community pharmacists on their consultation experiences, and the possible extension of prescribing rights to pharmacists in Nigeria	No standardised definition provided	Nigeria	Patients (n=432, RR 86.6%)	Questionnaire	92.5% supported PP. 79.7% favored restricted formulary prescribing, and 71.9% prefer to see a doctor if their conditions get worse.
Moore, Kennedy and McCarthy (2014) [53]	Explore GP–pharmacist relationship, gain insight into communication between the professions and evaluate opinion on extension of the role of the community pharmacist	No standardised definition provided	Ireland	Doctors (n=500, RR 52%) and community pharmacists (n=335, RR 62%)	Questionnaire	Compared to doctors, pharmacists were more supportive of PP. 82% of GPs and 96% of pharmacists favored pharmacists dealing with minor ailments.
Hale et al. (2016) [54]	Assess whether patient satisfaction with the pharmacist as a prescriber and patient experiences in two settings of collaborative doctor-pharmacist prescribing may be barriers to implementation of PP	No standardised definition provided	Australia	Patients in pre-admission (n=200, RR 91%) and sexual health (n=17, RR 85%) clinics	Questionnaire	Almost all patients (98% in pre-admission and 97% in sexual health clinic) were satisfied with the consultation.
Ung et al. (2016) [55]	Explore how pharmacists can prescribe oral antibiotics to treat a limited range of infections whilst focusing on their confidence and appropriateness of prescribing	Current practice of Australian pharmacists presented	Australia	Pharmacists (n=240, RR 34.2%)	Questionnaire	High levels of appropriate antibiotic prescribing were shown for uncomplicated urinary tract

						infections (97.2%), cellulitis (98.2%) and adolescent acne (100%).
Auta et al. (2017) [56]	Explore the views of pharmacists in Nigeria on the extension of prescribing authority to them, determine their willingness to be prescribers and identify the potential facilitators and barriers to introducing PP in Nigeria	Provided definition of UK models	Nigeria	Pharmacists (n=775, RR 40.6%)	Questionnaire	97.1% supported PP. Facilitators for PP were increasing patients' access to care and better utilisation of pharmacists' skills. Barriers were medical resistance and pharmacists' inadequate diagnosis skills.
Khan et al. (2017) [57]	Assess the attitudes of rural population towards PP and their interest in using expanded PP services	No standardised definition provided	India	General public (n=480, RR 85.4%)	Questionnaire	81.5% supported PP. Participants with low income and tertiary education showed more interest towards PP ($p<0.05$).
Post-implementation of pharmacist prescribing						
Eng, McCormick and Kimberlin (1990) [19]	Examine the attitudes and self-reported prescribing activities of a sample of Florida pharmacists interviewed 6 months and 12 months after enactment of the Florida Pharmacist Self-Care Consultant Law (SCCL)	No standardised definition provided	USA	Pharmacists (prescribers and non-prescribers) (n=200, RR 97% for Phase 1; n= 131, RR 66% for Phase 2)	Interview (Quantitative approach)	Prescribers perceive that the law positively affected their relationships with patients. Both prescribers and non-prescribers believed that the law has not affected their relationships with physicians.
White-Means and Okunade (1992) [20]	Assess the current status of IP by Florida pharmacists two years after the law was enacted, examine correlates of the choice to prescribe, and discuss policy implications of the findings	Provided a description of the SCCL	USA	Pharmacists (prescribers and non-prescribers) (n=1800, RR 32.3%)	Questionnaire	Prescribers are more likely to perceive they have enough training to prescribe and to view their skills as comparable to those of physicians, but less likely to think a PharmD is needed.
Erwin, Britten and Jones (1996) [21]	Explore GPs' views on various drugs being dispensed by community pharmacists without a prescription to determine whether these views have changed since 1990	No standardised definition provided	UK	Doctors (not exposed to PP) (n=250, RR 69% for fundholding, n= 600, RR 57% for non-fundholding practices)	Questionnaire	GPs overall level of approval for PP had increased. GPs from fundholding practices agreed to a slightly wider range of drugs being made available over-the-counter than those from non-fundholding practices.
George et al. (2006a) [22]	Explore SP pharmacists' early experiences of prescribing and their perceptions of the prescribing course	Provided definition of UK models	Great Britain	SP pharmacist (n=518, RR 82.2%)	Questionnaire	Better patient management and funding issues were the main benefit and barrier respectively. Predictors of SP included time since SP registration; confidence and practicing in a setting other than community pharmacy.

Hobson and Sewell (2006a) [23]	Study the implementation of SP by pharmacists within primary care trusts (PCTs) and secondary care trusts (SCTs) in England	Provided definition of UK models	UK	Pharmacists (not exposed to PP) (n=143, RR 68% for SCT; n= 271, RR 68% for PCT)	Questionnaire	Additional training required around the clinical area of practice for SCT and the completion of continuing professional development for PCT respondents.
Hobson and Sewell (2006b) [24]	Provide data on the views of chief pharmacists and PCT pharmacists on the risks and concerns surrounding SP	An overview of global experiences presented	UK	Chief pharmacists and PCT pharmacists (not exposed to PP) (n=143, RR 68% for SCT; n= 271, RR 68% for PCT)	Questionnaire	There was positively about implementing SP but concerns rose over training and professional competency/responsibility.
Smalley (2006) [25]	Evaluate patients' experience of our established pharmacist-led SP hypertension clinic	No standardised definition provided	UK	Patients who experienced SP (n=127, RR 87%)	Questionnaire	91% continued to attend. 57% found the care they received was better than previous care. 86% understood their condition more, were more involved in decision-making and could easily schedule appointment.
George et al. (2007) [26]	Investigate the challenges experienced by pharmacists in delivering SP services, explore their perceptions of benefits of SP and obtain feedback on both SP training and implementation	Provided definition of UK SP model	Great Britain	SP pharmacists (n=488, RR 82.2%)	Questionnaire	Better patient management was the main benefit. Barriers include lack of organisational recognition of SP and funding. Greater emphasis on clinical skills development should be part of the SP course.
Stewart et al. (2008) [27]	Explore patients' perspectives and experiences of pharmacist SP in Scotland	Provided definition of UK SP model	UK	Patients who experienced SP (sample size not clear, RR 57.2%)	Questionnaire	89.3% were satisfied with the consultation, 78.7% thought it was comprehensive and most would recommend PP to others. However, 65% would prefer to consult a doctor.
Stewart et al. (2009b) [28]	Determine the awareness of, views on, and attitudes of members of the Scottish general public toward nonmedical prescribing, with an emphasis on PP	Provided definition of UK models	UK	General public (exposed and non-exposed to PP) (n=500, RR 37.1%)	Questionnaire	56.6% were aware of non-medical prescribing. More than half supported PP. Concerns rose about privacy despite acknowledging its enhanced convenience.
McCann et al. (2011) [29]	Capture information on PP in Northern Ireland	Provided definition of UK models	UK	Pharmacists who were identified as qualified prescribers (n=105, RR 76%)	Questionnaire	Benefits for patient care and pharmacist were reported. IP was viewed as the way forward but concerns were raised about prescribing without a diagnosis or beyond the team setting.

McIntosh et al. (2011) [30]	Investigate newly registered pharmacists' awareness of PP and views on potential future roles as prescribers	No standardised definition provided	Great Britain	Newly registered pharmacists (not exposed to PP) (n=1658, RR 25.2%)	Questionnaire	86.4% were interested in prescribing. Training is needed in clinical examination, patient monitoring and medico-legal aspects of prescribing. 66.3% thought the current requirement for SP was appropriate.
Stewart et al. (2011) [31]	Evaluate the views of patients across primary care settings in Great Britain who had experienced PP	No standardised definition provided	Great Britain	Patients who experienced PP (n=1622, RR 29.7%)	Questionnaire	The vast majority were satisfied with their consultation, believed their pharmacist prescribed as safely as their GP and considered them approachable and thorough.
Hutchison et al. (2012) [32]	Determine reasons for the slow adoption of prescribing authority by hospital pharmacists in the Canadian province of Alberta	An overview of PP in Canada presented	Canada	Pharmacists (not exposed to PP) (n=500, RR 62.8%)	Questionnaire	The value of PP motivates pharmacists to apply for PP. Barriers include the lengthy application process, increased liability and documentation requirements.
MacLure et al. (2013) [33]	Explore the views of the Scottish general public on non-medical prescribing	Provided definition of UK models	UK	General community in Scotland (exposed and non-exposed to PP) (n=500, RR 37.1%)	Questionnaire	There was lack of awareness of NMP knowledge and training but support for a limited range of prescribing. Barriers included lack of access to medical records and issues with privacy and confidentiality.
Tinelli et al. (2013) [34]	Obtain feedback from primary care patients on the impact of prescribing by nurse independent prescribers (NIPs) and pharmacist independent prescribers (PIPs) on experiences of the consultation, the patient–professional relationship, access to medicines, quality of care, choice, knowledge, patient-reported adherence and control of their condition	Provided definition of UK models	UK	Patients who experienced PP (n=975, RR 30%)	Questionnaire	Satisfaction and confidence with PIP were high. When comparing NMP to doctor prescribing, most reported no difference in their experience of care.
Hill et al. (2014) [35]	Not explicitly stated: Explore the acceptability of PP in addiction services in NHS Lanarkshire amongst the stakeholders and service users	Provided definition of UK models	UK	Patients (n=110, RR 78.2%), PP (n=5, 100%), medical prescribers (n=12, RR 50%)	Questionnaire	PP is seen as effective and preferred by patients. Although doctors have more reservations, the majority believed it was beneficial. All thought IP would be more beneficial.

Mansell et al. (2015) [36]	Determine whether patients prescribed treatment for minor ailments by a pharmacist symptomatically improve within a set time frame	No standardised definition provided	Canada	Patients who experienced PP (all population was included)	Questionnaire	Condition significantly/completely improved in 80.8% with only 4% experiencing bothersome side effects. Trust in pharmacists and convenience were the common reasons for choosing a pharmacist over a physician.
Bourne et al. (2016) [37]	Determine the current and proposed future IP practice of UK clinical pharmacists working in adult critical care	No standardised IP definition provided	UK	UK Clinical Pharmacy Association members (prescribers and non-prescribers) (n=404, RR 33%)	Questionnaire	Over a third were IP, and 70% intended to be prescribers within the next 3 years. Experience and working in a team facilitated IP. Pharmacists reported significant positives in patient care and job satisfaction.
Isenor et al. (2017) [58]	To identify the relationship between barriers and facilitators to pharmacist prescribing and self-reported prescribing activity using the Theoretical Domains Framework version 2 (TDF(v2))	An overview of PP in Nova Scotia (Canada) presented	Canada	Pharmacists (prescribers and non-prescribers) (n= 1100, RR 8%)	Questionnaire	The three domains most positive attitudes associated with prescribing were Knowledge (84 %), Reinforcement (81%) and Intentions (78 %). The largest effect on prescribing activity was the Skills domain.

Abbreviations:
NMP: Non-medical Prescribing
IP: Independent Prescribing
SP: Supplementary Prescribing
PP: Pharmacist Prescribing

Table 4: Characteristics and key findings of included qualitative studies (n=21)

Author (Year of publication)	Aim(s)/Objective(s)	Definition and model of PP discussed	Country of focus	Stakeholder population studied (number of participants)	Study design and methods	Key findings
Pre-implementation of pharmacist prescribing						
Weeks, Marriott and George (2010) [74]	Pilot a UK NMP course for Australian hospital pharmacists and elicit participants' views on NMP and experiences of the training	Provided definition of UK models	Australia	Hospital pharmacists (n=15)	Focus group	Confidence, competency, legislative constraints, acceptance by other health providers, assessment requirements and university documentation were highlighted.
Hatah et al. (2013) [75]	Evaluate GPs' perceptions of pharmacists' contributions to services traditionally undertaken by GPs	Provided definition of IP	New Zealand	Doctors (n=18)	Interview	GPs were more accepting of pharmacists' medication reviews than of PP unless appropriate controls, close collaboration and co-location of services took place.
Pojskic et al. (2014) [76]	Ascertain the initial perceptions of the Ontario government and health professional stakeholder groups regarding the prospect of prescriptive authority for pharmacists	An overview of the models present internationally and in Ontario presented	Canada	Key informants from the Ontario government and provincial pharmacy and medical regulatory colleges and professional associations (n=17)	Qualitative study using policy documents and semi-structured interviews	Pharmacy organisations and Ontario government representatives supported while medical organisations opposed PP.
Bajorek et al. (2015) [77]	Explore the perspectives of GP super clinic staff on current and potential (future) pharmacist-led services provided in this setting	No standardised definition provided	Australia	Doctors (n=3), pharmacist (n=1), nurse (n=1), business manager (n=1) and reception staff (n=3)	Interview	Positive working relationships, satisfaction with pharmacist's current role and support for potential future roles were reported. Although GPs had differing views about PP, they saw several benefits for it.
Auta, Strickland-Hodge and Maz (2016) [78]	Investigate stakeholders' views on granting prescribing authority to pharmacists in Nigeria	No standardised definition provided	Nigeria	Policymakers, pharmacists, doctors and patient group representative (n=43)	Interview	Non-medical stakeholders supported PP while doctors were reluctant to do so. Benefits (access to medicines) and barriers (pharmacists' diagnosis skills) were stated.
Le, Braunack-Mayer and Laurence (2017) [79]	Explore the potential impact of a collaborative prescribing model for Opioid Substitution treatment (OST) on patients, pharmacists and health provider relationships from the perspective of pharmacists and patients	No standardised definition provided	Australia	OST patients (n=14) and community pharmacists (n=18)	Interviews with patients and focus groups with pharmacists	Benefits included improved continuity of care and convenience. Changes to healthcare relationships and ensuring adequate support of PP were highlighted.

Post-implementation of pharmacist prescribing						
Lloyd and Hughes (2007) [59]	Explore the views and professional context of pharmacists and physicians (who acted as their training mentors), prior to the start of SP training	Provided definition of UK SP model	UK	Pharmacists prescribers (n=47) and their mentors (n=35)	Focus groups with pharmacists and face-to-face semi-structured interviews with the mentors	SP was anticipated to improve patient care and interprofessional relationships. Loss of diversity, deskilling of junior doctors, safety and professional encroachment were reported.
Tully et al. (2007) [60]	Investigate the views and experiences of pharmacists in England before and after they registered as SP	Provided definition of UK SP model	UK	Pharmacists (before and after registering as SPs) (n=8)	Interview	Pharmacists thought training would legitimise their current informal prescribing. Pharmacists already involved with prescribing were more likely to work as prescribers.
Blenkinsopp et al. (2008) [61]	Explore GPs perceptions of the advantages and disadvantages of pharmacist SP and the future introduction of IP	Provided definition of UK models	UK	Doctors who had experienced SP (n=13)	Focus group	Not all referred patients to the PP. Those GPs who referred patients described benefits with some ambivalence.
Stewart et al. (2009a) [62]	Explore the perspectives of pharmacist SP, their linked independent prescribers and patients, across a range of settings, in Scotland, towards PP	Provided definition of UK models	UK	SP pharmacists (n=9), their mentors (n=8) and patients (n=18)	Interview	All were supportive of SP identifying benefits for patients and the wider healthcare. Pharmacists were keen on IP but not doctors citing inadequate examination skills.
Weiss and Sutton (2009) [63]	Investigate the potential threat to medical dominance posed by the addition of pharmacists as prescribers in the UK and explore the role of prescribing as an indicator of professional power, the legitimacy and status of new PP and the forces influencing professional jurisdictional claims over the task of prescribing	Provided definition of UK models	UK	SP pharmacists (n=23)	Interview	Facilitators include blurred definitions of prescribing, competence and a team approach to patient management.
Hobson, Scott and Sutton (2010) [64]	Explore the opinions of patients on the development of NMP	Provided definition of UK models	UK	Patients (exposed and not exposed to PP) (n=18)	Interview	Concerns rose about clinical governance, privacy and space. Participants acknowledged pharmacists' knowledge and accessibility.
Lloyd, Parsons, and Hughes (2010) [65]	Explore the context and experiences, in relation to the practice of SP, of pharmacists and physicians (who acted as their training mentors) at least 12 months after pharmacists had qualified as SP	Provided definition for UK IP model	UK	SP pharmacists (n=40) and their mentors (n=31)	Focus groups with pharmacists and face-to-face semi-structured interviews with the mentors	PP was perceived to reduce doctors' workload and improved continuity of care. IP was seen as contentious by mentors due to the diagnostic element.

Tonna et al. (2010) [66]	Explore pharmacists' perceptions of the feasibility and value of PP of antimicrobials in secondary care in Scotland	Provided definition of UK models	UK	Senior hospital pharmacists (prescribers and non-prescribers) (n=37)	Focus group	Perceived benefits included quicker access to medicines, reduced risk of resistance and better application of evidence-based medicine.
Dawoud et al. (2011) [67]	Investigate pharmacist prescribers' views and experiences of the early stages of SP implementation	Provided definition for independent, dependent and collaborative prescribing models	UK	SP pharmacists (n=16)	Interview	Benefits reported on patient care and pharmacists' job satisfaction. SP limited pharmacists' freedom in decision making. Hence, IP was supported.
McCann et al. (2012a) [68]	Explore patients' perspectives of pharmacists as prescribers	Provided definition of UK models	UK	Patients who experienced PP (n=34)	Focus group	Patients supported PP especially in a team setting. However, there was a lack of awareness of PP role.
McCann et al. (2012b) [69]	Provide an in-depth understanding of PP from the perspective of pharmacists, medical colleagues and other key stakeholders in Northern Ireland	Provided definition of UK SP model	UK	PP (n=11), medical colleagues (n=11) and other key stakeholders (n=13)	Interview	PP resulted in a more holistic approach to care. Challenges include working within areas of competency, complex conditions and resistance by older doctors.
Makowsky et al. (2013) [70]	Understand what factors influence pharmacists' adoption of prescribing using a model for the Diffusion of Innovations in healthcare services	An overview of prescribing authority in Alberta presented	Canada	Pharmacists (prescribers and non-prescribers) (n=38)	Interview	PP was dependent on the innovation itself, adopter, system readiness, practice setting, communication and influence.
Deslandes, John and Deslandes (2015) [71]	Explore the views and experiences of patients with mental illness on being managed by a pharmacist SP in a secondary care outpatient setting	Provided definition of UK SP model	UK	Patients with mental illness who experienced SP (n=11)	Exploratory study using semi-structured interviews and self-completion diaries	Patients supported PP and felt they were involved in decisions concerning their healthcare.
Feehan et al. (2016) [72]	Investigate the perceived demand for and barriers to PP in the community pharmacy setting	An overview of prescribing authority in USA presented	USA	Consumers (n=19), community pharmacists (n=20) and re-imbursement decision-makers (n=8) (not exposed to PP)	Interview	Consumers opposed. Pharmacists supported PP for limited conditions. Reimbursement decision-makers were most receptive. Barriers included awareness of PP, pharmacist training, conflicts of interest and liability issues.
McIntosh and Stewart (2016) [73]	Explore the views and reflections on PP of UK pre-registration pharmacy graduates	No standardised definition provided	UK	Pre-registration pharmacy graduates (n=12)	Interview	Support was related to professional development. Barriers included lack of organisational strategy, confidence and workload.

Abbreviations:
NMP: Non-medical Prescribing
IP: Independent Prescribing
SP: Supplementary Prescribing
PP: Pharmacist Prescribing

Table 5: Characteristics and key findings of included mixed-methods studies (n=3)

Author (Year of publication)	Aim(s)/Objective(s)	Definition and model of pharmacist prescribing discussed	Country of focus	Stakeholder population studied (sample size)	Study design and methods	Key findings
Pre-implementation of pharmacist prescribing						
Hanes, and Bajorek (2005) [81]	Explore the views of a sample of Australian hospital pharmacists on prescribing privileges	Provided a definition for dependent prescribing	Australia	Hospital pharmacists (n=10) and teacher practitioners (n=5) (15 completed the questionnaire, 8 participated in the focus groups)	Questionnaire and focus group	Benefits include more efficient/improved pharmaceutical care and reduced healthcare costs. Physician opposition was a barrier. Training and accreditation beyond registration was deemed necessary.
Vracar and Bajorek (2008) [82]	Explore Australian GPs' views on extending prescribing rights to pharmacists, the appropriateness of PP models, and the influence of GPs' characteristics on their preference for a particular PP model	An overview of international models presented	Australia	Doctors (150 approached, 22 filled the questionnaire and 10 participated in the interview)	Questionnaire and semi-structured interview	Repeat prescribing and prescribing by referral were the most favoured. Safety issues, lack of awareness of pharmacist training and capabilities, clinical responsibility, GP–patient relationship and remuneration were raised.
Post-implementation of pharmacist prescribing						
Baqir (2010) [80]	Evaluate the extent of PP and identify some of the barriers to maintaining and developing such services	No standardised definition provided	UK	Pharmacists who undertook a prescribing course (179 were invited to participate, 98 filled the questionnaire but not clear how many	Multiple methods: Questionnaire, focus groups, documents review and interviews	In secondary care, easy access to medical records and prescription pads as well as close working relationships with doctors were facilitators. The major

	were involved in the focus groups)	barrier was lack of a clear strategy at organisational level.

Abbreviations:
PP: Pharmacist Prescribing

Table 6: Facilitators and barriers to pharmacist prescribing

Facilitators	• Pharmacists' personal qualities (communication skills, training, experience, and enthusiasm) • Practice setting (secondary vs primary vs community) • Organisational, managerial, and medical colleagues' support • Resources (workforce, space, access to medical records)
Barriers	• Pharmacists' skills (clinical examination and diagnostic skills) • Resources (workforce, access to medical records, space, time) • Physicians and organisational support • Funding • Legal aspects (accountability, conflict of interest) • Pharmacy practice recognition