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Published in:
BMJ open

Publication date:
2022

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Citation for published version (APA):

Edwards, J., Coward, M., & Carey, N. (2022). Barriers and facilitators to implementation of non-medical independent prescribing in primary care in the UK: a qualitative systematic review. *BMJ open*, 12(6), [e052227]. <https://doi.org/10.1136/bmjopen-2021-052227>

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BMJ Open Barriers and facilitators to implementation of non-medical independent prescribing in primary care in the UK: a qualitative systematic review

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To cite: Edwards J, Coward M, Carey N. Barriers and facilitators to implementation of non-medical independent prescribing in primary care in the UK: a qualitative systematic review. *BMJ Open* 2022;**12**:e052227. doi:10.1136/bmjopen-2021-052227

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2021-052227>).

Received 12 April 2021
Accepted 27 May 2022



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ABSTRACT

Objectives To support workforce deficits and rising demand for medicines, independent prescribing (IP) by nurses, pharmacists and allied health professionals is a key component of workforce transformation in UK healthcare. This systematic review of qualitative research studies used a thematic synthesis approach to explore stakeholders' views on IP in primary care and identify barriers and facilitators influencing implementation.

Setting UK primary/community care.

Participants Inclusion criteria were UK qualitative studies of any design, published in the English language. Six electronic databases were searched between January 2010 and September 2021, supplemented by reference list searching. Papers were screened, selected and quality appraised using the Quality Assessment Tool for Studies with Diverse Designs. Study data were extracted to a bespoke table and two reviewers used NVivo software to code study findings. An inductive thematic synthesis was undertaken to identify descriptive themes and interpret these into higher order analytical themes. The Diffusion of Innovations and Consolidated Framework for Implementation Research were guiding theoretical anchors.

Primary and secondary outcome measures N/A.

Results Twenty-three articles addressing nurse, pharmacist and physiotherapist IP were included. Synthesis identified barriers and facilitators in four key stages of implementation: (1) 'Preparation', (2) 'Training', (3) 'Transition' and 4) 'Sustainment'. Enhancement, substitution and role-specific implementation models reflected three main ways that the IP role was used in primary care.

Conclusions In order to address global deficits, there is increasing need to optimise use of IP capability. Although the number of independent prescribers continues to grow, numerous barriers to implementation persist. A more coordinated and targeted approach is key to overcoming barriers identified in the four stages of implementation and would help ensure that IP is recognised as an effective approach to help alleviate workforce shortfalls in the UK, and around the world.

PROSPERO registration number CRD42019124400.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Adopting a qualitative synthesis facilitated contextual understanding into the implementation of non-medical independent prescribing (IP) in primary care settings in the UK.
- ⇒ Higher order analytical themes were identified that offer in-depth interpretation of non-medical IP implementation in UK primary care.
- ⇒ The theoretical lens improved understanding of the generalisability of factors known to facilitate non-medical IP in UK primary care.
- ⇒ Grey literature was excluded from the synthesis.

INTRODUCTION

Equitable access to primary care improves health outcomes, lowers costs and enhances patient experience.^{1 2} Global workforce deficits³⁻⁵ and the rising prevalence of long-term conditions,^{6 7} multimorbidity⁸⁻¹⁰ and COVID-19¹¹ have severely threatened primary care sustainability.¹²⁻¹⁵ Medicines use in global priorities including diabetes and cardiovascular diseases is increasing, with worldwide drug therapy days rising in 2019 to 1.8 trillion and an average of 234 days per person/year.¹⁶ With one in four adults in UK primary care taking five or more medicines daily,¹⁷ the workforce implications for meeting prescribing needs are profound.

Mobilising primary care to improve workforce and service sustainability is a global challenge.^{5 18} As in other countries,^{19 20} primary care in the four devolved UK nations (ie, England, Scotland, Wales and Northern Ireland) has undergone significant restructuring and reorganisation.²¹⁻²⁴ In England, for example, the 2019 National Health Service (NHS) long-term plan amalgamated general practitioner (GP) practices into primary care networks (PCN), covering populations of 30 000-50 000.²⁵ Pooling resources to achieve government targets²⁶ with the promise of extra non-medical staff

(eg, advanced/specialist clinical pharmacists, dieticians, paramedics and physiotherapists), PCNs were expected to offer additional hours within broader service options.²⁷ While the impact of the new 2021/2022 Health and Care Bill on primary care workforce transformation in England remains uncertain,²⁸ the diverse skills of the non-medical advanced practice workforce including prescribing capability are likely to remain important for addressing UK primary care prescribing and medicines optimisation needs.^{29–31}

In line with global movements to enhance the skills of non-medical healthcare professionals, over 90 000 UK nurses, pharmacists, optometrists, radiographers, physiotherapists, podiatrists, dieticians and paramedics³² under serial legislative changes^{33–36} and with accredited additional training^{37–39} are authorised to prescribe using supplementary and/or independent forms. Although UK legislation restricts dieticians and diagnostic radiographers to supplementary prescribing, as reported by professions with dual supplementary/independent prescribing (IP) rights (eg, nurses, pharmacists, physiotherapists, podiatrists) IP is more workable^{40 41} and has largely superseded supplementary prescribing in many UK non-doctor led primary and community care services.^{42–44} Enabling the autonomous initial assessment and ongoing management of patient prescribing and medicines optimisation needs, IP increases practitioner autonomy/expertise,^{29 45–47} enhances clinical outcomes compared with doctor-led care²⁹ and results in high service-user satisfaction.⁴⁸ Across contemporary primary care settings in the UK and internationally IP is an increasingly essential component of service re-design.^{45 49–54}

Despite its many benefits, the UK adoption rates for IP vary,^{55 56} with medical opposition to prescribing roles,^{57 58} training course drop-out,⁴⁶ delayed prescribing onset^{59 60} and role underuse reported.^{61–64} Difficulties with implementation are frequently cited.^{43 46 59 65–67} Several UK^{68 69} and international systematic^{54 70–72} and literature reviews,^{73 74} have focused on implementation barriers and/or facilitators. However, these have been profession-specific,^{54 70–72 74} have included international models with varying legislative/jurisdictional levels of prescribing autonomy^{54 70–72} and/or have addressed prescribing in heterogeneous care settings.^{54 68 69 74} None have synthesised qualitative studies in all IP eligible professions in UK primary care. Considering IP enhances workforce skills and builds capacity for service redesign and improved sustainability,^{42 75–77} identifying and understanding the challenges to its implementation is ever pressing.^{78 79}

Aim

This qualitative meta-synthesis aimed to identify barriers and facilitators that influence implementation of IP in UK primary care.

Theoretical perspective

This review is broadly informed by the Diffusion of Innovations theory^{80 81} and the Consolidated Framework for

Implementation Research^{82 83} which provided theoretical anchors for identifying contextual factors likely to influence implementation.^{84–89}

METHODS

This qualitative meta-synthesis is reported following the Enhancing transparency in reporting the synthesis of qualitative research (ENTREQ) guidelines⁹⁰ which incorporates elements of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.⁹¹ Thematic qualitative meta-synthesis^{92 93} permits synthesis of context-embodied research and is a suitable method for identifying factors influencing implementation.^{94–96} The review was registered in PROSPERO.⁹⁷

Search strategy

A systematic search of UK literature on primary and community care IP was undertaken in January 2021 and updated in September 2021. Barriers/facilitators to healthcare innovations are conceptually well established^{98–102} and thus grey literature was excluded. Search terms were developed according to the Sample, Phenomenon of Interest, Design, Evaluation, Research Type (SPIDER) tool¹⁰³ and tested based on truncations of words related to prescribing, community/primary care and UK non-medical healthcare professions with IP authority (eg, nurses, pharmacists, optometrists, physiotherapists, podiatrists, paramedics and radiographers). Wild card and Boolean Search Operators were used. Qualitative search terms were not included^{104 105}; all citations were screened for qualitative methodology. Search strings (see online supplemental file 1 examples) were adapted for six electronic databases (EBSCO - MEDLINE, CINAHL, OVID - Embase, ProQuest - British Nursing Index, Nursing & Allied Health, Web of Science). The 2010 inception search date reflected major UK coalition governmental change and the introduction of landmark legislative reforms^{106–109} that decentralised UK primary/community care commissioning.¹¹⁰ Inclusion criteria applied to study selection are shown in table 1. Retrieved citations were downloaded to EndNote V.X9 and duplicates removed.

Screening and eligibility

Two reviewers (JE and NC) independently assessed all titles and abstracts against the inclusion criteria and the full-text versions of papers deemed potentially relevant were obtained and reviewed. Papers found not to meet the criteria during screening were excluded with reasons recorded as shown in the PRISMA table (figure 1). Reference list hand searching supplemented database searching.

Quality assessment

In keeping with the scope of a qualitative meta-synthesis,^{111 112} studies were not excluded on the basis of quality assessment.^{92 113} Methodological appraisal of individual papers was undertaken using the Quality

Table 1 Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
▶ Primary research conducted in the UK (England, Scotland, Northern Ireland and/or Wales).	▶ International/UK literature reviews, meta-analyses or meta-synthesis and/or grey literature.
▶ Studies employing participatory and/or non-participatory data collection methods within any qualitative, quantitative or mixed methods design.	▶ Quantitative studies not employing qualitative data collection methods.
▶ Studies addressing IP by legislated non-doctor healthcare professionals.	▶ Studies addressing supplementary, dependent and/or collaborative models of prescribing.
▶ Studies addressing primary/community care IP.	▶ Studies addressing secondary care and/or mixed primary and secondary care IP.
▶ Studies presenting empirical evidence of barriers and/or facilitators to IP implementation.	
▶ Studies addressing non-context specific educational programmes for non-medical IP.	
▶ Peer reviewed, full-text articles published between 01 January 2010 and 30 September 2021 in the English language.	
IP, independent prescribing.	

Assessment Tool for Studies with Diverse Designs (QATSDD),¹¹⁴ which has demonstrated validity and test-retest reliability for assessing the reporting and methodological transparency of diverse study designs.¹¹⁵ The tool uses a 4-point scoring system for assessment of qualitative studies (14 questions) and mixed methods studies (16 questions), resulting in total possible scores of 42 and 48, respectively.¹¹⁴ Scoring was undertaken by one reviewer (JE) and any uncertainties were discussed and resolved with a second reviewer (NC). Online supplemental file 2 provides a detailed breakdown of questions and the grading of study manuscripts.

Data extraction

Study data were extracted by one author (JE) to a bespoke table adapted from recommended templates.¹¹⁶ This collated contextual and methodological information, data on barriers and/or facilitators and main findings and was piloted on five index studies to ensure consistency and usability. Data extraction was recursive and involved repeated review/update between ensuing analysis stages.¹¹⁷

Data analysis and synthesis

The aim of thematic analysis was to develop a coherent synthesis of barriers and facilitators that influenced IP across stages of the implementation continuum.^{118–120} Data analysis followed a four stage, iterative process described by Thomas and Harden¹²¹ (table 2). Qualitative ‘data’ referred to participant quotations, (sub) themes, explanations, hypotheses or new theory, observational excerpts and author interpretations.¹²² Barriers were defined as ‘any obstacle (material or immaterial) impeding adoption, implementation and/or sustainability of IP’^{123 124} and facilitators were defined as ‘any

obstacle (material or immaterial) enhancing adoption, implementation and/or sustainability of IP’.^{123 124}

Rigour within the analytical process

To ensure analytical rigour, two independent reviewers (JE and NC) initially performed inductive line-by-line data coding from five highest quality index papers (stage 2). Each reviewer produced sets of open data codes which were compared and discussed. If different codes and/or different interpretations were assigned to a concept, these were discussed and revised. Disagreements were resolved by a third reviewer (MC). Data codes were subsequently grouped into descriptive themes, creating a codebook for application to all papers (stage 3). To identify possible contradictory cases and clarify thematic commonalities within studies,¹²⁵ a matrix of participant quotes was charted to constituent themes (see online supplemental file 3).¹²⁶

Patient and public involvement

The review was conducted as part of a PhD exploring paramedic IP in UK primary care, for which a University service user/carers group was instrumental in informing study design and methods. However, as the systematic review focused on implementation challenges and not patient-related outcomes, the group was not involved in design or conduct.

RESULTS

Out of 5365 original articles identified 23 met inclusion criteria^{127–150} (see figure 1, PRISMA table).

Study characteristics and quality assessment

Table 3 summarises the study characteristics and quality assessment scores of included articles. Studies were undertaken

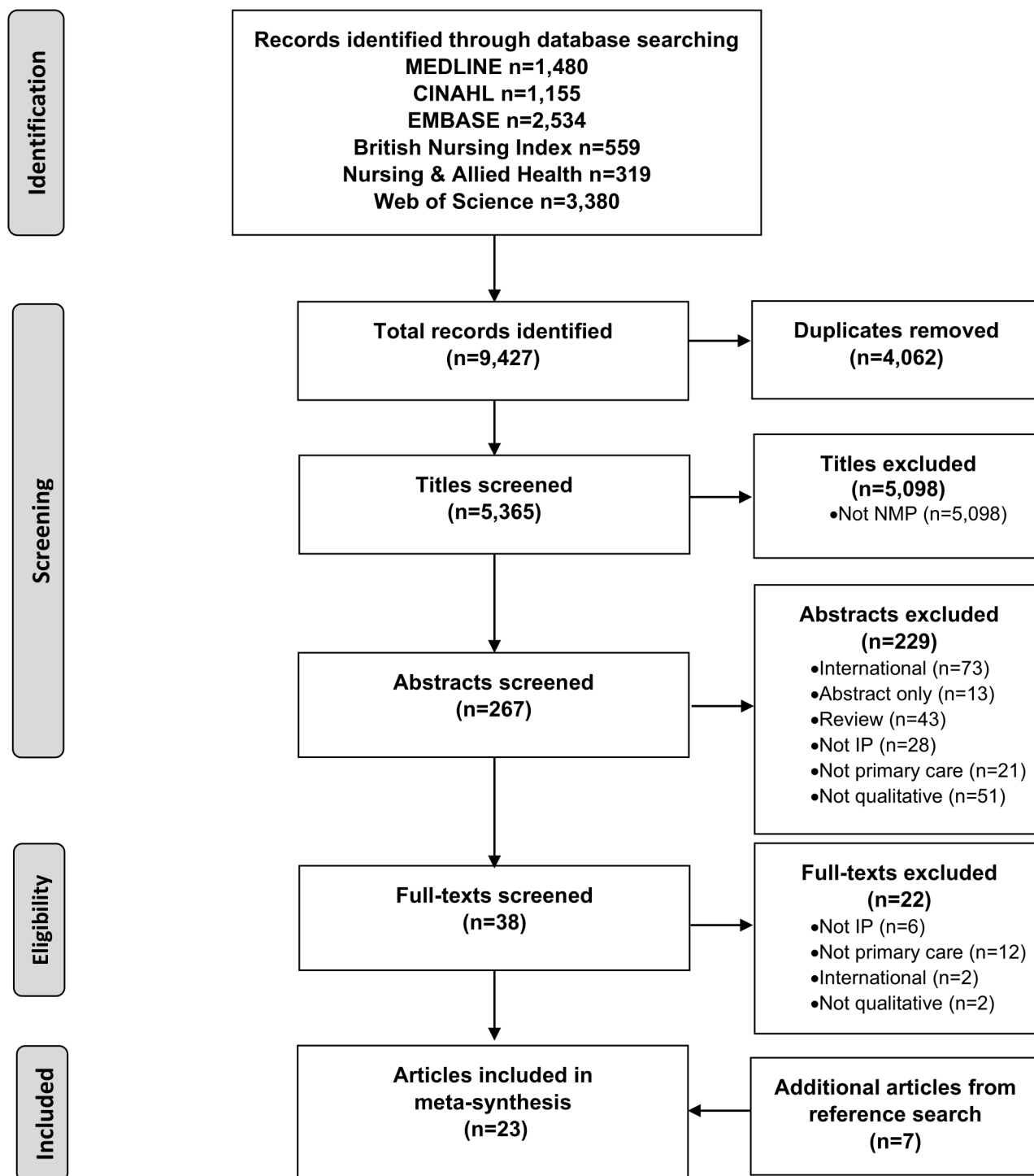


Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses depicting study selection, screening, eligibility for inclusion and synthesis (adapted from Page *et al*).⁹¹ IP, independent prescribing; NMP, non-medical prescribing.

in England,^{129 132 133 136 138 140 141 143 146–150} Scotland^{127 128 130 139} or across devolved UK nations.^{131 134 135 142 144} The representation of independent prescribers from Wales^{131 134} and Northern Ireland^{142 144} was limited. Sixteen studies used qualitative methods,^{127 130 131 133 135–140 144–150} six used mixed methods^{128 129 132 134 141 142} and one employed a qualitative survey.¹⁴³

Fifteen studies addressed nurse IP,^{127–129 132–134 136–140 143 146 148 150} seven included

pharmacists^{130 131 135 142 144 147 149} and one study focused on physiotherapists.¹⁴¹ Where indicated, studies were conducted pre-2011,^{128 129 133 137–139 143 147–149} between 2011–2015^{127 130 132 134 145 146 150} or between 2016–2019.^{131 135 142 144}

All studies reported results from primary care IP implementation; in general practice,^{136–138 143} community domiciliary/residential care,^{132 139 140 142 144 146 150} or mixed general practice/community settings.^{127–131 133–135 141 147 148} Participants included

Table 2 Stages of analysis

Stage 1	In-depth reading and familiarisation with individual papers, data extraction.
Stage 2	Inductive line-by-line coding of highest quality, index papers (n=5) to develop a set of 'open codes' by two independent reviewers (JE and NC).
Stage 3	Codes discussed/agreed, grouped into descriptive themes using NVivo ¹⁸⁹ ; codebook applied to all papers, and expanded/modified by identifying new codes/themes and/or merging/renaming existing codes/themes. ¹⁹⁰
Stage 4	Descriptive themes organised into higher order analytical themes and matrix charted with corresponding indicative quotes.

nurse/pharmacist prescribers,^{130 132 134–137 139 140 146 147 149 150}
 nurse/physiotherapist non-prescribers,^{141 143} nurse non-
 medical prescriber trainees and educational staff,^{127–129}
 service-users^{133 134 138 148} and multidisciplinary team
 members.^{142 144 149 150} Studies explored training,^{127–129}
 IP roles,^{130 136 137 139 146 149} patient accep-
 tance,^{133 138 148} prescribing/medicines optimisation prac-
 tices,^{131 132 134 140 141 150} implementation feasibility¹⁴² and
 barriers and/or facilitators.^{135 143 144 147}

The methodological quality of included studies (see [table 3](#) summary) was average, with a QATSDD mean score 25 (range 13–36), mainly due to seven low scoring studies.^{130 132 137–140 143} Common methodolog- ical weaknesses were: lack of explicit theoretical frame- work,^{130 132 137 138 140 143} limited/absent rationale for choice of analytical methods^{130 132 137–140 143} and lack of reliability assessment for analytical processes.^{130 132 137–140 143} Method- ological strengths of higher scoring studies were: statement of aims/objectives in main body of report,^{128 131 134 135 141 145 150} description of data collection procedures^{128 131 135 141 144 145 147} and fit between research question and method of anal- ysis.^{128 134 135 141 144 145 147 150} Notably studies providing richer contextual descriptions,^{131 135 144 146 147 150} and/ or using implementation theory^{135 144} explored barriers and/or facilitators in greater depth.

Identification of barriers and facilitators and key stages of implementation

Implementation of IP in primary care was found to be complex and influenced by a myriad of organisational service, team and individual stakeholder level barriers and facilitators. Informed by descriptive/data themes, these fell into four major analytical themes, each of which is presented as a key stage in the implementation process as follows:

1. Analytical theme 1: Preparation—organisational readiness for implementation
2. Analytical theme 2: Training—optimising practitioner readiness for IP
3. Analytical theme 3: Transition—ensuring early pre- scribing support

4. Analytical theme 4: Sustainment—maximising and de- veloping IP.

[Table 4](#) provides an overview of analytical themes, associated descriptive/data themes and summative find- ings. Examples of indicative quotations making up these themes are presented in online supplemental file 3. Factors presented within themes acted as barriers and/ or facilitators to implementation, for example, poor managerial support was a barrier, while proactive mana- gerial support and leadership facilitated implementation. It is acknowledged that barriers and facilitators overlap some themes and in some cases are interdependent. For example, lack of mentoring relationships with doctors limited opportunity for informal support, which in turn prevented prescribing competence development and risked loss of prescriber confidence.^{140 147} Therefore, to avoid duplication of findings, barriers and facilitators are presented within the themes deemed most appro- priate, yet their presence and influence is acknowledged elsewhere. Given that the majority of data were derived from studies conducted in England or mixed geograph- ical settings, it was not possible to deduce differences in barriers and facilitators across the devolved UK nations.

Analytical theme 1: preparation—organisational readiness for implementation

This analytical theme refers to barriers and facilitators influential to the planning phase of implementation which related to the service need and relative advantage of implementing IP, the need for consistent managerial leadership and an interprofessional environment that was conducive to team implementation.

Descriptive theme 1.1: clarifying need and advantage of implementing independent prescribing

Identifying shortfalls in existing medicines pathways and how IP could fill service gaps were key steps in this stage. Studies described a highly qualified, specialist nursing and pharmacy workforce delivering unscheduled, sched- uled and out-of-hours services^{130 132–137 139 140 142 144 146 148–150} who routinely made autonomous clinical decisions necessitating prescribing and medicines optimisation skills.^{127 133–135 140 146 148 150} IP held tangible advantage over former methods of accessing prescribed medicines which involved request, referral and/or the counter-signing of prescriptions by doctors. Subject to GP workload^{132 142 144} and constrained availability,^{140 142 144 146} these methods were labour intensive,^{140–142 144 146} inefficient^{136 140 141 146} and burdened services and patients through the need for additional healthcare contacts.^{133 137 139 141 142 146 148} By removing the need for doctor input, IP improved respon- siveness with respect to medicines,^{133 135 139 140 142 144 146 148} enhanced care quality^{130 142 146} and helped prevent adverse outcomes.¹⁴⁰

Lack of team clarity and transparency on IP role intentions were persistent barriers to implementa- tion.^{137 139 140 142 144 146 147 149} Poor team understanding of IP could limit integration,¹⁴⁹ and promote role ambiguity¹⁴⁹

Table 3 Continued

Author(s), year	Country, setting	Study focus, participants	Barriers	Facilitators	QATSDD score
Inch et al (2019) ¹⁴²	England, Scotland, Northern Ireland. Elderly residential care.	Feasibility of implementation. 2 P non-IPs, 4 PIPs, 6 GPs, 16 care home staff. 2 patients, 3 relatives, 1 dietician non-IP.	3, 49	10, 21, 22, 23, 52	54%
Kelly et al (2010) ¹⁴³	England. Gen-P.	Barriers to adoption of IP. 31 practice NIPs, 120 N non-IPs.	1, 2, 3, 9, 13, 35, 36, 42, 45, 50, 51, 53, 54, 55		33%
Lane et al (2020) ¹⁴⁴	England, Scotland, Northern Ireland. Elderly residential care	Barriers and facilitators to prescribing. 27 P non-IPs, 29 GPs, 12 care home staff, 7 patients, 7 relatives.	3, 35, 43, 48, 49	6, 7, 8, 10, 11, 21, 22, 39, 46, 52, 56	78%
Latham and Nyatanga (2018a,b) ^{145,146}	England. Comm pall care.	Views on prescribing role. 6 NIPs.	3, 15, 18, 27, 35, 36, 38, 49, 50, 60	7, 8, 10, 11, 12, 20, 21, 22, 30, 44, 52, 57, 61	71%
Maddox et al (2016) ¹⁴⁷	England. Gen-P; Comm, Nursing homes, Comm pharmacy.	Barriers and facilitators to prescribing. 25 NIPs, 5 PIPs.	3, 15, 16, 26, 27, 29, 35, 37, 42, 48, 62	6, 7, 10, 12, 24, 29, 30, 42, 47, 57, 61	71%
Stenner et al (2011) ¹⁴⁸	England. Gen-P; Comm clinics.	Patient views on nurse prescribing. 41 patients.		11, 22, 23, 29, 39	55%
Weiss et al (2016) ¹⁴⁹	England. Gen-P.	Views on prescribing role. 7 NIPs, 7 PIPs, 7 GPs.	3, 6, 17, 25, 35, 45, 49, 51, 56, 58, 59, 63	3, 6, 8, 11, 12, 22, 24, 29, 39, 44, 46, 47, 63	52%
Williams et al (2018) ¹⁵⁰	England. OOH/unscheduled care.	Factors influencing nurse and GP antibiotic prescribing for respiratory tract infection. 15 NIPs, 15 GPs.	15, 16, 18, 26, 27, 34, 49, 59	6, 12, 22, 23, 24, 28, 32, 41	76%

Barriers: 1=Lack of backfill/protected/study time, 2=Lack of DMP role clarity/supervision/availability, 3=Lack of medical/managerial support/leadership, 14=Lack of national IP incentives/policy initiatives, 15=Lack of clinical record/IT access, 16=Lack of CPD/supervision, 17=IP role isolation, 18=Time/workload constraints, 19=Lack of IP strategy, 25=Lack of interprofessional collaboration/communication networks, 26=Unclear/absent clinical protocols/guidelines, 27=Inappropriate patient/team pressure for prescribing, 33=Lack of local policies for IP, 34=Lack of governance/accountability structures, 35=Lack of team understanding of IP, 36=Lack of clinical/service advantage of IP, 37=Lack of peer support/mentoring, 38=Lack of prescribing confidence/competence, 42=Fear of responsibility/accountability/error, 43=Lack of practitioner specialist skills, 45=Lack of professional/personal adoption incentive, 48=Poor/absent physician relationships, 49=Lack of IP role clarity, 50=Expedient medicines pathways, 51=Prescribing considered outside professional practice scope, 53=Lack of course information, 54=Inconsistent selection policies, 55=Lack of workforce planning, 58=Formulary restrictions, 59=Lack of service user acceptance, 60=Delayed registration post qualification, 62=Lack of medical supervision, 63=Employment model.

Facilitators: 4=DMP role clarity/good DMP supervision, 5=Interprofessional training model, 6=IP role clarity, 7=Established physician relationships, 8=Medical/managerial support/leadership, 9=Professional/personal adoption incentive, 10=Clinical/service advantage of IP, 11=Interprofessional collaboration/communication networks, 12=Peer support/mentoring, 13=Lack of course funding, 20=Prescribing integral to advanced practice, 21=Identified service pathways gaps, 22=Practitioner specialist skills, 23=Consultation time, 24=CPD/supervision, 28=Clinical/professional protocols/guidelines, 29=Prescribing confidence/competence, 30=Exposure to prescribing opportunity, 31=Adequate formulary, 32=National incentives/policy initiatives for prescribing, 39=Service user acceptance of IP, 40=Governance/accountability structures, 41=Audit/feedback on prescribing practice, 44=Good interprofessional relationships, 46=Stakeholder consultation, 47=Team understanding of IP, 52=Clinical record/IT access, 56=Medical supervision, 61=Delineated scope of prescribing competence. Comm, community; CPD, continued professional development; DMPs, designated medical practitioners; Gen-P, general practice; GPs, general practitioners; HEI, higher educational institute; IC, integrated care; IP, independent prescribing; IT, information technology; NIP, nurse IP; N non-IPs, nurse non-IPs; OOH, out of hours; pall, palliative; physio-IP, physiotherapist IP; physio non-IPs, physiotherapist non-IP; PIPs, pharmacist IP; QATSDD, Quality Assessment Tool for Studies with Diverse Designs.

Table 4 Analytical themes and subthemes from included studies, with summative findings

Analytical theme	Descriptive theme	Data theme	Summative findings
Analytical theme 1: Preparation—organisational readiness for implementation	Theme 1.1: Clarifying need and advantage of independent prescribing	Clarifying clinical/service need for independent prescribing	► Establishing a clear service/clinical need for IP ^{128 133 135–137 139 147} and identifying existing gaps in medicines pathways was a key requisite and facilitator for adoption. ^{130 132 141 142 144 146}
		Establishing service pathway gaps	► Team clarity on the need for adoption cemented IP role intentions and avoided role dissonance following implementation. ^{137 140 142 144 147 149}
		Role clarity	► Managerial leadership/support for IP was essential for ensuring initial and on-going infrastructural, funding and other implementation support needs. ^{127–130 132 136 137 139–142 144 146 149}
	Theme 1.2: Managerial leadership and support	Role of managers	► Trusting interprofessional relationships, collaboration/team-working built confidence in IP and facilitated team support for implementation. ^{127 128 131 133 135 137 139 140 144 146 147 149}
		Recognising value	
		Culture	
	Theme 1.3: Interprofessional environment	Inter-professional relationships	
		Communication & collaboration	
Analytical theme 2: Training—optimising practitioner readiness for independent prescribing	Theme 2.1: Selecting the right practitioners	Selection	► Adoption was impeded by inconsistent candidate selection policies and lack of workforce planning. ^{141 143} Individual practitioner expectation of professional/personal benefit remained a key driver for IP adoption. ^{128 130 131 136 137 139}
		Skills and aptitudes	► Skills requisite to IP (eg, physical assessment and communication skills) were important factors influencing service user and team acceptance of IP. ^{133 134 138 142 144 146 148–150}
		Motivation and commitment	► Motivational barriers (eg, lack of remuneration, fear of litigation and competing professional or personal commitments) disincentivised training uptake. ^{136 141 143}
	Theme 2.2: Preparing and supporting practitioners during training	Expectations of training	► Lack of information on NMP training and support for managing competing work, personal/ academic commitments negatively influenced student learning experiences. ^{127–129 143 146}
		Study leave	► Standardised allocation of study leave/backfill/protected time and prepared practice mentors were essential to support learning. ^{127–129 132}
		Designated Medical Practitioners	► Additional training buddying schemes helped students better manage the competing demands of training while working. ¹²⁹
Analytical theme 3: Transition—ensuring early prescribing support	Theme 3.1: Transition as a point of vulnerability	Self-confidence	► Transition was a point of high vulnerability for new prescribers with an initial lack of confidence often under-recognised by teams. ^{135 137 139 140 146 147}
		Minimum competence	► Delineating a minimum scope of practice by restricting formulary and/or using guidelines/protocols facilitated early growth of competence and confidence. ^{136 137 139 140 147 149}
	Theme 3.2: Nurturing confidence and competence	Experience and exposure	► Early exposure to prescribing opportunity, time and structured support systems with medical supervision were essential in transition. ^{127 130–132 134–137 139 146 147}
	Theme 3.3: Transition support needs	Informal and formal support systems	
Analytical theme 4: Sustainment—maximising and developing independent prescribing	Theme 4.1: Service delivery	Impact on workload	► IP could increase workload and imposed time constraints. ^{130 135–137 139 140 146 150} Role underuse was a risk in community settings if infrastructural requisites (eg, electronic prescribing/IT clinical record access) failed to be implemented. ^{130 132 139 140 146 147}
		Role/service expansion	► IP for service redesign and sustainability was facilitated by competence development, CPD opportunity and medical/managerial leadership. ^{130 131 134 137 139 140 142 144 146 147 149 150}
	Theme 4.2: Supporting role development	Continued professional development	► CPD provision and formal evaluation of IP implementation was inconsistent and lacked standardisation in primary care. ^{130 136 140 147 150}
		Evaluation and reflection	► ‘Enhancement’, ‘substitution’ and ‘role specific’ implementation models based on the maintenance or change in prescribing competence, service reconfiguration and/or substitution of services were identified. ^{130 137 139 140 142 144 146 147 149}

CPD, continued professional development; DMPs, designated medical practitioners; GPs, general practitioners; IP, independent prescribing; NMP, non-medical prescribing.

or misuse.^{130 136 140 147} Consultative team stakeholder processes facilitated clarification of current medicines pathways bottle necks,¹⁴⁴ helped cement clinical advantage of IP¹⁴⁴ and encouraged a collective understanding of implementation.^{142 144 149} Conversely, if existing medicines pathways were perceived to be expedient and IP held limited advantage, adoption was less likely.^{141 143}

Descriptive theme 1.2: managerial leadership and support

Lack of managerial leadership and support were highly cited barriers to implementation that persisted across the review decade. Nurse/pharmacist prescribers reported stage specific and ongoing funding,^{128 141 143} training^{129 130 132 136 137 139 140 147} and infrastructural needs^{130 132 139 140 146 147} that extended

across the IP implementation trajectory. Managerial support was, however, frequently reported to diminish post-adoption^{128-130 132 136 137 139-141 143 146 147} and many practitioners believed managers lacked knowledge about IP^{130 136 137 141 143} or misunderstood its potential for improving service quality.^{130 143} Nurses/pharmacists ascribed high value to IP for improving service efficiency^{135 136 139 140 146 147} and skill utilisation,^{130 132 136 140} perceiving it extended clinical knowledge beyond prescribing,^{130 132 140 146} enhanced clinical confidence^{130 137 139 140 146} and job satisfaction,^{136 139 146} and facilitated team education.^{130 142 149} They perceived themselves a unique workforce resource with potential for better mobilisation in under-resourced areas (eg, mental health).¹³⁰ However, there was a perception that management lacked appreciation of primary care workforce aspirations for IP¹⁴³ and overlooked its scope.^{130 141 143} Better recognition and commitment were considered essential for leveraging and driving IP services forward.¹³⁰

Ensuring teams understood IP and its role within care delivery mitigated subsequent barriers^{136 137 140 149} and was critical for implementation success.^{137 139 140 142 144 146 147 149} Doctors, receptionists,^{136 137 149} dispensing pharmacists^{146 149} and peer colleagues^{139 146 147 149} all played supervisory and/or infrastructural roles in IP implementation and understanding the need for this input was essential. While staff clarity on their roles in relation to IP positively influenced willingness to provide enabling supports such as clinical administration,^{136 149} record access¹⁴⁴ and clinical supervision/pharmaceutical advice^{140 146} lack of team understanding of IP was a barrier that was cited repeatedly across the review decade.^{132 136 137 139 140 143 144 146 147 149}

Descriptive theme 1.3: Interprofessional environment

Respectful, trusting interprofessional relationships promoted an appreciation of different professional skill sets,¹⁴⁹ helped ratify the purpose of IP^{127 149} and built team confidence in the prescribing competence of nurses and pharmacists.^{127 140} Good relationships facilitated information transfer,¹⁴⁰ promoted supervision provision,^{147 149} shared learning¹²⁷ and team working.¹⁴⁹ Acceptance and positive attitudes towards IP as a shared skill were facilitative to implementation^{142 144 149} and mitigated the likelihood of 'turf wars' emerging if IP roles was perceived to encroach on professional territories.¹⁴⁹ While many nurses/pharmacists reported positive relationships with doctors,^{137 139 140 146 149} others described jurisdictional tensions over prescribing authority.^{137 143 149} Building trust for IP where relationships were weak took time,¹⁴² and given the important supervisory role of doctors in IP,^{130 132 136 139 140 146 147} consideration of their strength in adoption planning is pertinent. Good communication networks were more likely where established relationships and positive attitudes towards IP prevailed,^{140 149} and were important for imparting information to teams about IP,^{136 142 144} for developing supervision and peer support^{140 146} and promoting teamwork.^{144 149}

Analytical theme 2: training—optimising practitioner readiness for independent prescribing

This analytical theme refers to the extent to which organisations select and prepare the right practitioners for IP training, as well as how they support and maximise students' learning experiences.

Descriptive theme 2.1: selecting the right practitioners

Overall, strategic planning for IP workforce selection lacked scrutiny, and practitioner choice,^{128 130 136} expectation of improved job satisfaction,^{136 143 146} efficiency and patient benefit^{128 136} were the primary drivers for implementation across the review period. Training course drop out¹²⁸ and failure to prescribe following training,^{130 132} suggest a need to ensure selection procedures match skills and capabilities to IP and increase the chances of organisational return on IP training investment. Synthesis identified essential skills^{130 133 135 136 138 146 148 150} and personal motivation^{128 130} as important considerations. Study demographic data indicated a clinically experienced workforce,^{130 136 137 146 147} with degree/higher degree educational and/or specialist skills attainment.^{128 133 140 148} Advanced physical assessment and clinical specialty skills not only suggested expertise and theoretical knowledge to underpin IP but were also recognised by patients as important contributors to care quality.^{133 138 148} Patients reported high levels of confidence in IP led care, with the caveat that prescribers demonstrated knowledge and expertise.^{133 138 148} Good interpersonal, communication, examination, history taking and diagnostic skills were key. These were mandatory for differential diagnosis^{133-135 148 150} and holistic management,^{136 146 150} for conferring practitioner prescribing/non-prescribing decisions^{134 135 150} and managing treatment concordance^{130 133 135 138 144 148 150} and patient expectations for medicines.^{134 135 150} Motivational deterrents to IP uptake that were identified by non-prescribing nurses¹⁴³ and physiotherapists¹⁴¹ were being near retirement,¹⁴³ a reluctance to undertake further advanced training,^{141 143} concerns about training rigour¹⁴¹ and a perception of effort/remuneration imbalance.^{141 143} Although IP job satisfaction and professional benefits were considered future adoption drivers¹⁴³ lack of financial remuneration in particular disincentivised practice nurse¹⁴³ and physiotherapy adoption.¹⁴¹

Descriptive theme 2.2: preparing and supporting practitioners during training

UK non-medical prescribing training programmes employ profession-specific or interprofessional models, delivering 26 days equivalent full-time education alongside a supervised learning in practice period.¹²⁷ Given the onus for safe prescribing, programmes were reported by students and nurse/pharmacist prescribers to be academically rigorous.^{129 146} There was evidence however that students lacked key knowledge about generic training models,¹⁴³ the learning expectations of different pedagogies,¹²⁷ as well as course assessment and portfolio requirements.¹²⁸ Expecting narrower, specialty specific rather



than generic training was common.^{128 146} Students found the academic demands of training while continuing their usual clinical duties challenging indicating a need to better balance work, personal and academic commitments.^{127 129} The degree of allocated support time^{128 129} and the quality of mentoring during supervised practice learning¹²⁷ were key influences on student learning experiences. Adequate study leave, protected time and backfill respectively optimised study time, reduced personal time encroachment and negated the need to absorb usual role duties while training.¹²⁸ Despite organisational requirement to confirm study leave arrangements pre-training, primary care allocation was highly unstandardised, with some students entering training without a confirmed agreement.¹²⁸ Prepared practice mentors with clarity on their role obligations in general provided a higher level of input to students,¹²⁷ and good mentor–student relationships that continued post-training facilitated transition.¹³² Additional training buddying schemes helped students better manage the competing demands of training while working, although time constraints limited their uptake.¹²⁹

Analytical theme 3: transition—ensuring early prescribing support

This analytical theme highlighted the importance of the post-qualification transition period in the development of prescribing confidence/competence and identified a high need for supervision and informal and formal support. Delineating the scope of prescribing competence facilitated early implementation.

Descriptive theme 3.1: transition as a point of vulnerability

Many nurses/pharmacists held vivid memories of anxiety and fear during their first IP encounters,^{137 139 140 146 147} reporting a diminution of self-confidence during the early transition period.^{135 137 139 140 146 147} This finding traversed the review decade and was unrelated to how prepared prescribers felt by training.^{137 146} Heightened awareness of the risks of error,¹⁴⁷ the cautionary approach instilled by training^{137 147} and liability for personal accountability^{139 146} fuelled feelings. It was recognised that self-confidence and competence development were essential for prescribing^{137 147} and mitigated anxiety,¹⁴⁶ but were highly dependent on exposure to prescribing opportunities,^{146 147} time^{137 147} and above all, the level of available support.^{127 132 139 146 147} Without a channel for accessing supervision, nurses/pharmacists could doubt competence, lose confidence and defer from prescribing.¹⁴⁷ This led to a lack of competence development and underutilisation of IP¹⁴⁷ and suggests that greater acknowledgement of transitional developmental needs is necessary.

Descriptive theme 3.2: nurturing competence and confidence

Establishing competence boundaries and recognising personal limitations were important enablers in transition.^{137 147} Nurse/pharmacist prescribers defined competence as the immediate clinical areas in which they had the

knowledge and confidence to prescribe.^{136 137 139 140 147 149} Delineating individual scope of prescribing practice by restricting the range of medicines prescribed to circumscribed clinical areas^{136 140 146 149} in line with clinical guidelines and protocols¹³⁷ encouraged the early development of competence.¹⁴⁷ Alternatively, prescribing outside these boundaries,¹³⁷ as in complex polypharmacy or comorbidity,^{132 140} was deemed risky, unsafe and unprofessional.^{136 147 149} Nurses/pharmacists reported that teams often failed to recognise their self-confidence issues related to competence,¹⁴⁰ and exerted inappropriate expectations for IP.^{132 136 137} Recognising that as a new skill, development of prescribing competence was time and opportunity dependent^{137 146 147} several nurses expressed anxiety that prescribing skills would diminish during transition if not used.¹⁴⁶

Descriptive theme 3.3: transition support needs

Reports of poor transition support pervaded the review decade^{130 132 135 136 139 140 146 147} and there was limited evidence of pre-emptive, formalised supervision provision.¹³² Nurses reported this absence as immediately impactful,¹³⁹ especially in isolated roles and in services with few prescribers.^{130 147} While nurses and pharmacists desired structured and informal supervision,^{140 147} in all seven studies addressing this theme,^{130 132 136 139 140 146 147} most could only access a variable level of informal support. ‘Open door’ contemporaneous advice given by GPs was the primary source, although specialist doctors, peers and pharmacists were also consulted. Team receptiveness to providing this mentoring,¹⁴⁷ its reliability^{135 139} and accessibility^{146 147} were key facilitators. Informal opportunities for discussion provided security¹⁴⁷ and were valued.^{136 139 146 147} Exemplifying barrier interdependence, lack of mentoring relationships with doctors limited opportunity for informal support, prevented prescribing and limited competence with specific medicines or clinical conditions.¹⁴⁷ In turn this necessitated re-engagement of GP referral for prescribing and culminated in inequitable patient medicines management.^{140 147} To address shortfalls in formal support provision, several prescribers set up local peer networks,^{132 136 140} however a strong desire for formalised mentorship was expressed.^{130 136 140 147}

Analytical theme 4: sustainment—maximising and developing independent prescribing

This analytical theme describes barriers and facilitators within the descriptive subthemes of service delivery and supporting role development, which relate to how IP was used and maximised in primary care.

Descriptive theme 4.1: service delivery

Prescribers reported that IP promoted efficient, streamlined services.^{136 137 139 140 142 146} However, views on how it impacted individual practitioner workload differed.^{136 137 139 140 146 147} IP reportedly lengthened consultations,^{130 136} added administrative tasks^{139 146} and increased job-related stress.¹³⁶ Undertaking in-depth

holistic assessment to inform prescribing needs imposed time constraints,^{130 150} which were exacerbated in strict 10-minute clinical allocation systems.^{135 136} Additional time and experience could however be mitigating.^{135 150} Community IPs reported their main workload barriers as administrative and related to absent or incompatible electronic record and prescription generation systems.^{132 139 140 146 147 150} Seeking clinical information caused significant delays, in some cases causing IPs to revert to GP referral for prescribing needs.^{132 139 146 147} However, recent IT accessibility was suggested to mitigate retrieval problems.¹⁴⁴

Attitudes towards role change because of IP also influenced perceptions about workload.^{136 137} Some prescribers perceived that GPs abdicated responsibility for prescribing following introduction of IP¹⁴⁶ which increased workload and job demand.^{136 137} Prescribers negatively referred to this as work offloading,¹³⁷ and were suspicious of underpinning financial motives.¹⁴³ Alternatively, other prescribers viewed the benefits of IP at a broader service level and as an opportunity to reduce GP colleague workforce pressures.^{132 144 146} While GPs in one study stressed that their acceptance of pharmacist IP rested on whether it increased existing workload¹⁴² limited team member involvement within studies precluded synthesis of wider primary care workload impact of IP.

Descriptive theme 4.2: supporting role development

Despite limited contextual detail on workforce planning,^{130 144 149} three broadly categorised ‘models’ of IP implementation were identified. The first ‘*Enhancement*’ model introduced IP to enhance the efficiency of existing nurse/pharmacist roles without changing the pattern of service provision, client group or condition complexity.^{137 139 140 147 149} The second ‘*Substitution*’ model adapted existing IP roles to directly substitute or replace GP services, which required some level of structural re-organisation of care and/or a change in core prescribing competence,^{130 139 142 144 146} (eg, substituting GPs in out-of-hours palliative care services and additionally managing non-cancer terminal illness¹⁴⁶). The final, less frequently evidenced ‘*Role specific*’ model created new roles specifically for pharmacist prescribers, for which geriatric chronic disease and comorbidity management were new areas of competence, and in which pharmacists assumed a transfer of responsibility from GPs for care home medicines management.^{142 144} One study found that the specific models of employment/funding influenced how well IP roles were integrated,¹⁴⁹ with direct GP practice employment as opposed to commissioned Primary Care Trust (PCT) funded roles creating greater sense of permanence, better role use and enhanced team involvement. This was assumed to result from improved relationships, trust and team building.^{142 144}

A strategical top-down approach to implementation of IP was unclear from the reviewed studies, and overall an individual practitioner, bottom-up approach appeared to drive adoption. However, there was some evidence

that where skill mix was recognised and valued within services,^{144 149} CPD was readily available¹⁴⁹ and doctors provided leadership^{137 149} IP was used to greater extent for primary care redesign and service sustainability. Absent policy and national targets restrained IP resource allocation,¹³⁰ while policy and national guidance was facilitative.^{142 144} Doctors also imposed constraints on IP by limiting clinical caseloads,^{137 147} restricting formularies^{132 149} or by retaining sole diagnostic prescribing responsibility for patients.^{130 144} For some prescribers, competence expansion was synonymous with crossing job descriptions and mandated formal negotiation with employers.¹⁴⁷

Provision of CPD overall was inconsistent, untargeted to evolving learning needs,^{136 147} and prescribers identified pharmacology,¹³⁹ statutory drug updates¹³⁶ as key topics. Lack of confidence with heart failure,¹⁴⁰ mental health conditions¹³⁰ polypharmacy and off-label prescribing¹⁴⁷ suggested CPD in comorbidities warranted further input. Trust provision included forums/meetings,^{136 140} commissioned training, national conference attendance^{139 149} and electronic journal resources.¹³⁹ However, provision varied widely and with few prescribers reporting accessible CPD systems,^{136 140} there was agreement that improved implementation was necessary.^{130 136 139 140 147 150}

With time and input to create support systems¹⁴⁰ and enhance communication concerning role boundaries¹⁴⁶ prescribers reported that IP integration improved. However, formal evaluation following implementation was rare,¹³² with only two studies^{135 150} identifying quality assurance activities such as audit and local/national data benchmarking in the context of antibiotic stewardship.

DISCUSSION

The future of UK primary care is reliant on workforce expansion and introduction of new first-contact non-medical roles.^{27 151–154} Ensuring practitioners have the right skills to enable sustainable service development, at scale and pace is key.^{155 156} Recent reports of rising non-medical prescriber numbers in some regions of the UK^{30 79 157} suggest healthcare providers are recognising the value of prescribing for skill-mix and workforce transformation. Ensuring implementation is optimised, sustained and IP roles are maximised for service and patient benefit is essential.

This is the first meta-synthesis evaluating barriers and facilitators to the implementation of IP by non-medical healthcare professionals in primary care. Guided by theory and synthesising factors across a continuum of implementation provides a temporal dimension and insight into three primary ‘enhancement’, ‘substitution’, and ‘role specific’ models of implementation that previous UK systematic reviews lack.^{54 68 69 74} In its infancy in UK primary care non-medical prescribing research,^{135 144 158 159} implementation theory is likely to become increasingly important for informing implementation strategies as the governance arrangements for

extended prescribing rights grow in complexity¹⁵⁷ and the socio-political primary care landscape continues to change.¹⁶⁰

From stakeholders' experiences of implementing IP, barriers and facilitators were identified in four key analytical themes: 'Preparation', 'Training', 'Transition' and 'Sustainment'. While some interdependence and overlap is acknowledged, these themes present a stage based road map of barriers and facilitators for consideration in future implementation.

In the theme 'Preparation', the importance of organisational readiness for implementing IP was reflected by a need for consistent managerial leadership/support, improved team understanding of prescribing role intentions and an interprofessional environment that supports novice prescribers. While nurses and pharmacists considered IP integral to advanced practice and essential to enhance workforce skill utilisation there was concern that it lacked strategic prominence in primary care. Accordingly, the 'Training' theme identified a need for improved managerial recognition of primary care workforce aspirations for IP along with a need to ensure skills and motivations matched those necessary for training. In line with national reports,^{43 46 55} the response to the non-medical prescribing agenda has been sluggish in some UK regions,⁵⁹ with reforms to commissioning either marginalising⁵⁹ or fragmenting its funding.^{110 161} Moreover, in common with national evaluations,^{43 59 162 163} this synthesis identified a continuing practitioner led implementation of IP with largely voluntary uptake. Contrary to secondary care,⁶² there was limited evidence^{142 144} for policy driven service design or targeted strategy embedding IP within career or service pathways. This suggests a disjointed approach to implementation that may reflect the rapidly changing policy and service context of UK primary care.¹⁶⁴⁻¹⁶⁶ However, with a third of the non-medical general practice workforce near retirement age,¹⁶⁷ and succession of IP roles lacking guarantee,¹⁴⁹ sustainability of non-medical prescribing capability is a key concern for future management of primary care patient medicines needs.¹⁶⁸

Transition was identified as a key stage in implementation that warrants greater scrutiny and has resonance for professions such as paramedics who are new to prescribing. While its affective nature^{169 170} and need for bespoke support systems has been previously recognised,^{171 172} few studies have specifically sampled novice prescribers^{170 173} to ascertain optimal supervisory requirements.¹⁶⁹ Despite extension of IP rights to optometrists, physiotherapists, radiographers, podiatrists and paramedics over the past 13 years, focus on implementation issues during transition within each profession has been limited.^{43 174 175} This is likely to be especially important for paramedics who, awarded IP rights in 2018 have not been subject to the supplementary prescribing lead in period that characterises other professions¹⁷⁶ and who are historically less well established in the primary care workforce.^{177 178} Early data suggesting challenges around role isolation, team

expectations of paramedic IP and lack of legislative parity for controlled drugs warrants further exploration to determine whether paramedics too, face similar barriers identified by this review.^{175 179}

In common with other UK reviews,^{68 69} limited overall focus on long-term sustainability or strategy for implementation at either local, regional or national level was found. This was echoed by the dominance of the 'enhancement', as opposed to 'role specific' implementation models identified and may reflect the multiple changes made to policy,¹⁸⁰ leadership¹⁸¹ and commissioning¹⁸² and the ongoing embedding of new governance structures within primary care.¹⁸³ Of note, despite finding a need for more cohesive managerial support that extends across the entire implementation trajectory, minimal reference was made to the championing and change agent functions of non-medical prescribing leads.^{171 172} The Department of Health has long recommended implementation of non-medical prescribing under direction of a designated lead with strategic, operational and governance footholds.³³ A lack of representation in recent regional research¹⁵⁷ supports the tenet that many of these roles were not replaced in England following the abolition of primary care trusts.¹⁷² Successful implementation is more likely when champions are fully organisationally supported¹⁸⁴ and provide sustained input to implementation activities.^{171 185 186} However, a lack of role infrastructure, clarity and designated time,^{157 172} along with the increasingly diverse non-medical prescribing workforce is challenging this important role. While other models of primary care workforce mentoring show promise,¹⁸⁷ the repetition and frequency of barriers exposed by this synthesis over the review decade indicate urgent need for a more cohesive approach to supporting IP.

Strengths and limitations

This review strengthens the UK evidence base by identifying challenges to IP implementation in traditional and contemporary primary care contexts. Using comprehensive search strategies and robust analysis methods, it highlights factors during 'Preparation', 'Training', 'Transition' and 'Sustainment' stages and models of implementation which can be used by practitioners and policymakers to identify areas for improving implementation support.

Although limited to UK literature, the theoretical lens ensured focus on common factors known to facilitate implementation (eg, the need for leadership and championing) which are generalisable to any implementation context, either in the UK or internationally. We did not however include grey literature and although qualitative synthesis enabled rich description of elements perceived by stakeholders to influence implementation of IP in the UK, reviews that include quantitative literature in primary care are encouraged. Our focus on primary care excluded barriers and facilitators that may be unique to acute care and other settings. Moreover, as the non-medical prescribing agenda is disseminated across the NHS, it will be increasingly important to consider the theoretical

basis for developing strategies to achieve more successful implementation of this complex innovation in different professions.^{67 119 188}

CONCLUSION

Globally, healthcare systems are implementing strategies to address workforce deficits that enhance the skills of nurses, pharmacists and other non-medical healthcare professionals. Integral to advanced scope of practice, it is imperative that IP capability is optimised through successful implementation. This meta-synthesis has identified persistent barriers at the ‘Preparation’, ‘Training’, ‘Transition’ and ‘Sustainment’ stages of implementation. A more coordinated and targeted approach to overcome barriers identified in these stages is key to ensuring that IP is an effective approach to helping alleviate workforce shortfalls in the UK, and around the world.

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Contributors JE and NC conceived the study. JE obtained funding, oversaw all aspects of the project and contributed to all stages. JE drafted this paper. JE designed and executed all the searches, data extraction, coding and quality appraisal. NC contributed to all stages of the review, including data extraction and coding. MC and NC contributed to the evolving synthesis and formulation of conclusions. JE is the guarantor of the paper.

Funding This work was supported by a University of Surrey Doctoral Scholarship 2018–2021 award (6522700).

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement No data are available. No additional data are available.

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SupplementaryFile1_V2.0_19112021

Supplementary File 1. MEDLINE search string

EBSCO host; MEDLINE		
1	(MM "Family Practice")	42,149
2	(MM "Primary Health Care")	52,315
3	(MM "Physicians, Family")	11,183
4	(MH "Community Health Nursing")	19,640
5	(MH "Community Health Workers")	5,502
6	(MH "Community Health Services")	32,035
7	(MH "Community Health Centres")	34,071
8	TI (community N1 health) OR AB (community N1 health)	41,477
9	TI (community N1 care) OR AB (community N1 care)	13,601
10	TI (primary N1 health) OR AB (primary N1 health)	28,349
11	TI (primary N1 care) OR AB (primary N1 care)	138,944
12	TI (general N1 practice*) OR AB (general N1 practice*)	45,549
13	TI (general N1 practitioner*) OR AB (general N1 practitioner*)	53,594
14	TI (family N1 practice*) OR AB (family N1 practice*)	10,921
15	TI (family N1 practitioner*) OR AB (family N1 practitioner*)	2,955
16	TI (gp N1 practice*) OR AB (gp N1 practice*)	2,067
17	TI (gp N1 service*) OR AB (gp N1 service*)	433
18	TI (gp N1 clinic*) OR AB (gp N1 clinic*)	341
19	OR/1-18	343,938
20	TI prescrib* OR AB prescrib*	153,174
21	TI independent prescrib* OR AB independent prescrib*	508
22	TI non-medical prescrib* OR AB non-medical prescrib*	208
23	OR/20-22	153,174
24	TI nurs* OR AB nurs*	460,786
25	TI physiotherap* OR AB physiotherap*	26,543
26	TI pharmacist* OR AB pharmacist*	34,354
27	TI (podiatr* OR chiropod*) OR AB (podiatr* OR chiropod*)	3,274
28	TI radiographer* OR AB radiographer*	1,746
29	TI (dietician* OR dietician*) OR AB (dietician* OR dietician*)	7,306
30	TI paramedic* OR AB paramedic*	7,958
31	TI optometr* OR AB optometr*	3,584
32	OR/24-31	533,864
33	23 AND 32	12,932
34	TI nurs* N1 prescrib* OR AB nurs* N1 prescrib*	1,054
35	TI pharmacist* N1 prescrib* OR AB pharmacist* N1 prescrib*	751
36	TI physiotherap* N1 prescrib* OR AB physiotherap* N1 prescrib*	105
37	TI paramedic* N1 prescrib* OR AB paramedic* N1 prescrib*	4
38	TI podiatr* N1 prescrib* OR AB podiatr* N1 prescrib*	15
39	TI chiropod* N1 prescrib* OR AB chiropod* N1 prescrib*	2
40	TI dietician* N1 prescrib* OR AB dietician* N1 prescrib*	18
41	TI dietitian* N1 prescrib* OR AB dietitian* N1 prescrib*	3
42	TI radiograph* N1 prescrib* OR AB radiograph* N1 prescrib*	61
43	TI optometr* N1 prescrib* OR AB optometr*N1 prescrib*	14
44	OR/34-43	1,985
45	33 OR 44	12,993
46	19 AND 45	2,417
47	LIMITS Full Text, Published 20100101-20201231, Peer-reviewed, English language	1,480

SupplementaryFile2_V2.0_19112021

Supplementary File 2. Quality Assessment Tool for Studies with Diverse Designs scores

	Afseth & Paterson 2017	Boreham 2013	Bowskill 2014	Brodie 2014	Carter 2021	Cole & Gillett 2015	Courtenay 2010	Courtenay 2017	Courtenay 2019	Cousins & Donnell 2012	Daughtry & Hayter 2010	Dhalivaal 2011	Downer & Shepherd 2010	Herklots 2015	Holden 2018	Inch 2019	Kelly 2010	Lane 2020	Latham & Nyatanga 2018a,b	Maddox 2016	Stenner 2011	Weiss 2016	Williams 2018
Explicit theoretical framework	3	1	0	0	3	0	1	0	3	1	0	0	3	0	3	0	0	3	3	0	0	0	3
Statement of aims/ objectives in main body of report	3	3	3	2	3	3	2	3	3	2	3	2	3	3	3	3	3	2	3	2	3	3	3
Clear description of research setting	3	3	3	2	3	2	3	2	3	3	3	2	1	2	2	3	2	3	3	2	3	3	2
Evidence of sample size considered in terms of analysis	0	0	0	0	1	0	0	0	2	3	0	3	0	1	3	3	1	1	2	3	0	0	0
Representative sample of target group of a reasonable size	2	3	3	2	2	3	3	3	2	3	1	2	0	1	3	3	3	3	1	3	3	3	3
Description of procedure for data collection	3	3	3	2	3	1	2	2	3	3	2	2	2	2	3	1	1	3	3	3	3	3	2
Rationale for choice of data collection tool(s)	2	2	0	0	2	0	0	2	3	1	0	2	3	0	2	0	0	3	3	2	0	0	0
Detailed recruitment data	2	2	3	1	3	2	3	2	3	2	2	3	1	2	3	3	2	3	3	3	3	3	3
Statistical assessment of reliability & validity of measurement tool(s) (Quan)	n/a	0	2	n/a	n/a	0	n/a	0	n/a	n/a	n/a	n/a	n/a	n/a	2	0	0	n/a	n/a	n/a	n/a	n/a	n/a
Fit between stated research question & method of data collection (Quan)	n/a	3	3	n/a	n/a	1	n/a	2	n/a	n/a	n/a	n/a	n/a	n/a	3	3	0	n/a	n/a	n/a	n/a	n/a	n/a
Fit between stated research question & format & content of data collection tool (Qual)	1	3	2	2	3	1	0	3	3	0	0	2	0	0	2	1	0	3	1	1	0	3	2
Fit between research question & method of analysis	3	3	3	2	2	1	3	3	3	3	3	0	3	3	3	1	2	3	3	3	3	3	3
Good justification for analytical method selected	1	2	0	1	2	0	0	2	2	0	0	0	3	2	2	0	0	2	3	1	0	0	2
Assessment of reliability of analytical process (Qual)	0	2	0	1	1	0	3	2	0	3	0	0	0	0	0	0	0	0	0	3	3	0	3
Evidence of user involvement in design	3	2	2	0	2	0	0	3	1	0	0	0	0	0	0	3	2	2	0	1	0	0	3
Strengths & limitations critically discussed	2	0	2	1	3	0	1	3	3	1	1	0	1	2	2	2	0	3	2	3	2	1	3
Total	28	32	29	16	33	14	21	32	33	25	15	18	20	18	36	26	16	33	30	30	23	22	32
Max score possible	42	48	48	42	42	48	42	48	42	42	42	42	42	42	48	48	48	42	42	42	42	42	42

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Supplementary File 3 – Analytical themes and sub-themes showing link of indicative quotations to barriers and facilitators

Analytical Theme	Descriptive Theme	Data theme	Indicative quotations	Barriers/facilitators
Analytical theme 1: Preparation – organisational readiness for implementation	Theme 1.1: Clarifying need & advantage of independent prescribing	Clarifying clinical/service need for IP	<ul style="list-style-type: none"> • “You’re not waiting for medics to .. do your prescribing, you can do it as an autonomous practitioner ...the most crucial aspect of it—continuity of care.”⁽¹⁾ • “I’m not sure that the qualification would improve my level of patient care [Doctors] sign scripts as required.”⁽²⁾ 	F - Clinical/service advantage of IP. B - Lack of clinical/service advantage of IP.
		Establishing service pathway gaps	<ul style="list-style-type: none"> • “Because I have to write, send it to the GP, it has to land on the GP’s desk, then the patient has gotta make an appointment to see that GP, then the prescription comes from the GP, and then they go and fulfil that prescription, and then make an appointment to come back and see me.”⁽³⁾ • “I feel reasonably comfortable that we can manage them ..by directing them to the pharmacist or the GP. I don’t feel that it’s particularly hampering my treatment....”⁽³⁾ • “A viable (pharmacist) IP service would depend on successfully addressing the many points in the circuit of prescribing where it can go wrong.”⁽⁴⁾ 	F - Identified service pathway gaps. B - Expedient medicines pathways
		Role clarity	<ul style="list-style-type: none"> • “When I start working in a practice, I tend to try and agree ground rules, or, rules of engagement....about what it is they want me to do, and if they’re fairly broad, then that’s okay, in some cases they’re fairly narrow..”⁽⁵⁾ • “So basically our p-formulary [personal formulary] has to match up with what we’re doing, and .. that’s when you say, ‘actually no, I’m not prescribing tramadol ‘or I am not prescribing whatever they’re asking for.”⁽⁵⁾ • “I don’t think all our colleagues are clear about non-medical prescribing.”⁽⁶⁾ • “I think as soon as they (reception staff) realize you can prescribe they expect you to be able to do exactly what doctors can do. They don’t understand your limitations....”⁽⁷⁾ 	F - IP role clarity F - Team understanding of IP B - Lack of IP role clarity B - Lack of team understanding of IP
	Theme 1.2: Managerial leadership and support	Role of managers	<ul style="list-style-type: none"> • “I phoned up for advice...but she (manager) really didn’t know... Anything I knew, I knew myself.”⁽⁸⁾ • “I’ve had nothing but support. They created a consulting room for me, put all the systems in place, the diagnostics, even putting notices in the notice-board for the first year or two so the patients were aware. And the staff were all made aware of it, we have practice meetings, the practice nurse was consulted.”⁽⁹⁾ • “I know I wouldn’t get the support from work for their funding...I would do it, but it’s funding”⁽³⁾ • “I was challenged the other day ... to ask why I hadn’t written end of life charts ...and I wouldn’t do it because I did not have enough medical information about that patient.”⁽¹⁰⁾ 	F – Medical/managerial support/leadership. F - Stakeholder consultation F - Clinical record/IT access B - Lack of medical/managerial support/leadership. B – Lack of course funding. B - Lack of clinical record/IT access
		Recognising value	<ul style="list-style-type: none"> • “We probably weren’t prepared to remunerate her [nurse prescriber] as much as she thought she should be, because partly in our eyes she wasn’t going to be doing that much extra.”⁽⁹⁾ • “It’s just like having another partner who can deal with certain conditions, 	F - Medical/managerial support/leadership.

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Analytical Theme	Descriptive Theme	Data theme	Indicative quotations	Barriers/facilitators
		Culture	<p><i>and who also works as a nurse within the practice.</i>⁽⁹⁾</p> <ul style="list-style-type: none"> • <i>"I can't imagine how anyone can do our jobs without being a prescriber now ... it has given me another layer of knowledge and, the other side of it is, if you're advising people, you should have that knowledge."</i>⁽¹⁾ • <i>"... I mean if you want to be a doctor, be a doctor, if you want to be a nurse, be a nurse, but if you're a nurse you can't do nice bits of doctoring that you feel...."</i>⁽⁹⁾ • <i>"In some surgeries generally the nursing team can feel a bit threatened by having pharmacist prescribers, It's about identifying our different areas of expertise and.. working together."</i>⁽⁹⁾ 	<p>B - Lack Medical/managerial support/leadership.</p> <p>F - Prescribing integral to advanced practice.</p> <p>B - Prescribing considered outside professional practice scope</p>
		Inter-professional relationships	<ul style="list-style-type: none"> • <i>"... they've got a good skill mix, so everyone's got their slightly different areas of expertise..." So quite often the doctors will still ring me and say – or pop in and say – what do you recommend for this, what are we supposed to be prescribing for this?"</i>⁽⁹⁾ • <i>"...the engagement from Doctor... as the sort of the overall lead GP for that care home, was very disappointing".</i>⁽¹¹⁾ • <i>"It was building that trust that you could do it, and you...were competent...you observed safety aspects."</i>⁽¹²⁾ 	<p>F - Established physician relationships.</p> <p>F - Good inter-professional relationships</p> <p>B - Poor/absent physician relationships</p>
		Communication & collaboration	<ul style="list-style-type: none"> • <i>"We have regular clinical meetings as a practice – myself, the GPs and the nurse. And then we also have multidisciplinary meetings every 6–8 weeks."</i>⁽⁹⁾ • <i>"I don't really feel they'd (GPs) listen to me...they'd be like, well, we're GPs, we're the partners here, we make the decisions and that's final really. I do feel it's a fait accompli here...this is the way this place has been run for a long, long time."</i>⁽⁹⁾ 	<p>F - Inter-professional collaboration/communication networks.</p> <p>B - Lack of inter-professional collaboration/communication networks.</p>
Analytical theme 2: Training – optimising practitioner readiness for independent prescribing	Theme 2.1: Selecting the right practitioners	Selection	<ul style="list-style-type: none"> • <i>"I presume I need to do a minor illness course first, which my GP has not agreed to for last three years."</i>⁽²⁾ • <i>"I wanted to do the nurse prescribing course for two years .. my employing GPs will not support me, even though all my work is in extended or advanced role."</i>⁽²⁾ 	<p>B - Inconsistent selection policies</p> <p>B - Lack of workforce planning.</p>
		Skills & aptitudes	<ul style="list-style-type: none"> • <i>"You have to be competent, not only with your history taking... but examination skills; you have to be able to relate those findings... to the patient in a language that they can understand."</i>⁽¹³⁾ • <i>"I think that is very important that they don't skimp. When I come in she'll take my weight, do my feet, do my blood pressure, want to know when I last had my eyes checked. .. I have all the blood tests done, and we go through those, what's wrong, what's right."</i>⁽¹⁴⁾ • <i>"I would definitely come back to see the nurse prescriber again; I don't</i> 	<p>F - Practitioner specialist skills</p> <p>F - Service user acceptance of IP.</p> <p>B - Lack of practitioner specialist skills.</p>

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Analytical Theme	Descriptive Theme	Data theme	Indicative quotations	Barriers/facilitators
			<i>see that there's any difference really between seeing the doctor or the nurse prescriber. The nurse prescriber seems to have just as much knowledge as the doctor...</i> ⁽¹⁵⁾	
		Motivation & commitment	<ul style="list-style-type: none"> •<i>"I don't think we get paid enough to make those decisions."</i>⁽³⁾ •<i>"I have undertaken a large amount of further training ..with very little financial remuneration.. in my leisure time, to the exclusion of leisure activities. Eventually, one would hope for some incentive beyond job satisfaction."</i>⁽²⁾ •<i>"The patients are aware of your skills and they know you're making decisions and prescribing for them. It gives you a sense of satisfaction."</i>⁽⁶⁾ •<i>"For me prescribing right does carry a lot of accountability and responsibility and .. I'm not sure that's something I'd want to take on board."</i>⁽³⁾ 	F - Professional/personal adoption incentive B - Lack of professional/personal adoption incentive B - Fear of responsibility/accountability/error
	Theme 2.2: Preparing and supporting practitioners during training	Expectations of training	<ul style="list-style-type: none"> •<i>"Reassurance that I could do [the course] with present qualifications or what I need to do to obtain these before I do the prescriber's course."</i>⁽²⁾ •<i>"Nurses that have done course say [very] intense and difficult."</i>⁽²⁾ •<i>"Need info about what it involves, assessment, funding etc. Also general career advice."</i>⁽²⁾ 	B - Lack of course information.
		Study leave	<ul style="list-style-type: none"> •<i>"As much as I would like but there be no-one doing my work while I am away...have to catch up."</i>⁽¹⁶⁾ •<i>"I plan to do asthma training and then like to do minor illness training, but when I do I will have to do most of it in my own time – this puts me off nurse prescribing."</i>⁽²⁾ 	B - Lack of backfill/protected/study time
		Designated Medical Practitioners	<ul style="list-style-type: none"> •<i>"I think when we did our prescribing training ... some of us had a lot of very .. proactive support from the medical mentors and some of us had less than that."</i>⁽¹⁰⁾ •<i>"I had to educate (DMP).. on how the course works."</i>⁽¹⁷⁾ •<i>"...I think the two of us were kind of floundering a bit ... we still had slightly differing ideas as to what competency meant."</i>⁽¹⁷⁾ 	F - DMP role clarity/good DMP supervision. B - Lack of DMP role clarity/supervision/availability.
Analytical theme 3: Transition - ensuring early prescribing support	Theme 3.1: Transition as a point of vulnerability	Self-confidence	<ul style="list-style-type: none"> •<i>"When you've done the course, you lose a lot of confidence, because you learn a lot more about, you know the dilemmas and the ethics of prescribing... so, then, it's actually harder to prescribe (it) independently."</i>⁽⁵⁾ •<i>"In some ways, it's like motherhood I think, you feel adequately prepared and then it happens and I think oh my goodness, this is bigger than I thought..."</i>⁽¹⁾ •<i>"I think they [doctors] sort of assume sometimes that we know more than we do, and I think they assume we have huge confidence in our skills when we don't..."</i>⁽¹²⁾ 	F - Prescribing confidence/competence. B - Lack of prescribing confidence/competence.
	Theme 3.2: Nurturing confidence	Minimum competence	<ul style="list-style-type: none"> •<i>"I have quite a limited range that I feel confident doing, using and I haven't gone outside it..."</i>⁽¹²⁾ •<i>"I think you have got to realize your limitations and put a stop on it when you feel your skills aren't adequate."</i>⁽⁷⁾ 	F - Delineated scope of prescribing competence F - Clinical/professional protocols/guidelines.

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Analytical Theme	Descriptive Theme	Data theme	Indicative quotations	Barriers/facilitators
	and competence		<ul style="list-style-type: none"> • "I do know where my competencies are and where my weaknesses are, and I don't sort of go beyond my scope of practice."⁽⁹⁾ • "I suppose virtually everything that I see and talk about is influenced by NICE in the first instance, and the relevant NICE guidance, whatever it might be."⁽¹⁸⁾ • "I'm happy with exacerbations and chest infections, so, like UTIs [urinary tract infections] and wound infections, but anything that's going beyond that I just don't feel confident in myself to be going out and doing that."⁽¹²⁾ 	F - Adequate formulary B - Inappropriate patient/team pressure for prescribing B – Unclear/absent clinical protocols/ guidelines
		Experience & exposure	<ul style="list-style-type: none"> • "The first time I had to ask the GP if I was actually on the right lines.. It's not as difficult the second and the third and the fourth time."⁽⁸⁾ • "It's like learning to drive and then the first time you actually go out without someone sat by you ..."⁽¹⁾ • "Most of my colleagues have stuck with their original prescribing competence. I reacted to questions that were being asked – could you do X? So I thought, well, could I do X? And I've then made myself competent in that particular area."⁽⁹⁾ • "...as I've become more experienced. . . I'm more aware now, I suppose, of the – the complexities of certain patients."⁽¹⁹⁾ 	F - Exposure to prescribing opportunity B - Delayed registration post qualification
	Theme 3.3: Transition support needs	Informal & formal support systems	<ul style="list-style-type: none"> • "I suppose the bottom line is I don't get any formal support. I mean, I get support in an informal way from GPs and the consultant and my colleagues."⁽¹²⁾ • "There are times when .. it's slightly more complex, so .. I'll go and get some advice.. I think it's really important to function in this way."⁽⁹⁾ • "If I am in any whatsoever doubt then I just buzz through to the GP (family physician)."⁽⁵⁾ 	F – Medical supervision. B – Lack of medical supervision.
Analytical theme 4: Sustainment - maximising and developing independent prescribing	Theme 4.1: Service delivery	Impact on workload	<ul style="list-style-type: none"> • "A big disadvantage is that a lot of doctors have offloaded their work on to us. Workload has increased so much and you have to go to a lot of meetings, often in your own time".⁽⁷⁾ • "We're really, really fortunate here. . . our appointment times, if you're booked into the nurse clinic, they're half-hour appointments, so we can really spend time providing the education and explaining why we're not giving antibiotics."⁽¹⁹⁾ • "Oh, it has changed dramatically. Workload had trebled. We see most of the minor ailments. We have taken a lot more on—the more knowledge you get the higher the workload. We do all medication reviews and all hypertension reviews."⁽⁷⁾ • "Non-medical prescribing consultations—the time tends to be much longer."⁽²⁰⁾ 	F - Consultation time. B - Time/workload constraints.
	Theme 4.2: Supporting IP role development	Role/service expansion	<ul style="list-style-type: none"> • "I don't see how that (mental health NMP scope extension for benzodiazepine management) could happen with the QOF (Quality and Outcomes Framework) targets ... For (mental health) there's not a target ... so I genuinely don't think it's going to become part of the practice nurses remit."⁽²⁰⁾ • "I'd like to put my name somewhere regularly along with the doctors... so 	F – Employment model. F - National incentives/policy initiatives for IP B – Employment model. B - IP Role isolation.

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Analytical Theme	Descriptive Theme	Data theme	Indicative quotations	Barriers/facilitators
			<p><i>I'm there...part of the surgery. But because ... I'm not employed by the surgery, other than being extra, additional help occasionally... it kind of leaves me in a bit of no-man's land.</i>⁽⁹⁾</p> <ul style="list-style-type: none"> • <i>"It's altered my role quite in depth ... We see anything from an ingrown toenail to somebody with chest pain. In the afternoon we work on an appointment basis, running chronic disease .. and weight management clinics."</i>⁽⁷⁾ • <i>"I found myself being given referrals for much more complex problems than perhaps I had been given before. I found myself in the position where GPs were actually expecting me to initiate treatment or to suggest what treatment they might give."</i>⁽⁸⁾ • <i>"I have learnt over the years... extending my scope of practice as I felt more confident, and then went and sort of commissioned training or shadowed somebody, just so that I can improve my competencies and take on more of the long-term conditions and manage them in general practice."</i>⁽⁹⁾ 	<p>B – Lack of national incentives/policy initiatives for IP B - Lack of local policies for IP</p>
		Continued professional development	<ul style="list-style-type: none"> • <i>"Expanding your prescribing may be difficult, not because of your knowledge of the drugs, but because there's no training at a good enough level for the other stuff, .. how do you become competent to treat osteoporosis, there are no courses."</i>⁽⁵⁾ • <i>"I don't think I have increased my scope over the years; to be frank."</i>⁽¹²⁾ • <i>"Most of my colleagues have stuck with their original prescribing competence. I reacted to questions ... could you do X?... And I've then made myself competent..."</i>⁽⁹⁾ • <i>"...what I would love is to sort of have a week or two a year when I was buddied up with a doctor, and he/she made me do all the prescribing. It would be terrifying but it would really make me learn."</i>⁽¹²⁾ • <i>"We take group learning very seriously, we have clinical catch up ... where if anyone has found any new exciting evidence or guidelines or examples of good practice we do tend to talk inter-professionally."</i>⁽¹⁸⁾ 	<p>F - CPD/supervision B - Lack of CPD/supervision</p>
		Evaluation & Reflection	<ul style="list-style-type: none"> • <i>"...it's something that's a .. priority.. for me and my team here, so we're doing a lot of work ..., both in terms of auditing, so we understand how much prescribing's going on. We also are looking at appropriateness of prescribing, so auditing case notes against the local guidelines and providing feedback to prescribers...So it's high up on our agenda."</i>⁽¹⁹⁾ • <i>"No. I haven't had a prescribing update. Even trying to get an update on how to use your British National Formulary, any new drugs, is difficult."</i>⁽⁶⁾ • <i>"[W]e have a training session, like an audit with the local CCG team, in relation to our practices antibiotic prescribing and comparing it to the area in the north west... so that kind of helped influence .. my antibiotic prescribing."</i>⁽¹³⁾ • <i>"...we don't as a group kind of get together... as clinicians and feeding</i> 	<p>F - Audit/feedback on prescribing practice. B - Governance/accountability structures B - Lack of governance/accountability structures</p>

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Analytical Theme	Descriptive Theme	Data theme	Indicative quotations	Barriers/facilitators
			<i>back information, events that have happened ... significant events ... we don't have joint CPD.</i> ⁽¹⁸⁾	

CCG – clinical commissioning group, CFIR – Consolidated Framework for Implementation Research, CPD – continued professional development, DMP – designated medical practitioner, DOI – Diffusion of Innovations, IP – independent prescribing.

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