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TITLE

Multiplicity and complexity: a qualitative exploration of influences on prescribing in UK general practice

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ABSTRACT

Objectives

Despite widespread availability of evidence-based guidelines to inform rational use of medicines, considerable unwarranted variation exists in prescribing. A greater understanding of key determinants of contemporary prescribing in UK general practice could inform strategies to promote evidence-based prescribing. This study explored (1) current influences on prescribing in general practice and (2) the role and potential of general practice-based pharmacists (PBPs) to promote greater engagement with evidence-based prescribing.

Design

Semi-structured, telephone interviews and a focus group were conducted, audio-recorded and transcribed verbatim. Thematic analysis was undertaken.

Participants

(i) General practice prescribers: General Practitioners (GPs), PBPs, nurses.
(ii) Key informants: National Health Service (NHS) employees with responsibility for influencing, monitoring and measuring general practice prescribing.

Setting

General practices and NHS organisations in England.

Results

Interviews with 17 prescribers (GPs (n=6), PBPs (n=6), nurses (n=5)) and six key informants, and one focus group with five key informants were undertaken between November 2018 and April 2019. Determinants operating at individual, practice and broader area levels impacted prescribing and guideline use. Prescribers' professional backgrounds e.g. nursing, pharmacy, patient populations and patient pressure were perceived as substantial influences, as well as media portrayal and public perceptions of medicines.

Prescribers identified practice-level determinants of prescribing, including practice culture and shared beliefs. Key informants tended to emphasise higher-level influences, including NHS policies, availability of support and advice from secondary care and generic challenges associated with medicines use e.g. multi-morbidity.

Participants expressed mixed views about the potential of PBPs to promote evidence-based prescribing in general practice.

Conclusion

Prescribing in UK general practice is influenced by multiple competing factors. Strategies to promote evidence-based prescribing should target modifiable influences at practice and individual levels. Customising strategies for prescribers from a range of professional backgrounds may maximise their effectiveness.

Keywords

General practice, guideline, evidence-based, pharmacist, qualitative research

ARTICLE SUMMARY

Strengths and limitations of this study

- This study explored a wide range of perspectives, including:
  - General practice prescribers from three different professional groups (doctors, pharmacists and nurses)
  - Key informants working at various levels within the NHS, encompassing a range of roles and responsibilities
- The interview/focus group topic guides were developed flexibly to allow for exploration of additional topics
- This study investigated the use of guidelines in general; research to explore the uptake of guidelines for specific medical conditions may reveal a different picture

INTRODUCTION

Medicines are the most common intervention used within the NHS [1]. They are vital to the prevention and treatment of illness, maintenance of health and management of chronic conditions. NHS expenditure on medicines is eclipsed only by the staff budget [2]. Despite annual increases in spending to £17.4 billion (2016/17) [3], there is substantial evidence that medicines are not always used judiciously [4 5], with considerable unwarranted variation in practice [6 7] and sub-optimal patient outcomes [8 9].

Non-medical prescribing was introduced in the UK to improve patient access to medicines, optimise skills of qualified health care professionals and reduce doctors' workloads. It was first introduced as supplementary prescribing in 2003, whereby the medical prescriber retained some control, and then as independent prescribing in 2006. There are approximately 30,000 nurse and 3,000 pharmacist independent or supplementary prescribers; the majority work in general practice [10-13].

Prescribing does not always reflect standards and advice [7]. The National Institute for Health and Care Excellence (NICE) was established in 1999 to address problematic variation in NHS treatment availability and quality [14]. NICE endorses the principles of 'Medicines Optimisation' [15] which explicitly promote prescribing based on the patient experience, evidence and safety. Inconsistent prescribing behaviour persists and is not fully explained by practice and patient variation [16]. As such, further investigation of influences on prescribing is warranted.

This study explored influences on prescribing in general practice. The objectives were to explore:

i. Prescribers' perceptions of influences on their prescribing
ii. Key informants' perspectives about the ways in which prescribing in general practice is influenced, monitored and measured, including the use of NICE and other guidelines
iii. The role and potential of PBPs to promote greater use of evidence in prescribing in general practice

METHOD

Study design

This study comprised two groups of participants: (i) general practice prescribers: GPs, PBPs and nurses, and (ii) key informants: individuals working in national, regional and local NHS roles, with responsibility for influencing, measuring and monitoring general practice prescribing.

Recruitment

Potential interviewees were initially identified through local, regional and national NHS networks and contacts and thereafter by snowball sampling [17]. A target sample matrix (Table 1) was developed to reflect a maximum variation sample of (i) prescribers (medical (GPs) and independent (PBPs and nurses)), based on individual and practice characteristics, and (ii) key informants working at local, regional and national levels within the NHS in roles connected with general practice prescribing.

Initial contact with potential interviewees was by email. Sampling ceased when all matrix elements were filled.

Data collection

Potential participants were sent an information sheet and asked to provide written informed consent prior to participation. The interview and focus group topic guides (see Supplementary Information) were informed by the literature and information from preliminary discussions with local and regional NHS contacts. Questions for both samples focused on the participant's role, perceived influences on prescribing, the experience of variation in prescribing and the role and potential of PBPs. Guides were piloted with non-participating pharmacists to check for relevance of questions and terminology and were refined during the study as new topics were identified [18]. Prior to the interview, participants were asked to provide brief details about themselves and the general practice or organisation in which they worked.

All interviews were conducted by telephone by one researcher (MC), who led the focus group, supported by a facilitator (NA) who made brief notes to support transcription of the recorded discussion. The interviews and focus group were digitally recorded, transcribed verbatim and identifying information removed (MC). MC made short reflexive field notes.

Data collection took place between November 2018 and April 2019.

Data analysis

Transcripts were coded using standard software QSR NVivo v11©. An interpretative approach to data analysis [19] for both groups was adopted, focussing on perceptions and understanding of existing influences on prescribing. Thematic analysis [20] was used to generate codes about the influences on prescribing and the PBP's role. MC developed an initial framework of codes, which was applied by a mixed-methods researcher (AD) to analyse and code a subset (n=6) of transcripts. Both researchers subsequently discussed commonalities and differences in coding. The framework was amended to reflect these discussions, and thereafter all transcripts were coded by one researcher (MC) using the refined coding framework. Main themes and links between themes from all transcripts were discussed by MC and AD and agreed with the entire team. Neither MC nor AD was a pharmacist or prescriber.

This report conforms to the standards for reporting qualitative research (SRQR) guidelines [21].

PATIENT AND PUBLIC INVOLVEMENT

This study specifically focussed on the influences on prescribing as perceived by prescribers and key informants in the NHS; no patients were involved.

RESULTS

Twenty-three interviews were completed with 17 prescribers (GPs (n=6), PBPs (n=6), nurses (n=5)) (Table 1) and six key informants. One focus group was conducted with five key informants (Table 2) comprising representatives from a Regional Medicines Optimisation Committee (RMOC) whose members (decision-makers, healthcare professionals and patients) support and optimise local prescribing practice and reduce unwarranted variation regionally and nationally (in England). Interviews lasted a mean of 41 minutes (range 24 – 53 minutes). The focus group lasted 59 minutes. Participant characteristics are presented in Tables 2 and 3.

Most participating PBPs had direct experience of the Clinical Pharmacists in General Practice programme [22], a scheme funded by NHS England to support the introduction of pharmacists into general practice.

The results are presented in three sections: (i) Prescribers' perspectives, (ii) Key informants' perspectives, (iii) Comparison of prescriber and key informant perspectives. The contributor of each quotation is denoted by a unique P (participant) number and role (GP, nurse, PBP, KI - key informant), NHS level at which s/he is working, I-interview or FG-focus group.

(i) PRESCRIBERS' PERSPECTIVES

Summary of prescribers' perspectives

Prescribers acknowledged that guidelines from NICE and other bodies were a predominant influence on their prescribing. They also discussed the impact of their professional background and training, as well as experience and individual characteristics. The socio-economic features of local patient populations were frequently cited as an important determinant of prescribing. Prescribers expressed a range of views about the current and potential roles of PBPs.

National and local guidelines

Prescribers from all professional groups reported that their prescribing was fundamentally influenced by information provided by NICE guidelines, their local Clinical Commissioning Group (CCG), condition-specific organisations and Royal Colleges:

> *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.* P1, Nurse

> *NICE guidance we're heavily influenced by … number 1 is* [name of CCG formulary] *… number 2 is the NICE guidance and then I suppose number 3 is the British National Formulary, it's every GP's bible really.* P14, GP

Guidelines were often amplified by financial incentive schemes, such as the national Quality and Outcomes Framework (QOF) [23] and local initiatives e.g. from the CCG [24]. Prescribers commented on the impact of computerised decision-support tools, such as ScriptSwitch [25] and Optimise RX [26]. Some prescribers appreciated the real-time prompts from these systems:

> *I personally find it a huge source of assurance and reassurance in my prescribing practice.* P1, Nurse

Others reported being overwhelmed by the information:

> *There's so much information sometimes like 'do not prescribe this in pregnancy' and it's someone in their 50s … we are inclined to ignore that kind of information and then suddenly realise that … what it was flagging up was actually important.* P13, GP

Professional background

Many participants mentioned their own and colleagues' professional background as influencing their prescribing. PBPs and nurses were frequently characterised, by themselves and others, as aware of their professional boundaries and 'sphere of competence' and therefore more likely to follow prescribing guidelines than their GP colleagues:

> *I guess I'd make the distinction between GPs and independent prescribers …* [the latter] *… are a bit more cautious … you … have your area and you … won't stray outside that. So being educated before prescribing in new areas is much more important. Whereas I think as far as the GPs go, they can prescribe anything and everything from day 1.* P11, PBP

Individual experience and qualities

The individual prescriber's accumulated experience and access to support, education and development opportunities were also considered to be important determinants of prescribing:

> *So we might have a specialist in the field … recently we had a cardiologist consultant and he spoke about heart failure, so it was educational … it really helped weighing up the prescribing techniques that we use.* P22, PBP

Individual qualities, such as confidence and ambition were also mentioned as influences on prescribing:

> *I think you're willing to learn, you're willing to try new things and look at your own confidence and you've got to be really honest.* P29, PBP

Patient characteristics

The socio-economic profile of the local patient population was identified by prescribers as an influence on their prescribing. Several reported responding to the needs of deprived patient populations:

> *Where I work, it's quite a deprived area, life expectancy is generally a lot lower ... So our approach is very different, we really try to serve the needs of the local demographic... if it was in a different setting we would be saying 'go and buy this over the counter' … that patient's not really in a position where they would afford it.* P22, PBP

Some also mentioned the pressure of prescribing for an affluent and assertive population:

> [We] *encourage* [sic] *people that things that are cheaper to buy over the counter would be better buying over the counter … But some of our patients are a bit resistant to the idea… a case of 'why should we? We've paid tax, we should be getting these things.'* P13, GP

Prescribers identified guidance from authoritative sources, such as NICE, as a tool for managing challenging demands from individual patients:

> *NICE is what you turn to when the patient says 'I want the drug that was in the Daily Mail last week'. And you say 'sorry I can't prescribe that, it's not been agreed by NICE yet.'* P12, GP

Comments about managing patient demand highlighted differences between individual prescribers:

> *I'm probably a bit too nice sometimes! One of my colleagues is very good at just saying 'no'. For things like sleeping tablets. I tend to do more negotiation, short supplies or weaning courses … rather than being a point blank 'no' person.* P18, GP

Organisational culture

Prescribers discussed the culture within their general practice, including opportunities for informal learning from colleagues about new developments in guidelines and prescribing:

> *We take group learning very seriously, we have clinical catch up at coffee, where if anyone has found any new exciting evidence or guidelines or examples of good practice we do tend to talk inter-professionally.* P29, PBP

> *In practice, we don't as a group kind of get together … as clinicians and feeding back information, events that have happened … significant events … we don't have joint CPD* [continuing professional development] *events.* P22, PBP

Although prescribers often reported limited influence from the pharmaceutical industry (noted by some as differing from close relationships in the past), contact between practices and "drug reps" still continued in other forms:

> *Every practice I've worked in has stopped seeing drug reps. I think there is still advertising in Monthly Index of Medical Specialities and in things like the British Medical Journal … some of the fairly accessible GP free education has still got drug reps attending. I don't talk to them, but I'm always made to feel slightly bad for not talking to them because you're always encouraged to.* P10, GP

Practice-based pharmacist (PBP) roles

PBPs had differing employment models and patterns, with some individuals working as full members of the general practice team and others shared between several practices. Experience varied considerably as did their access to training, support and development.

Although other prescribers often mentioned the positive impact of PBPs' complementary knowledge and skills, some GPs were cautious about PBPs' ability to solve current GP workforce problems:

> *Prescribing in the context of multi-morbidity is the sort of thing that experienced GPs offer … I think prescribing pharmacists could do really well, but when they're into the more complex, multi-faceted, social, psychological issues and stuff that the generalist patients have, they would find it more difficult.* P12, GP

Participants expressed mixed views about PBPs' potential to influence their colleagues' prescribing practice, but many mentioned the importance of PBPs' particular knowledge of medicines:

> *They (PBPs) were invaluable as a source of information, in terms of kind of combinations of things and interactions* P18, GP

Some identified the types of tasks most appropriate for PBPs, including medicines review and reconciliation, repeat prescribing and patient education, but cautioned against PBPs duplicating tasks commonly undertaken by nurses.

> *They're certainly looking at the sheer burden of repeat prescribing and medicine management … that's going to … be more pharmacist-driven to take some of the pressure off ourselves.* P13, GP

(ii) KEY INFORMANTS' PERSPECTIVES

Summary of key informants' perspectives

Key informants emphasised the fundamental influence of guidelines produced by NICE, CCGs and professional bodies on prescribing in general practice. They highlighted the effect of strategic developments, the roll-out of NHS policies and medicines optimisation principles. They often suggested that a prescriber's professional background was an important determinant of their prescribing.

National and local guidelines

Key informants cited NICE guidelines as a key source of evidence used by prescribers in general practice, but also emphasised the guidance and associated formularies developed by local commissioning bodies, condition-specific organisations and Royal Colleges as equally important and invariably in tune with the national guidelines:

> *If it's on the formulary it's accepted, you know, it is the formulary choice. And actually now it's the GPs who are pushing back, if a specialist says 'why not use this?' 'yeah, but it's not on the formulary.*
> P27, KI, local/regional, focus group

NHS policies and organisation of services

Several key informants were involved in developing NHS policies which they believed had a direct influence on prescribing:

> *I think there is also a significant amount of influence resulting from national policy initiatives, so two recent examples that I could cite would be the items that shouldn't be routinely prescribed in primary care and also conditions for which medicines shouldn't be routinely prescribed.* P31, KI, regional/national, interview

They also highlighted that the availability of external support (e.g. from secondary care) affects prescribing in general practice:

> *Some areas have community geriatricians who help to support the prescribing with GPs and the pharmacists in the team, for people in care homes and those complex ones. And in other places … that support isn't there.*
> P28, KI, regional/national, focus group

Medicines Optimisation

Key informants expressed concern about medicines and prescribing-related problems which they explicitly connected with an impetus to develop and embed medicines optimisation principles.

Influences on prescribing in general practice included an increase in problematic polypharmacy, and the importance of patient-centred and safe prescribing:

> *So it … will say first line this, add in that, add in this as a third drug … So you've only got to have two long term conditions …and you'll be on 6 drugs before you know it.* P4, KI, regional, interview

> *The fact that your liver might need some fancy drug might be of completely no interest to you if it means that you're trekking off to the hospital all the time and you're suffering from side effects and actually what you want to do is spend some time with your grandchildren.* P28, KI, regional/national, focus group

> *If I want to get somebody to really think twice about the way they prescribe, then I always play the safety card … our prescribing incentive scheme for GPs is called the 'quality prescribing and safety scheme'.*
> P23, KI, local/regional, interview

Professional differences

Key informants attributed variation in prescribing to different professional backgrounds and training. They mainly characterised nurses and PBPs as risk-averse and prescribing within strict limits, whereas GPs were considered to have the greatest ability and appetite for risk-taking and managing complex patients:

> *I think nurses tend to be … a bit more protocol-driven and so tend to be quite focussed on an individual disease entity. … Pharmacists I see have a slightly different risk appetite and they're willing to juggle maybe 2 or 3 comorbidities and then, I would hope, what should come about is that GPs and doctors should be able to then multiple* [sic] *the more complex, multi comorbidities.* P27, KI, local/regional, focus group

Patient characteristics

Key informants reflected upon the influence of patients as individuals as well as populations (general and local). Public opinion and media messages about medicines were particularly mentioned:

> *I mean just because it's cancer doesn't mean that the drugs always work, if only you can get your hands on them, which is how they're portrayed in the media, isn't it? If only we could get this drug funded all would be well.* P28, KI, regional/national, focus group

Key informants also recognised the importance of socio-economic factors in influencing prescribing in an area:

> *Self-care is hugely on the agenda at the moment, encouraging patients to buy things over the counter, rather than getting them prescribed.* [Our] *GPs are in a more deprived area and tend to feel that patients can't afford to buy those products and therefore they end up prescribing them.* P8, KI, local, interview

Practice-based pharmacists (PBPs)

Key informants recognised that PBPs had hugely variable roles, responsibilities and models of employment. Participants expressed mixed opinions about the best model; most favoured situating pharmacists within general practices. Emerging primary care networks, in which groups of practices are working together to provide a range of healthcare services for the local population, were identified by some as an opportunity for the PBP to work with a group of practices.

Participants reported variation between PBPs, particularly in terms of experience and skills, and expressed concern about differing levels of support and training available. Some saw opportunities for career development as crucial to allowing PBPs to achieve their potential:

> *We have this varied pattern of some people who come in more or less newly qualified to the role in a GP practice. So the NHS England training is good, actually, but it only goes up to a certain point. What happens to those people … where do they go next?* (P28, KI, regional/national, focus group)

(iii) COMPARISON: Prescribers' and key informants' perspectives

There was general agreement between prescribers and key informants about many of the influences on general practice prescribing (Figure 1).

Both groups acknowledged that national and other prominent guidelines had considerable influence and emphasised the effects of prescribers' professional backgrounds and experience. Both groups identified individual patients, populations, the media and public opinion as having a substantial influence on prescribing.

While prescribers identified influences on prescribing that may be shaped at a general practice level, such as attitudes towards shared learning, key informants highlighted the effect of NHS organisational policies and the availability of external services on prescribing. Key informants frequently mentioned medicines optimisation principles and the underlying problems which this approach seeks to address.

Participants in both groups mentioned current wide variation in the role of the PBP. Prescribers had mixed views about the potential for the PBP to address underlying workforce problems in general practice, and key informants emphasised the need for ongoing training, support and career progression.

DISCUSSION

Principal findings

This study identified a range of influences on prescribing in general practice by exploring the perspectives of prescribers and key informants. Although the guidance provided by NICE and other bodies is frequently described as fundamental to informing prescribing decisions in general practice, this study highlighted a range of competing realities which impact on prescribers' abilities or inclination to prescribe according to the available evidence. Predominant among these influences are the prescriber's professional background and patient characteristics (both individuals and populations). The role of the PBP varies between general practices, and this current study has revealed conflicting attitudes about PBPs' contribution to evidence-based prescribing.

Strengths and limitations

Whilst prescribers were evenly drawn from the different professional groups identified at the study outset, most were from larger practices (>10,000 patients) with lower levels of deprivation. Prescribers in smaller general practices and in areas of greater deprivation may have provided additional insights into the factors influencing their prescribing.

This study included key informants working at various levels within the NHS and encompassed a range of roles and perspectives. Although most had accumulated experience in roles connected with prescribing in general practice over many years, their current level of contact with general practices on a day-to-day basis varied considerably.

Flexible evolution of the interview topic guides allowed for exploration of additional issues raised by individual participants which had not been anticipated at the research design stage. The focus group discussion with key informants was less researcher-led than the interviews and offered an opportunity for participants to interact with, probe and challenge each other. A similar session with prescribers may have yielded alternative or additional observations, but this was not possible.

This study explored the use of guidelines in general and the factors which compete with them to influence general practice prescribing. Research to explore the uptake of guidelines for specific medical conditions or to investigate prescribing in instances where evidence is unclear or existing guidelines are considered unhelpful, may provide different insights.

Comparison with existing literature

Previous research has highlighted differences between evidence, such as NICE guidelines, and prescribing in a range of healthcare settings [8 27]. This study identified several influences which compete with the evidence-based approach promoted in guidelines and affect prescribing decisions in general practice, in particular the prescriber's professional background. Sharing of responsibilities among prescribers from differing professional backgrounds may have resulted in variation in the use of guidelines, but some see independent prescribers as suited to promoting an evidence-based approach to prescribing [28]. Although all professional groups represented in this study acknowledged the importance of guidelines, nurses and pharmacists were found to be more likely to prescribe in accordance with the available evidence than GPs. Findings from this study suggest that strategies to increase the use of evidence-based guidelines should be tailored for different professional groups.

Participants explicitly mentioned the impact of local demographics on prescribing, which corresponds with previous research linking practice prescribing patterns with patient populations [29 30]. Taking account of local demographics and providing patient-centred care may inhibit the prescriber's ability to follow guidelines. This tension echoes previous research which identified competing 'macro' and 'micro' influences on prescribing [31] and the 'explicit' and 'tacit' types of knowledge which inform prescribing decisions [32].

Previous research with GPs found that openness to sharing knowledge amongst general practice colleagues can shape and develop prescribing [33]. Some participants in this study worked in practices which encouraged diverse professionals to share new evidence and some did not. Their reflections suggest that a collaborative culture may facilitate greater use of guidelines and reduce problematic variation in prescribing within teams.

An NHS England scheme promoting the inclusion of pharmacists in general practice teams [22] was extended in 2019 [34] and there are now over 1000 PBPs in England. This study revealed more cautious attitudes, particularly among GPs, towards PBPs' contribution to the general practice team than reported elsewhere [35 36]. The availability of support and training, as previously found, as well as the ambition and aptitude of the individual [37], are important factors when optimising the complementary skills of prescribers from a pharmacy background.

Implications for research and practice

This study was the first phase of a research programme to explore the uptake of NICE guidelines to influence prescribing in general practice. It demonstrates a range of complex and overlapping factors that affect prescribing in general practice and impact prescribers' use of the evidence presented in guidelines. These influences are not all amenable to modification and further analysis of the data to pinpoint flexible behaviours and determinants would be a useful next step. Participants in our study expressed a range of views about the potential for PBPs to influence prescribing in general practice. Capturing the views and experiences of a greater number of PBPs working in diverse practice contexts will provide a robust basis for developing strategies which involve PBPs in promoting the use of guidelines in general practice prescribing. These strategies should focus on the more flexible influences on prescribing and take account of the different use of guidelines between prescribers from a range of professional backgrounds.

Conclusion

A multiplicity of influences impact prescribing in general practice and compete with guidance from NICE and other bodies. These influences operate at different levels with varying effects on prescribers from different professional backgrounds. Clarity is required regarding the current and potential role of PBPs to promote greater evidence-based prescribing in general practice.

ADDITIONAL INFORMATION

Funding

This work is supported by a PhD Studentship awarded to the lead author (MC) by the University of Bath.

Ethical approval

This study was approved by the Research Ethics Approval Committee for Health (ref. EP 17/18 233), University of Bath.

Competing interests

There are no competing interests

Author contributions

Authors: MC, MW and SC contributed to the design of the study; MC collected and analysed all the data; MC, MW and SC contributed to the interpretation of the data for this manuscript. MC drafted the manuscript and MW and SC critically revised and gave approval for the final version. All authors agree to be accountable for all aspects of the work.

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Data sharing statement

Data are available on reasonable request.

REFERENCES

1. Royal Pharmaceutical Society. Medicines Optimisation: Helping patients to make the most of medicines 2013 [Available from: https://www.england.nhs.uk/medicines/medicines-optimisation/ accessed May 2020].
2. NHS Digital. Prescribing and medicines team 2018 [Available from: https://digital.nhs.uk/data-and-information/data-insights-and-statistics/prescribing-and-medicines-team accessed May 2020].
3. The Kings Fund. The rising cost of medicines to the NHS: what's the story? 2018 [Available from: https://www.kingsfund.org.uk/publications/rising-cost-medicines-nhs accessed May 2020].
4. Garfield S, Barber N, Walley P, et al. Quality of medication use in primary care - Mapping the problem, working to a solution: A systematic review of the literature. *BMC Med* 2009;7:50. doi: 10.1186/1741-7015-7-50
5. Trueman P, Lowson K, Blighe A, et al. Evaluation of the Scale, Causes and Costs of Waste Medicines, 2010.
6. Public Health England. Atlas of Variation 2019 [Available from: https://fingertips.phe.org.uk/profile/atlas-of-variation accessed May 2020].
7. Flodgren G, Hall AM, Goulding L, et al. Tools developed and disseminated by guideline producers to promote the uptake of their guidelines. *Cochrane Database Syst Rev* 2016(8) doi: 10.1002/14651858.CD010669.pub2
8. Foy R, Leaman B, McCrorie C, et al. Prescribed opioids in primary care: cross-sectional and longitudinal analyses of influence of patient and practice characteristics. *BMJ Open* 2016;6(5):e010276. doi: 10.1136/bmjopen-2015-010276 [published Online First: 2016/05/15]
9. Soyombo S, Stanbrook R, Aujla H, et al. Socioeconomic status and benzodiazepine and Z-drug prescribing: a cross-sectional study of practice-level data in England. *Fam Pract* 2019 doi: 10.1093/fampra/cmz054 [published Online First: 2019/10/24]
10. Courtenay M, Khanfer R, Harries-Huntly G, et al. Overview of the uptake and implementation of non-medical prescribing in Wales: a national survey. *BMJ Open* 2017;7(9):e015313. doi: 10.1136/bmjopen-2016-015313
11. Hobson RJ, Scott J, Sutton J. Pharmacists and nurses as independent prescribers: exploring the patient's perspective. *Fam Pract* 2009;27(1):110-20. doi: 10.1093/fampra/cmp070
12. Cope L, Abuzour A, Tully M. Nonmedical prescribing: where are we now? *Therapeutic advances in drug safety* 2016;7(4):165-72. doi: 10.1177/2042098616646726 [published Online First: 2016/04/29]
13. Health Foundation. A critical moment: NHS staffing trends, retention and attrition. London, 2019.
14. National Institute for Health and Care Excellence. History of NICE [Available from: https://www.nice.org.uk/about/who-we-are/history-of-nice accessed May 2020].
15. National Institute for Health and Care Excellence. Medicines Optimisation 2016 [Available from: https://www.nice.org.uk/guidance/qs120 accessed May 2020].
16. Willis TA, West R, Rushforth B, et al. Variations in achievement of evidence-based, high-impact quality indicators in general practice: An observational study. *PLoS One* 2017;12(7):e0177949. doi: 10.1371/journal.pone.0177949 [published Online First: 2017/07/14]
17. Coyne IT. Sampling in qualitative research. Purposeful and theoretical sampling; merging or clear boundaries? *J Adv Nurs* 1997;26(3):623-30. [published Online First: 1997/09/26]
18. Gioia DA, Corley KG, Hamilton AL. Seeking Qualitative Rigor in Inductive Research: Notes on the Gioia Methodology. *Organizational Research Methods* 2012;16(1):15-31. doi: 10.1177/1094428112452151
19. Green J, Thorogood N. Qualitative methods for health research. London: SAGE Publications 2004.
20. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology* 2006;3(2):77-101. doi: 10.1191/1478088706qp063oa
21. O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for reporting qualitative research: a synthesis of recommendations. Acad Med. 2014;89(9):1245-1251

22. NHS England. Pharmacy Integration Fund 2016 [Available from: https://www.england.nhs.uk/commissioning/primary-care/pharmacy/integration-fund/ accessed May 2020].

23. NHS England. 2019/20 General Medical Services (GMS) contract: Quality and Outcomes Framework (QOF) 2019 [Available from: https://www.england.nhs.uk/publication/2019-20-general-medical-services-gms-contract-quality-and-outcomes-framework-qof/ accessed May 2020].

24. Basildon & Brentwood Clinical Commissioning Group. Prescribing Incentive Scheme 2019-2020 2019 [Available from: https://basildonandbrentwoodccg.nhs.uk/your-health/medicines-management accessed May 2020].

25. Optum Inc. ScriptSwitch 2018 [Available from: http://www.optum.co.uk/how-we-help/scriptswitch.html accessed May 2020].

26. First Databank. FDB OptimiseRX [Available from: https://www.fdbhealth.co.uk/solutions/fdb-optimiserx/ accessed May 2020].

27. Duncan P, Cabral C, McCahon D, et al. Efficiency versus thoroughness in medication review: a qualitative interview study in UK primary care. *Br J Gen Pract* 2019;69(680):e190-e98. doi: 10.3399/bjgp19X701321 [published Online First: 2019/02/13]

28. Barnett NL. Opportunities for collaboration between pharmacists and clinical pharmacologists to support medicines optimisation in the UK. *Br J Clin Pharmacol* 2019 doi: 10.1111/bcp.13966 [published Online First: 2019/04/16]

29. Guthrie B, Makubate B, Hernandez-Santiago V, et al. The rising tide of polypharmacy and drug-drug interactions: population database analysis 1995-2010. *BMC Med* 2015;13:74. doi: 10.1186/s12916-015-0322-7 [published Online First: 2015/04/19]

30. Tobin H, Bury G, Cullen W. Mental illness in primary care: a narrative review of patient, GP and population factors that affect prescribing rates. *Ir J Psychol Med* 2018:1-8. doi: 10.1017/ipm.2018.35 [published Online First: 2018/10/03]

31. Grant A, Sullivan F, Dowell J. An ethnographic exploration of influences on prescribing in general practice: why is there variation in prescribing practices? *Implement Sci* 2013;8:72. doi: 10.1186/1748-5908-8-72 [published Online First: 2013/06/27]

32. Gabbay J, May Al. Evidence based guidelines or collectively constructed "mindlines?" Ethnographic study of knowledge management in primary care. *BMJ* 2004;329(7473):1013. doi: 10.1136/bmj.329.7473.1013

33. Thomson JS, Anderson K, Haesler E, et al. The learner's perspective in GP teaching practices with multi-level learners: a qualitative study. *BMC Med Educ* 2014;14:55. doi: 10.1186/1472-6920-14-55 [published Online First: 2014/03/22]

34. National Health Service. NHS Long Term Plan 2019 [Available from: https://www.longtermplan.nhs.uk/publication/nhs-long-term-plan/ accessed May 2020].

35. Maskrey M, Johnson CF, Cormack J, et al. Releasing GP capacity with pharmacy prescribing support and New Ways of Working: a prospective observational cohort study. *Br J Gen Pract* 2018;68(675):e735-e42. doi: 10.3399/bjgp18X699137 [published Online First: 2018/09/27]

36. Anderson C, Zhan K, Boyd M, et al. The role of pharmacists in general practice: A realist review. *Research in Social and Administrative Pharmacy* 2019;15(4):338-45. doi: https://doi.org/10.1016/j.sapharm.2018.06.001

37. Butterworth J, Sansom A, Sims L, et al. Pharmacists' perceptions of their emerging general practice roles in UK primary care: a qualitative interview study. *Br J Gen Pract* 2017;67(662):e650-e58. doi: 10.3399/bjgp17X691733

38. Public Health England. National General Practice Profiles 2019 [Available from: https://fingertips.phe.org.uk/profile/general-practice/data#page/0/gid/2000005/pat/152/par/E38000204/ati/7/are/D83005 accessed May 2020].

TABLES, FIGURES AND SUPPLEMENTARY INFORMATION

TABLE 1: Target recruitment matrix

GENERAL PRACTICE PRESCRIBERS		**KEY INFORMANTS**	
Gender	Male Female	Gender	Male Female
Role	General Practitioner Practice-based pharmacist Nurse	NHS Level	Local Regional National
Years since qualification	≤10 >10	Years in current post	≤ 2 >2
Employment	Clinical Commissioning Group Practice NHS England	Direct contact with general practice	Yes No
Practice size (patient list)	Small (< 5000 patients) Medium/Large (>5000 patients)		
Practice level of deprivation*	≤ 5 > 5		
**Information from National General Practice Profiles [38] (lower numbers indicate more deprivation)*			

TABLE 2: Prescriber and general practice characteristics

Individual characteristics					General practice characteristics	
Study no.	**Gender**	**Employer**	**Years since registration**	**Years since qualifying as independent prescriber**	**Practice list size**	**Indices of Multiple Deprivation (IMD) decile***
General Practitioners (GPs)						
P10	F	Practice	> 5		>5000 – ≤ 10,000	≤ 5
P12	M	Practice	> 5		>5000 – ≤ 10,000	> 5
P13	F	Practice	> 5		>5000 – ≤ 10,000	> 5**
P14	F	Practice	> 5		>5000 – ≤ 10,000	> 5
P16	F	Practice	> 5		> 10,000	> 5
P18	F	Practice	> 5		>5000 – ≤ 10,000	≤ 5
Practice-based pharmacists (PBPs)						
P3	M	Practice	> 5	> 5	> 10,000	> 5
P9	M	Group of 4 practices	≤ 5	≤ 5	<5000 >10,000 >10,000 >10,000	≤ 5 > 5 <5 <5
P11	M	Practice	> 5	≤ 5	> 10,000	> 5
P22	M	Practice	> 5	≤ 5	> 10,000	≤ 5
P29	F	Practice	> 5	≤ 5	> 10,000	> 5
P32	M	Community pharmacy/ practice	> 5	≤ 5	>5000 – ≤ 10,000	> 5
Nurses						
P5	F	Practice	> 5	> 5	> 10,000	> 5**
P1	M	Practice	> 5	> 5	> 10,000	> 5
P15	F	Practice	> 5	> 5	> 10,000	> 5
P19	F	Practice	> 5	> 5	> 10,000	≤ 5
P21	F	Practice	> 5	≤ 5	> 10,000	> 5

**Information from National General Practice Profiles [38] (lower numbers indicate more deprivation)*

***Derived from participant's depiction of patient population*

P9 worked in four practices; P3 and P21 worked in the same practice

TABLE 3: Key informant characteristics

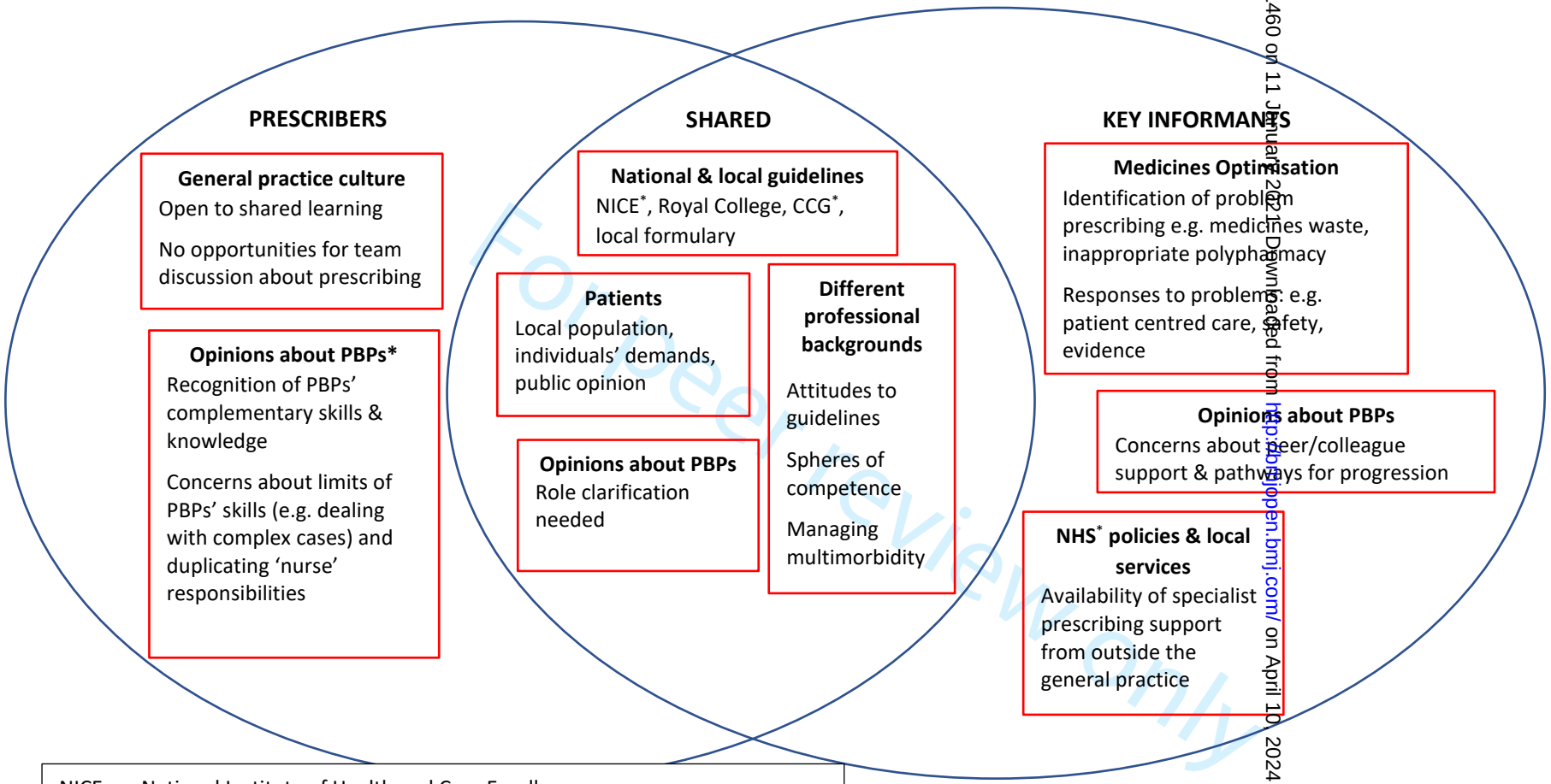
Study no.	Gender	Age	National Health Service level Local*/regional**/national***	Time in post	Direct contact with general practices	Interview or focus group
P2	F	>30 to ≤50 years	Local	≤ 2 years	Y	Interview
P4	F	>50 years	Regional	>2 years	Y	Interview
P8	F	>30 to ≤50 years	Local	≤ 2 years	Y	Interview
P17	F	>50 years	National	>2 years	N	Interview
P23	F	>50 years	Local & regional	>2 years	Y	Interview
P24	M	>50 years	Local & regional	>2 years	N	Focus Group
P25	F	>30 to ≤50 years	Local & regional	>2 years	Y	Focus Group
P26	M	>30 to ≤50 years	National & regional	>2 years	Y	Focus Group
P27	M	>50 years	Local & regional	>2 years	Y	Focus Group
P28	F	>50 years	National & regional	>2 years	Y	Focus Group
P31	M	>50 years	National & regional	>2 years	N	Interview

* Local: working at individual Clinical Commissioning group level

** Regional: working across Clinical Commissioning Groups or regional body

*** National: representative of/working on national body

FIGURE 1: Comparison of prescriber and key informant perspectives: Influences on prescribing and practice-based pharmacists (PBPs)



NICE	National Institute of Health and Care Excellence
CCG	Clinical Commissioning Group
NHS	National Health Service
PBP	Practice-based pharmacist

SUPPLEMENTARY BOX 1: General practice prescriber interview topic guide

1. Please briefly describe your role as a prescriber in general practice

PROMPTS

   a. How long since you qualified/registered?
   b. How long have you been in your current/most recent post?
   c. Who is your employer?
   d. Do you have a specialism?

2. What are the factors which underpin prescribing decisions in your general practice?

PROMPTS

   a. How much do decisions vary amongst different professional groups?

PROMPTS (examples)

   b. National influences
      i. National Institute for Health & Clinical Excellence (NICE)
      ii. Other guidelines
      iii. Contract (e.g. Quality & Outcomes Framework (QOF))
      iv. Regional Medicines Optimisation Committee (RMOC) information or advice
   c. Local influences
      i. Advice from the local prescribing committee (may be called Area Prescribing Committee)
      ii. Local prescribing incentive schemes
      iii. Clinical Commissioning Group (CCG) (e.g. practice visits, guidelines)
      iv. Patient factors (population, specific patients)
      v. Electronic prescribing 'rules'
   d. Education, feedback and information
      i. Feedback (e.g. from CCG) about prescribing practice
      ii. Local primary care education programmes
      iii. Informal learning (e.g. from colleagues)
      iv. Access to electronic data about prescribing in the area or region or national (e.g. RightCare, ePACT2)
      v. Information from pharmaceutical industry

3. How do the same or other factors currently influence your own prescribing?

4. What is your experience of variation in prescribing practice in your general practice?

5. FOR GPs & NURSE PRESCRIBERS: What can you tell me about how a practice-based pharmacist may influence prescribing in your general practice, and you as a prescriber?

   FOR PRACTICE-BASED PRESCRIBING PHARMACISTS: What can you tell me about how you, as a prescriber, could influence prescribing in your general practice?

PROMPTS

   a. Do you have any thoughts on how practice-based pharmacists should be employed (by the practice/CCG)?
   b. What training or support may be necessary for practice-based pharmacists to work effectively in the general practice?

6. Is there anything else you would like to say about your current role, or about prescribing in your general practice (or area)?

SUPPLEMENTARY BOX 2: Key Informant interview and focus group topic guide

1. Please briefly describe your role with regard to prescribing in general practices in your area/region/nationally

PROMPTS

a. How long since you qualified/registered?
b. How long have you been in your current/most recent post?
c. Who is your employer?
d. Do you have a specialism?
e. Do you have direct contact with general practices (or CCGs)?
f. Are you involved in monitoring prescribing practice?
g. Are you involved in supporting general practices to make changes to their prescribing practice?

2. In your experience what are the main influences on prescribing practice in general practices (amongst all professional groups)?

PROMPTS (categories & examples)

a. National influences
   i. National Institute for Health & Clinical Excellence (NICE)
   ii. Other guidelines
   iii. Contract (e.g. Quality & Outcomes Framework (QOF))
   iv. Regional Medicines Optimisation Committee (RMOC) information or advice
b. Local influences
   i. Advice from the local prescribing committee (may be called Area Prescribing Committee)
   ii. Local prescribing incentive schemes
   iii. Clinical Commissioning Group (CCG) (e.g. practice visits, guidelines)
   iv. Patient factors (population, specific patients)
   v. Electronic prescribing 'rules'
c. Education, feedback and information
   i. Local primary care education programmes
   ii. Informal learning (e.g. from colleagues)
   iii. Access to electronic data about prescribing in the area or region or national (e.g. RightCare, ePACT2)
   iv. Information from pharmaceutical industry

3. What is your experience of variation in prescribing practice in your area (or region or nationally)?

4. (As you know) pharmacists are increasingly based in general practices. What is your opinion about whether practice-based pharmacists could play a part in influencing prescribing behaviour in general practice?

PROMPTS

a. Do you have any thoughts on how practice-based pharmacists should be employed (by the practice/CCG)?
b. What training or support may be necessary for practice-based pharmacists to work effectively in the general practice?

5. Is there anything else you would like to say about your current role, or about prescribing in general practice in your area (or region or nationally)?

Mary Carter, completed reporting checklist for qualitative study (based on the SRQR guidelines)

		Reporting Item	Page Number
Title			
	#1	Concise description of the nature and topic of the study identifying the study as qualitative or indicating the approach (e.g. ethnography, grounded theory) or data collection methods (e.g. interview, focus group) is recommended	1
Abstract			
	#2	Summary of the key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results and conclusions	2
Introduction			
Problem formulation	#3	Description and signifcance of the problem / phenomenon studied: review of relevant theory and empirical work; problem statement	3
Purpose or research question	#4	Purpose of the study and specific objectives or questions	3
Methods			
Qualitative approach and research paradigm	#5	Qualitative approach (e.g. ethnography, grounded theory, case study, phenomenolgy, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g. postpositivist, constructivist / interpretivist) is also recommended; rationale. The rationale should briefly discuss the justification for choosing that theory, approach, method or technique rather than other options available; the assumptions and limitations implicit in those choices and how those choices influence study conclusions and transferability. As appropriate the	4

		rationale for several items might be discussed together.	
Researcher characteristics and reflexivity	#6	Researchers' characteristics that may influence the research, including personal attributes, qualifications / experience, relationship with participants, assumptions and / or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results and / or transferability	4
Context	#7	Setting / site and salient contextual factors; rationale	4
Sampling strategy	#8	How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g. sampling saturation); rationale	4
Ethical issues pertaining to human subjects	#9	Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	12
Data collection methods	#10	Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources / methods, and modification of procedures in response to evolving study findings; rationale	4
Data collection instruments and technologies	#11	Description of instruments (e.g. interview guides, questionnaires) and devices (e.g. audio recorders) used for data collection; if / how the instruments(s) changed over the course of the study	4
Units of study	#12	Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	5
Data processing	#13	Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data	4

		integrity, data coding, and anonymisation / deidentification of excerpts	
Data analysis	#14	Process by which inferences, themes, etc. were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale	4
Techniques to enhance trustworthiness	#15	Techniques to enhance trustworthiness and credibility of data analysis (e.g. member checking, audit trail, triangulation); rationale	4
Results/findings			
Syntheses and interpretation	#16	Main findings (e.g. interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	5-10
Links to empirical data	#17	Evidence (e.g. quotes, field notes, text excerpts, photographs) to substantiate analytic findings	5-9
Discussion			
Integration with prior work, implications, transferability and contribution(s) to the field	#18	Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application / generalizability; identification of unique contributions(s) to scholarship in a discipline or field	10-11
Limitations	#19	Trustworthiness and limitations of findings	10
Other			
Conflicts of interest	#20	Potential sources of influence of perceived influence on study conduct and conclusions; how these were managed	12
Funding	#21	Sources of funding and other support; role of funders in data collection, interpretation and reporting	12

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Multiplicity and complexity: a qualitative exploration of influences on prescribing in UK general practice

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TITLE

Multiplicity and complexity: a qualitative exploration of influences on prescribing in UK general practice

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ABSTRACT

Objectives

Despite widespread availability of evidence-based guidelines to inform rational use of medicines, considerable unwarranted variation exists in prescribing. A greater understanding of key determinants of contemporary prescribing in UK general practice could inform strategies to promote evidence-based prescribing. This study explored (1) current influences on prescribing in general practice and (2) the possibility that general practice-based pharmacists (PBPs) may contribute to greater engagement with evidence-based prescribing.

Design

Semi-structured, telephone interviews and a focus group were conducted, audio-recorded and transcribed verbatim. Thematic analysis was undertaken.

Participants

(i) General practice prescribers: General Practitioners (GPs), PBPs, nurses.
(ii) Key informants: Individuals within the National Health Service (NHS) with responsibility for influencing, monitoring and measuring general practice prescribing.

Setting

General practices and NHS organisations in England.

Results

Interviews with 17 prescribers (GPs (n=6), PBPs (n=6), nurses (n=5)) and six key informants, and one focus group with five key informants were undertaken between November 2018 and April 2019. Determinants operating at individual, practice and societal levels impacted prescribing and guideline use. Prescribers' professional backgrounds e.g. nursing, pharmacy, patient populations and patient pressure were perceived as substantial influences, as well as media portrayal and public perceptions of medicines.

Prescribers identified practice-level determinants of prescribing, including practice culture and shared beliefs. Key informants tended to emphasise higher-level influences, including NHS policies, availability of support and advice from secondary care and generic challenges associated with medicines use e.g. multi-morbidity.

Participants expressed mixed views about the potential of PBPs to promote evidence-based prescribing in general practice.

Conclusion

Prescribing in UK general practice is influenced by multiple competing factors. Strategies to promote evidence-based prescribing should target modifiable influences at practice and individual levels. Customising strategies for medical and non-medical prescribers may maximise their effectiveness.

Keywords

General practice, guideline, evidence-based, pharmacist, qualitative, prescribing

ARTICLE SUMMARY

Strengths and limitations of this study

- This study explored a range of perspectives, including:
  - Medical and non-medical professionals prescribing in general practice (doctors, pharmacists and nurses)
  - Key informants working at various NHS levels who are influencing, monitoring and measuring general practice prescribing
- The interview/focus group topic guides were developed flexibly to allow for exploration of additional topics
- This study investigated the use of guidelines in general; research to explore the uptake of guidelines for specific medical conditions may reveal a different picture

INTRODUCTION

Medicines are the most common intervention used within the NHS [1]. They are vital to the prevention and treatment of illness, maintenance of health and management of chronic conditions. NHS expenditure on medicines is eclipsed only by the staff budget [2]. Despite annual increases in spending to £17.4 billion (2016/17) [3], there is substantial evidence that medicines are not always used judiciously [4 5], with considerable unwarranted variation in practice [6 7] and sub-optimal patient outcomes [8 9].

Although the National Institute for Health and Care Excellence (NICE) , established in 1999 to address problematic variation in NHS treatment availability and quality [10], issues a huge volume of prescribing advice and guidance to prescribers, inconsistent prescribing behaviour persists and is not fully explained by practice and patient variation [11]. In accordance with major professional bodies, NICE endorses 'Medicines Optimisation' principles [12] which explicitly promote prescribing based on individual patient experience, evidence and safety and encompass a possible tension between strict adherence to guidelines and clinician judgement in individual cases.

In contrast with most other countries, non-medical prescribing is a key feature of UK healthcare [13]. Whilst prescribing is embedded in undergraduate and postgraduate medical curricula, non-medical professionals undertake additional training to prescribe within their scope of competency. Currently there are approximately 48,000 nurse (independent or supplementary) prescribers [14] and 9,000 pharmacist independent prescribers [15]. Many of these prescribers work in general practice.

This study investigated influences (including the use of guidelines) on prescribing and the PBPs' potential to optimise the use of evidence in prescribing in general practice. The objectives were to explore:

i. General practice prescribers' perceptions of influences on their prescribing
ii. Key informants' perspectives about the ways in which prescribing in general practice is influenced, monitored and measured, including the use of NICE and other guidelines
iii. The role and potential of PBPs to promote greater use of evidence in prescribing in general practice

METHOD

Study design

The study adopted pragmatist principles [16], seeking to gain a practical understanding of participants' experience of prescribing; data collection methods (interviews and focus group) suited to eliciting knowledge based on experience reflected this epistemological underpinning.

To encourage participation, participants were offered either a telephone or face-to-face interview. As a further boost to recruitment and to encourage an exchange of perspectives and experiences between key informants [17],

members of a Regional Medicines Optimisation Committee comprising five members were invited to attend a focus group as an adjunct to one of their half-yearly meetings.

Recruitment

Potential interviewees were initially identified through local, regional and national NHS networks and contacts and thereafter by snowball sampling [18]. Individual and practice characteristics reported to influence prescribing (e.g. experience, [19] and patient profile [20]) were included in a sample matrix (Table 1). Matrix elements were used to guide recruitment of (i) medical and non-medical prescribers in general practice and (ii) key informants working at local (one clinical commissioning group (CCG)), regional (across CCGs) and national NHS levels in roles connected with general practice prescribing. Recruitment ceased when all the matrix elements were addressed.

Initial contact with potential participants was by email. Sampling ceased when all matrix elements were filled.

TABLE 1: Target recruitment matrix

GENERAL PRACTICE PRESCRIBERS		**KEY INFORMANTS**	
Gender	Male Female	Gender	Male Female
Role	General Practitioner Practice-based pharmacist Nurse	NHS Level	Local Regional National
Years since qualification	≤10 >10	Years in current post	≤ 2 >2
Employment	Clinical Commissioning Group Practice NHS England	Direct contact with general practice	Yes No
Practice size (patient list)	Small (< 5000 patients) Medium/Large (>5000 patients)		
Practice level of deprivation*	≤ 5 > 5		
**Information from National General Practice Profiles [21] (lower numbers indicate more deprivation)*			

Data collection

Potential participants were sent an information sheet and asked to provide written informed consent prior to participation. The topic guides (interview for prescribers and interview/focus group for key informants) (see Supplementary Information) were informed by the literature and information from preliminary discussions with local and regional NHS contacts. Questions focused on the participant's role, perceived influences on prescribing, the experience of variation in prescribing and the role and potential of PBPs. Guides were piloted with non-participating pharmacists to check for relevance of questions and terminology and were refined during the study as new topics were identified [22]. Prior to the interview, participants were asked to provide brief details about themselves and the general practice or organisation in which they worked.

All one-to-one interviews were conducted by telephone by one researcher (MC). MC led the focus group, supported by a facilitator (NA, post-doctoral researcher) who made brief notes to support transcription of the recorded discussion. The interviews and focus group were digitally recorded, transcribed verbatim and identifying information removed (MC). MC made short reflexive field notes.

Data collection took place between November 2018 and April 2019.

Data analysis

Transcripts were coded using standard software QSR NVivo v11©. Data were analysed interpretatively, focussing on participants' perception and understanding of influences on prescribing [23], in two groups 1) from interviews with prescribers and 2) from interviews and focus group for key informants. Topic guides included the same areas of investigation and allowed common experiences and perceptions between the groups to be identified. Codes about the influences on prescribing and the PBP's role were generated using reflexive thematic analysis techniques [24] by which participants' experiences and perceptions were understood and categorised. MC developed an initial framework of codes, which was applied by a mixed-methods researcher (AD, PhD student) to analyse and code a subset (n=6) of transcripts. Both researchers subsequently discussed commonalities and differences in coding. The framework was amended to reflect these discussions, and thereafter all transcripts were coded by MC using the refined coding framework. Main themes and links between themes from all transcripts were discussed by MC and AD and agreed with the entire team.

Both MC and AD had previously conducted qualitative research with general practices, but neither was a pharmacist or prescriber. Two interviewees were known professionally to MC prior to participating.
This report conforms to the Standards for Reporting Qualitative Research (SRQR) [25] and Consolidated Criteria for Reporting Qualitative Research (COREQ) [26] guidelines

PATIENT AND PUBLIC INVOLVEMENT

This study specifically focussed on the influences on prescribing as perceived by prescribers and key informants in the NHS; no patients were involved.

RESULTS

Twenty-three interviews were completed with six GPs, 11 non-medical, independent prescribers (PBPs (n=6), nurses (n=5)) (Table 2) and six key informants. One focus group was conducted with five key informants (Table 3) comprising representatives from a Regional Medicines Optimisation Committee (RMOC) whose members (decision-makers, healthcare professionals and patients) support and optimise local prescribing practice and reduce unwarranted variation regionally and nationally (in England). Interviews lasted a mean of 41 minutes (range 24 – 53 minutes). The focus group lasted 59 minutes.

Most participating PBPs had direct experience of the Clinical Pharmacists in General Practice programme [27], a scheme funded by NHS England to support the introduction of pharmacists into general practice. PBPs' current roles varied, with most including responsibility for medicines reviews, repeat prescriptions and some audit work.

The results are presented under theme headings in three sections: (i) Prescribers' perspectives, (ii) Key informants' perspectives, (iii) Comparison of prescriber and key informant perspectives. The contributor of each quotation is denoted by a unique P (participant) number and role (GP, nurse, PBP, KI - key informant). For key informants the NHS level at which s/he worked and I-interview or FG-focus group is indicated.

TABLE 2: Prescriber and general practice characteristics

Individual characteristics					General practice characteristics	
Participant no.	**Gender**	**Employer and work location**	**Years since registration**	**Years since qualifying as independent prescriber**	**Practice list size**	**Indices of Multiple Deprivation (IMD) decile***
General Practitioners (GPs)						
P10	F	Practice, England (West)	> 10		>5000 – ≤ 10,000	≤ 5
P12	M	Practice, England (South West)	> 10		>5000 – ≤ 10,000	> 5
P13	F	Practice, Scotland	> 10		>5000 – ≤ 10,000	> 5**
P14	F	Practice, England (South West)	> 10		>5000 – ≤ 10,000	> 5
P16	F	Practice, England (South West)	> 10		> 10,000	> 5
P18	F	Practice, England (Midlands)	> 10		>5000 – ≤ 10,000	≤ 5
Practice-based pharmacists (PBPs)						
P3	M	Practice, England (South)	> 10	> 5	> 10,000	> 5
P9	M	Group of 4 practices, England (London)	< 10	≤ 5	<5000 >10,000 >10,000 >10,000	≤ 5 > 5 <5 <5
P11	M	Practice, England (West)	< 10	≤ 5	> 10,000	> 5
P22	M	Practice, England (South)	> 10	≤ 5	> 10,000	≤ 5
P29	F	Practice, England (East)	< 5	≤ 5	> 10,000	> 5
P32	M	Community pharmacy/ Practice, England (South)	> 10	≤ 5	>5000 – ≤ 10,000	> 5
Nurses						
P5	F	Practice, Wales	> 10	> 5	> 10,000	> 5**
P1	M	Practice, England (West)	> 10	> 5	> 10,000	> 5
P15	F	Practice, England (West)	> 10	> 5	> 10,000	> 5
P19	F	Practice, England (Midlands)	> 10	> 5	> 10,000	≤ 5
P21	F	Practice, England (South)	> 10	≤ 5	> 10,000	> 5

**Information from National General Practice Profiles[21] (lower numbers indicate more deprivation)*

***Derived from participant's depiction of patient population*

P9 worked in four practices; P3 and P21 worked in the same practice

All PBPs and nurses were independent prescribers

TABLE 3: Key informant characteristics

Participant no.	Gender	Age	National Health Service level Local*/regional**/national*** (England)	Time in post	Direct contact with general practices	Interview or focus group
P2	F	>30 to ≤50 years	Local	≤ 2 years	Y	Interview
P4	F	>50 years	Regional	>2 years	Y	Interview

P8	F	>30 to ≤50 years	Local	≤ 2 years	Y	Interview
P17	F	>50 years	National	>2 years	N	Interview
P23	F	>50 years	Local & regional	>2 years	Y	Interview
P24	M	>50 years	Local & regional	>2 years	N	Focus Group
P25	F	>30 to ≤50 years	Local & regional	>2 years	Y	Focus Group
P26	M	>30 to ≤50 years	National & regional	>2 years	Y	Focus Group
P27	M	>50 years	Local & regional	>2 years	Y	Focus Group
P28	F	>50 years	National & regional	>2 years	Y	Focus Group
P31	M	>50 years	National & regional	>2 years	N	Interview

* Local: working at individual Clinical Commissioning group level

** Regional: working across Clinical Commissioning Groups or regional body

*** National: representative of/working on national body

(i) PRESCRIBERS' PERSPECTIVES

Summary of prescribers' perspectives (themes in bold text)

Prescribers acknowledged that **guidelines** from NICE and other bodies were a predominant influence on their prescribing. They also discussed the impact of their **professional background** and training, as well as experience and **individual characteristics**. **Patient characteristics**, such as socio-economic features of local **populations** were frequently cited as an important determinant of prescribing, as was the **organisational culture** of the general practice. Prescribers expressed a range of views about the current and potential **roles of PBPs**.

National and local guidelines

Prescribers from all professional groups reported that their prescribing was fundamentally influenced by information provided by NICE guidelines, their local Clinical Commissioning Group (CCG), condition-specific organisations and Royal Colleges:

> *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.* P1, Nurse

> *NICE guidance we're heavily influenced by … number 1 is* [name of CCG formulary] *… number 2 is the NICE guidance and then I suppose number 3 is the British National Formulary, it's every GP's bible really.* P14, GP

Guidelines were often amplified by financial incentive schemes, such as the national Quality and Outcomes Framework (QOF) [28] and local initiatives e.g. from the CCG [29]. Prescribers commented on the impact of computerised decision-support tools, such as ScriptSwitch [30] and Optimise RX [31]. Some prescribers appreciated the real-time prompts from these systems:

> *I personally find it a huge source of assurance and reassurance in my prescribing practice.* P1, Nurse

Others reported being overwhelmed by the information:

> *There's so much information sometimes like 'do not prescribe this in pregnancy' and it's someone in their 50s … we are inclined to ignore that kind of information and then suddenly realise that … what it was flagging up was actually important.* P13, GP

Professional background

Many participants mentioned their own and colleagues' professional background as influencing their prescribing. PBPs and nurses were frequently characterised, by themselves and others, as aware of their professional boundaries and 'sphere of competence' and therefore more likely to follow prescribing guidelines than their GP colleagues:

> *I guess I'd make the distinction between GPs and independent prescribers …* [the latter] *… are a bit more cautious … you … have your area and you … won't stray outside that. So being educated before prescribing in new areas is much more important. Whereas I think as far as the GPs go, they can prescribe anything and everything from day 1.* P11, PBP

Individual experience and qualities

Individual prescribers' accumulated experience and access to support, education and development opportunities were also considered to be important determinants of prescribing:

> *So we might have a specialist in the field … recently we had a cardiologist consultant and he spoke about heart failure, so it was educational … it really helped weighing up the prescribing techniques that we use.* P22, PBP

Individual qualities, such as confidence and ambition were also mentioned as influences on prescribing:

> *I think you're willing to learn, you're willing to try new things and look at your own confidence and you've got to be really honest.* P29, PBP

Patient characteristics

The socio-economic profile of the local patient population was identified by prescribers as an influence on their prescribing. Several reported responding to the needs of deprived patient populations:

> *Where I work, it's quite a deprived area, life expectancy is generally a lot lower ... So our approach is very different, we really try to serve the needs of the local demographic... if it was in a different setting we would be saying 'go and buy this over the counter' … that patient's not really in a position where they would afford it.* P22, PBP

Some also mentioned the pressure of prescribing for an affluent and assertive population:

> [We] *encourage* [sic] *people that things that are cheaper to buy over the counter would be better buying over the counter … But some of our patients are a bit resistant to the idea… a case of 'why should we? We've paid tax, we should be getting these things.'* P13, GP

Prescribers identified guidance from authoritative sources, such as NICE, as a tool for managing challenging demands from individual patients:

> *NICE is what you turn to when the patient says 'I want the drug that was in the Daily Mail last week'. And you say 'sorry I can't prescribe that, it's not been agreed by NICE yet.'* P12, GP

Comments about managing patient demand highlighted differences between individual prescribers:

> *I'm probably a bit too nice sometimes! One of my colleagues is very good at just saying 'no'. For things like sleeping tablets. I tend to do more negotiation, short supplies or weaning courses … rather than being a point blank 'no' person.* P18, GP

Organisational culture

Prescribers discussed the culture within their general practice, including opportunities for informal learning from colleagues about new developments in guidelines and prescribing:

> *We take group learning very seriously, we have clinical catch up at coffee, where if anyone has found any new exciting evidence or guidelines or examples of good practice we do tend to talk inter-professionally.* P29, PBP

> *In practice, we don't as a group kind of get together … as clinicians and feeding back information, events that have happened … significant events … we don't have joint CPD* [continuing professional development] *events.* P22, PBP

Although prescribers often reported limited influence from the pharmaceutical industry (noted by some as being different from close relationships in the past), contact between practices and "drug reps" still continued in other forms:

> *Every practice I've worked in has stopped seeing drug reps. I think there is still advertising in Monthly Index of Medical Specialities and in things like the British Medical Journal … some of the fairly accessible GP free education has still got drug reps attending. I don't talk to them, but I'm always made to feel slightly bad for not talking to them because you're always encouraged to.* P10, GP

Practice-based pharmacist (PBP) roles

PBPs had differing employment models and patterns, with some individuals working as full members of the general practice team and others shared between several practices. Experience varied considerably as did their access to training, support and development.

Although other prescribers often mentioned the positive impact of PBPs' complementary knowledge and skills, some GPs were cautious about PBPs' potential impact on prescribing in general practice:

> *Prescribing in the context of multi-morbidity is the sort of thing that experienced GPs offer … I think prescribing pharmacists could do really well, but when they're into the more complex, multi-faceted, social, psychological issues and stuff that the generalist patients have, they would find it more difficult.* P12, GP

Participants expressed mixed views about PBPs' potential to influence their colleagues' prescribing practice, but many mentioned the importance of PBPs' particular knowledge of medicines:

> *They (PBPs) were invaluable as a source of information, in terms of kind of combinations of things and interactions* P18, GP

Some identified the types of tasks most appropriate for PBPs, including medicines review and reconciliation, repeat prescribing and patient education, but cautioned against PBPs duplicating tasks commonly undertaken by nurses.

> *They're certainly looking at the sheer burden of repeat prescribing and medicine management … that's going to … be more pharmacist-driven to take some of the pressure off ourselves.* P13, GP

(ii) KEY INFORMANTS' PERSPECTIVES

Summary of key informants' perspectives (themes in bold text)

Key informants emphasised the fundamental influence of **guidelines** produced by NICE, CCGs and professional bodies on prescribing in general practice. They highlighted the effect of strategic developments, the roll-out of **NHS policies** and **medicines optimisation** principles. Key informants often suggested that a prescriber's **professional background** and **patient characteristics** were important determinants of their prescribing and were concerned about variation in **PBP roles** and access to career support.

National and local guidelines

Key informants cited NICE guidelines as a key source of evidence used by prescribers in general practice, but also emphasised the guidance and associated formularies developed by local commissioning bodies, condition-specific organisations and Royal Colleges as equally important and invariably in tune with the national guidelines:

> *If it's on the formulary it's accepted, you know, it is the formulary choice. And actually now it's the GPs who are pushing back, if a specialist says 'why not use this?' 'yeah, but it's not on the formulary.* P27, KI, local/regional, focus group

NHS policies and organisation of services

Several key informants were involved in developing NHS policies which they believed had a direct influence on prescribing:

> *I think there is also a significant amount of influence resulting from national policy initiatives, so two recent examples that I could cite would be the items that shouldn't be routinely prescribed in primary care and also conditions for which medicines shouldn't be routinely prescribed.* P31, KI, regional/national, interview

They also highlighted that the availability of external support (e.g. from secondary care) affects prescribing in general practice:

> *Some areas have community geriatricians who help to support the prescribing with GPs and the pharmacists in the team, for people in care homes and those complex ones. And in other places … that support isn't there.* P28, KI, regional/national, focus group

Medicines Optimisation

Key informants expressed concern about medicines and prescribing-related problems which they explicitly connected with an impetus to develop and embed medicines optimisation principles.

Influences on prescribing in general practice included an increase in problematic polypharmacy, and the importance of patient-centred and safe prescribing:

> *So it … will say first line this, add in that, add in this as a third drug … So you've only got to have two long term conditions …and you'll be on six drugs before you know it.* P4, KI, regional, interview

> *The fact that your liver might need some fancy drug might be of completely no interest to you if it means that you're trekking off to the hospital all the time and you're suffering from side effects and actually what you want to do is spend some time with your grandchildren.* P28, KI, regional/national, focus group

> *If I want to get somebody to really think twice about the way they prescribe, then I always play the safety card … our prescribing incentive scheme for GPs is called the 'quality prescribing and safety scheme'.* P23, KI, local/regional, interview

Professional differences

Key informants attributed variation in prescribing to different professional backgrounds and training. They mainly characterised nurses and PBPs as risk-averse and prescribing within strict limits, whereas GPs were considered to have the greatest ability and appetite for risk-taking and managing complex patients:

> *I think nurses tend to be … a bit more protocol-driven and so tend to be quite focussed on an individual disease entity. … Pharmacists I see have a slightly different risk appetite and they're willing to juggle maybe two or three comorbidities and then, I would hope, what should come about is that GPs and doctors should be able to then multiple* [sic] *the more complex, multi comorbidities.* P27, KI, local/regional, focus group

Patient characteristics

Key informants reflected upon the influence of patients as individuals as well as populations (general and local). Public opinion and media messages about medicines were particularly mentioned:

> *I mean just because it's cancer doesn't mean that the drugs always work, if only you can get your hands on them, which is how they're portrayed in the media, isn't it? If only we could get this drug funded all would be well.* P28, KI, regional/national, focus group

Key informants also recognised the importance of socio-economic factors in influencing prescribing in an area:

> *Self-care is hugely on the agenda at the moment, encouraging patients to buy things over the counter, rather than getting them prescribed.* [Our] *GPs are in a more deprived area and tend to feel that patients can't*

afford to buy those products and therefore they end up prescribing them. P8, KI, local, interview

Practice-based pharmacists (PBPs)

Key informants recognised that PBPs had hugely variable roles, responsibilities and models of employment. Participants expressed mixed opinions about the best model; most favoured situating pharmacists within general practices. Some believed that PBPs' skills and time may be most effectively used within the emerging primary care networks, in which groups of practices are working together to provide a range of healthcare services for the local population.

Participants reported variation between PBPs, particularly in terms of experience and skills, and expressed concern about differing levels of support and training available. Some saw opportunities for career development as crucial to allowing PBPs to achieve their potential:

> *We have this varied pattern of some people who come in more or less newly qualified to the role in a GP practice. So the NHS England training is good, actually, but it only goes up to a certain point. What happens to those people … where do they go next?* (P28, KI, regional/national, focus group)

(iii) COMPARISON: Prescribers' and key informants' perspectives

There was general agreement between prescribers and key informants about many of the influences on general practice prescribing (Figure 1, Comparison of prescriber and key informant perspectives).

Both groups acknowledged that national and other prominent guidelines had considerable influence and emphasised the effects of prescribers' professional backgrounds and experience. Both groups identified individual patients, populations, the media and public opinion as having a substantial influence on prescribing.

While prescribers identified influences on prescribing that may be shaped at a general practice level, such as attitudes towards shared learning, key informants highlighted the effect of NHS organisational policies and the availability of external support (e.g. from secondary care). Key informants mentioned universal problems with medicines (e.g. polypharmacy) and the benefits of medicines optimisation principles for patient outcomes. Participants in both groups mentioned current wide variation in the role of the PBP. Prescribers had mixed views about the potential for the PBP to address underlying workforce problems in general practice, and key informants emphasised the need for ongoing training, support and career progression.

DISCUSSION

Principal findings

This study identified a range of influences on prescribing in general practice by exploring the perspectives of prescribers and key informants. Although the guidance provided by NICE and other bodies is frequently described as fundamental to informing prescribing decisions in general practice, this study highlighted a complex range of competing realities which impact on prescribers' abilities or inclination to prescribe according to the available evidence. The application of guidelines differs between professional groups, whose attitudes are shaped by their early and continuing training. Patient characteristics (both individuals and populations) are also key influences. The role of the PBP varies between general practices, and this study has revealed some caution (especially amongst GPs) about the potential for increasing PBPs' impact on general practice prescribing.

Strengths and limitations

Whilst prescribers were evenly drawn from the different professional groups identified at the study outset, most were from practices with medium to large list sizes (>5,000 patients) and with less deprivation. Prescribers in smaller general practices and in areas of greater deprivation and with more varied experience may have provided

additional insights into the factors influencing their prescribing. Key informant participants were working at various levels within the NHS and encompassed a broad range of roles and perspectives.

Flexible evolution of the interview topic guides allowed for exploration of additional issues raised by individual participants which had not been anticipated at the research design stage. The focus group discussion with key informants was less researcher-led than the interviews and offered an opportunity for participants to interact with, probe and challenge each other. A similar session with prescribers may have yielded alternative or additional observations, but this was not possible.

This study explored the use of guidelines in general and the factors which compete with them to influence general practice prescribing. Research to explore the uptake of guidelines for specific medical conditions or to investigate prescribing in instances where evidence is unclear or existing guidelines are considered unhelpful, may provide different insights.

Comparison with existing literature

Previous research has highlighted differences between evidence, such as NICE guidelines, and prescribing in a range of healthcare settings [8 32]. This study identified several influences which compete with the evidence-based approach promoted in guidelines and affect prescribing decisions in general practice, in particular the prescriber's professional background. Sharing of responsibilities among prescribers from differing professional backgrounds may have resulted in variation in the use of guidelines, but some see non-medical prescribers as suited to promoting an evidence-based approach to prescribing [33]. Although all professional groups represented in this study acknowledged the importance of guidelines, nurses and pharmacists were perceived by themselves, GPs and key informants as more likely to prescribe in accordance with the available evidence than GPs. This suggests that strategies to increase evidence-based prescribing should be tailored for professional groupings and reflect their different routes to acquiring prescribing skills. Differences in the scope of prescribing routinely undertaken by medical and non-medical prescribers should also be considered. Participants explicitly mentioned the impact of local demographics on prescribing, which corresponds with previous research linking practice prescribing patterns with patient populations [34 35]. Taking account of local demographics and providing patient-centred care may impact the professional's prescribing and perceptions about the appropriateness of guidelines. This tension echoes previous research which identified competing 'macro' and 'micro' influences on prescribing [20] and the 'explicit' and 'tacit' types of knowledge which inform prescribing decisions [36].

Previous research with GPs found that openness to sharing knowledge amongst general practice colleagues can shape and develop prescribing [37]. Some participants in this study worked in practices which encouraged diverse professionals to share new evidence and some did not. Their reflections suggest that a collaborative culture may facilitate greater use of guidelines and reduce problematic variation in prescribing within teams.

This study revealed more cautious attitudes, particularly among GPs, towards PBPs' contribution to the general practice team than reported elsewhere [38 39]. PBPs who had been part of the NHS England scheme [27 40] were positive about the associated training, support and networking opportunities and these have previously been identified as important factors which optimise the complementary skills of prescribers from a pharmacy background; the ambition and aptitude of the individual are also influential [41].

Implications for research and practice

This study has demonstrated a range of complex and overlapping factors that affect prescribing in general practice and impact prescribers' use of the evidence presented in guidelines. These influences are not all amenable to modification and further analysis of the data to pinpoint flexible behaviours and determinants would be a useful next step. Participants in our study expressed a range of views about the potential for PBPs to influence prescribing in general practice. Capturing the views and experiences of a greater number of PBPs working in diverse practice contexts will provide a robust basis for developing strategies which involve PBPs in promoting the use of guidelines in general practice prescribing. These strategies should focus on the more flexible

influences on prescribing and take account of the different use of guidelines between prescribers from a range of professional backgrounds.

Conclusion

A multiplicity of influences impact prescribing in general practice and compete with guidance from NICE and other bodies. The effect of these influences is often experienced differently by medical prescribers who are less focused on guideline use than their non-medical colleagues. Pharmacists and their general practice colleagues require a clearer definition of the PBP role to allow them to fulfil their potential to contribute to greater evidence-based prescribing in general practice.

ADDITIONAL INFORMATION

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Ethical approval

This study was approved by the Research Ethics Approval Committee for Health (ref. EP 17/18 233), University of Bath.

Competing interests

There are no competing interests

Author contributions

Authors: MC, MW and SC contributed to the design of the study; MC collected and analysed all the data; MC, MW and SC contributed to the interpretation of the data for this manuscript. MC drafted the manuscript and MW and SC critically revised and gave approval for the final version. All authors agree to be accountable for all aspects of the work.

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Data sharing statement

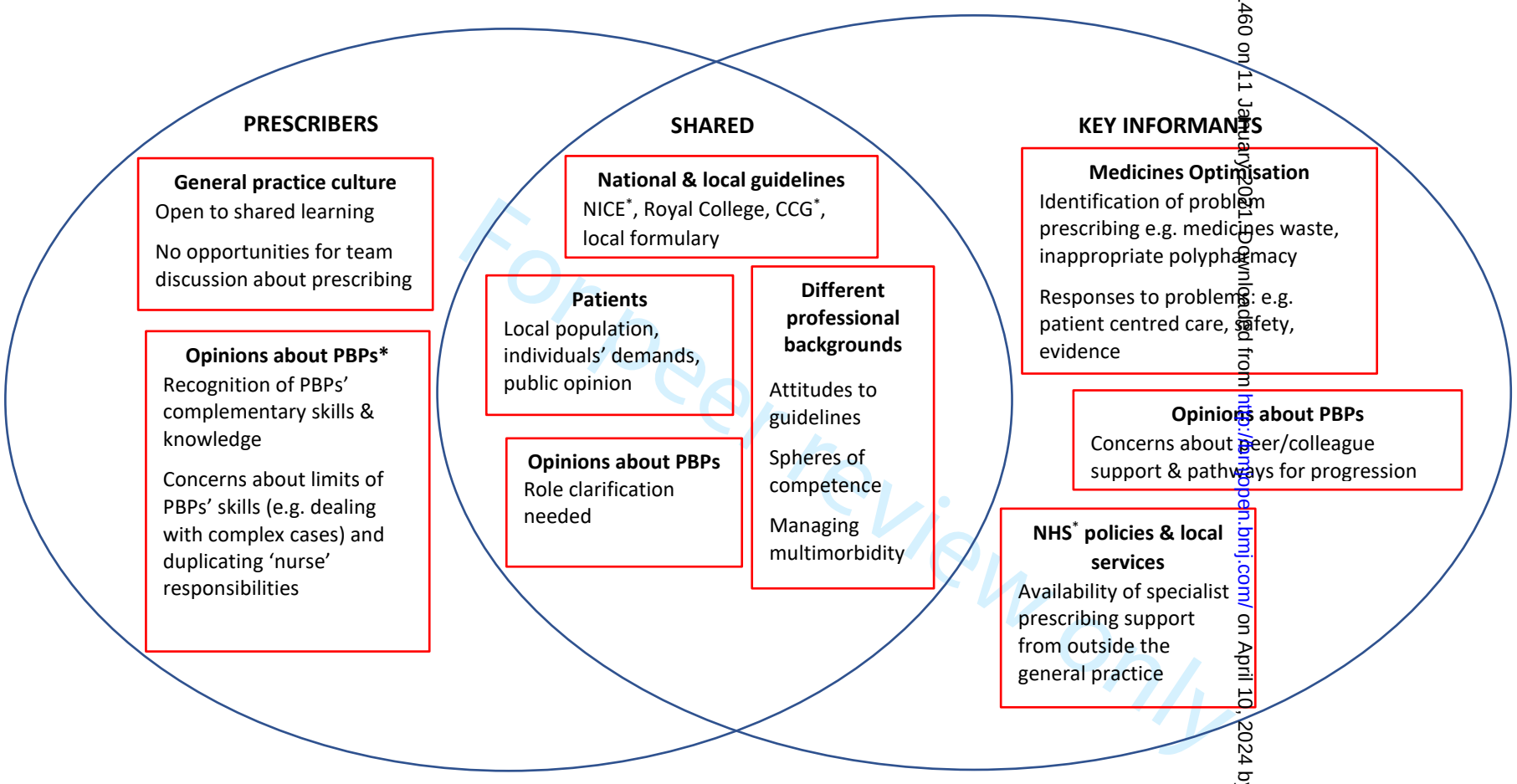
Data are available on reasonable request.

REFERENCES

1. Royal Pharmaceutical Society. Medicines Optimisation: Helping patients to make the most of medicines 2013 [Available from: https://www.england.nhs.uk/medicines/medicines-optimisation/ accessed October 2020.
2. NHS Digital. Prescribing and medicines team 2018 [Available from: https://digital.nhs.uk/data-and-information/data-insights-and-statistics/prescribing-and-medicines-team accessed October 2020.
3. The Kings Fund. The rising cost of medicines to the NHS: what's the story?, 2018.
4. Garfield S, Barber N, Walley P, et al. Quality of medication use in primary care - Mapping the problem, working to a solution: A systematic review of the literature. *BMC Med* 2009;7:50. doi: 10.1186/1741-7015-7-50
5. Trueman P, Lowson K, Blighe A, et al. Evaluation of the Scale, Causes and Costs of Waste Medicines, 2010.
6. Public Health England. Atlas of Variation 2019 [Available from: https://fingertips.phe.org.uk/profile/atlas-of-variation accessed October 2020.
7. Flodgren G, Hall AM, Goulding L, et al. Tools developed and disseminated by guideline producers to promote the uptake of their guidelines. *Cochrane Database Syst Rev* 2016(8) doi: 10.1002/14651858.CD010669.pub2
8. Foy R, Leaman B, McCrorie C, et al. Prescribed opioids in primary care: cross-sectional and longitudinal analyses of influence of patient and practice characteristics. *BMJ Open* 2016;6(5):e010276. doi: 10.1136/bmjopen-2015-010276 [published Online First: 2016/05/15]
9. Soyombo S, Stanbrook R, Aujla H, et al. Socioeconomic status and benzodiazepine and Z-drug prescribing: a cross-sectional study of practice-level data in England. *Fam Pract* 2019 doi: 10.1093/fampra/cmz054 [published Online First: 2019/10/24]
10. National Institute for Health and Care Excellence. History of NICE 2020 [Available from: https://www.nice.org.uk/about/who-we-are/history-of-nice accessed October 2020.
11. Willis TA, West R, Rushforth B, et al. Variations in achievement of evidence-based, high-impact quality indicators in general practice: An observational study. *PLoS One* 2017;12(7):e0177949. doi: 10.1371/journal.pone.0177949 [published Online First: 2017/07/14]
12. National Institute for Health and Care Excellence. Medicines Optimisation 2016 [Available from: https://www.nice.org.uk/guidance/qs120 accessed October 2020
13. Cope L, Abuzour A, Tully M. Nonmedical prescribing: where are we now? *Therapeutic advances in drug safety* 2016;7(4):165-72. doi: 10.1177/2042098616646726 [published Online First: 2016/04/29]
14. Nursing and Midwifery Council. The NMC register, 1 April 2019 – 31 March 2020. London, 2020.
15. General Pharmaceutical Council. General Pharmaceutical Council 2019 [Available from: https://www.pharmacyregulation.org/ accessed October 2020.
16. Morgan DL. Pragmatism as a Paradigm for Social Research. *Qualitative Inquiry* 2014;20(8):1045-53. doi: 10.1177/1077800413513733
17. Peek L, Fothergill A. Using focus groups: lessons from studying daycare centers, 9/11, and Hurricane Katrina. *Qualitative Research* 2009;9(1):31-59. doi: 10.1177/1468794108098029
18. Coyne IT. Sampling in qualitative research. Purposeful and theoretical sampling; merging or clear boundaries? *J Adv Nurs* 1997;26(3):623-30. [published Online First: 1997/09/26]
19. Haastrup PF, Rasmussen S, Hansen JM, et al. General practice variation when initiating long-term prescribing of proton pump inhibitors: a nationwide cohort study. *BMC Fam Pract* 2016;17:57. doi: 10.1186/s12875-016-0460-9 [published Online First: 2016/05/29]
20. Grant A, Sullivan F, Dowell J. An ethnographic exploration of influences on prescribing in general practice: why is there variation in prescribing practices? *Implement Sci* 2013;8:72. doi: 10.1186/1748-5908-8-72 [published Online First: 2013/06/27]
21. Public Health England. National General Practice Profiles 2019 [Available from: https://fingertips.phe.org.uk/profile/general-practice/data#page/0/gid/2000005/pat/152/par/E38000204/ati/7/are/D83005 accessed October 2020.
22. Gioia DA, Corley KG, Hamilton AL. Seeking Qualitative Rigor in Inductive Research: Notes on the Gioia Methodology. *Organizational Research Methods* 2012;16(1):15-31. doi: 10.1177/1094428112452151
23. Green J, Thorogood N. Qualitative methods for health research. London: SAGE Publications 2004.
24. Braun V, Clarke V. Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health* 2019;11(4):589-97. doi: 10.1080/2159676X.2019.1628806

25. O'Brien BC, Harris IB, Beckman TJ, et al. Standards for reporting qualitative research: a synthesis of recommendations. *Acad Med* 2014;89(9):1245-51. doi: 10.1097/ACM.0000000000000388 [published Online First: 2014/07/01]
26. Tong A, Craig J, Sainsbury P. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care* 2007;19(6):349-57. doi: 10.1093/intqhc/mzm042
27. NHS England. Pharmacy Integration Fund 2016 [Available from: https://www.england.nhs.uk/commissioning/primary-care/pharmacy/integration-fund/ accessed October 2020.
28. NHS England. 2019/20 General Medical Services (GMS) contract: Quality and Outcomes Framework (QOF) 2019 [Available from: https://www.england.nhs.uk/publication/2019-20-general-medical-services-gms-contract-quality-and-outcomes-framework-qof/ accessed October 2020.
29. Basildon & Brentwood Clinical Commissioning Group. Prescribing Incentive Scheme 2019-2020 2019 [Available from: https://basildonandbrentwoodccg.nhs.uk/your-health/medicines-management accessed October 2020.
30. Optum Inc. ScriptSwitch 2018 [Available from: http://www.optum.co.uk/how-we-help/scriptswitch.html accessed October 2020.
31. First Databank. FDB OptimiseRX [Available from: https://www.fdbhealth.co.uk/solutions/fdb-optimiserx/ accessed October 2020.
32. Duncan P, Cabral C, McCahon D, et al. Efficiency versus thoroughness in medication review: a qualitative interview study in UK primary care. *Br J Gen Pract* 2019;69(680):e190-e98. doi: 10.3399/bjgp19X701321 [published Online First: 2019/02/13]
33. Barnett NL. Opportunities for collaboration between pharmacists and clinical pharmacologists to support medicines optimisation in the UK. *Br J Clin Pharmacol* 2019 doi: 10.1111/bcp.13966 [published Online First: 2019/04/16]
34. Guthrie B, Makubate B, Hernandez-Santiago V, et al. The rising tide of polypharmacy and drug-drug interactions: population database analysis 1995-2010. *BMC Med* 2015;13:74. doi: 10.1186/s12916-015-0322-7 [published Online First: 2015/04/19]
35. Tobin H, Bury G, Cullen W. Mental illness in primary care: a narrative review of patient, GP and population factors that affect prescribing rates. *Ir J Psychol Med* 2018:1-8. doi: 10.1017/ipm.2018.35 [published Online First: 2018/10/03]
36. Gabbay J, May Al. Evidence based guidelines or collectively constructed "mindlines?" Ethnographic study of knowledge management in primary care. *BMJ* 2004;329(7473):1013. doi: 10.1136/bmj.329.7473.1013
37. Thomson JS, Anderson K, Haesler E, et al. The learner's perspective in GP teaching practices with multi-level learners: a qualitative study. *BMC Med Educ* 2014;14:55. doi: 10.1186/1472-6920-14-55 [published Online First: 2014/03/22]
38. Maskrey M, Johnson CF, Cormack J, et al. Releasing GP capacity with pharmacy prescribing support and New Ways of Working: a prospective observational cohort study. *Br J Gen Pract* 2018;68(675):e735-e42. doi: 10.3399/bjgp18X699137 [published Online First: 2018/09/27]
39. Anderson C, Zhan K, Boyd M, et al. The role of pharmacists in general practice: A realist review. *Research in Social and Administrative Pharmacy* 2019;15(4):338-45. doi: https://doi.org/10.1016/j.sapharm.2018.06.001
40. National Health Service. NHS Long Term Plan 2019 [Available from: https://www.longtermplan.nhs.uk/publication/nhs-long-term-plan/ accessed October 2020.
41. Butterworth J, Sansom A, Sims L, et al. Pharmacists' perceptions of their emerging general practice roles in UK primary care: a qualitative interview study. *Br J Gen Pract* 2017;67(662):e650-e58. doi: 10.3399/bjgp17X691733

FIGURE 1: Comparison of prescriber and key informant perspectives: Influences on prescribing and practice-based pharmacists (PBPs)



NICE	National Institute of Health and Care Excellence
CCG	Clinical Commissioning Group
NHS	National Health Service
PBP	Practice-based pharmacist

SUPPLEMENTARY BOX 1: General practice prescriber interview topic guide

1. Please briefly describe your role as a prescriber in general practice

PROMPTS

   a. How long since you qualified/registered?
   b. How long have you been in your current/most recent post?
   c. Who is your employer?
   d. Do you have a specialism?

2. What are the factors which underpin prescribing decisions in your general practice?

PROMPTS

   a. How much do decisions vary amongst different professional groups?

PROMPTS (examples)

   b. National influences
      i. National Institute for Health & Clinical Excellence (NICE)
      ii. Other guidelines
      iii. Contract (e.g. Quality & Outcomes Framework (QOF))
      iv. Regional Medicines Optimisation Committee (RMOC) information or advice
   c. Local influences
      i. Advice from the local prescribing committee (may be called Area Prescribing Committee)
      ii. Local prescribing incentive schemes
      iii. Clinical Commissioning Group (CCG) (e.g. practice visits, guidelines)
      iv. Patient factors (population, specific patients)
      v. Electronic prescribing 'rules'
   d. Education, feedback and information
      i. Feedback (e.g. from CCG) about prescribing practice
      ii. Local primary care education programmes
      iii. Informal learning (e.g. from colleagues)
      iv. Access to electronic data about prescribing in the area or region or national (e.g. RightCare, ePACT2)
      v. Information from pharmaceutical industry

3. How do the same or other factors currently influence your own prescribing?

4. What is your experience of variation in prescribing practice in your general practice?

5. FOR GPs & NURSE PRESCRIBERS: What can you tell me about how a practice-based pharmacist may influence prescribing in your general practice, and you as a prescriber?

   FOR PRACTICE-BASED PRESCRIBING PHARMACISTS: What can you tell me about how you, as a prescriber, could influence prescribing in your general practice?

PROMPTS

   a. Do you have any thoughts on how practice-based pharmacists should be employed (by the practice/CCG)?
   b. What training or support may be necessary for practice-based pharmacists to work effectively in the general practice?

6. Is there anything else you would like to say about your current role, or about prescribing in your general practice (or area)?

SUPPLEMENTARY BOX 2: Key Informant interview and focus group topic guide

1. Please briefly describe your role with regard to prescribing in general practices in your area/region/nationally

PROMPTS

a. How long since you qualified/registered?
b. How long have you been in your current/most recent post?
c. Who is your employer?
d. Do you have a specialism?
e. Do you have direct contact with general practices (or CCGs)?
f. Are you involved in monitoring prescribing practice?
g. Are you involved in supporting general practices to make changes to their prescribing practice?

2. In your experience what are the main influences on prescribing practice in general practices (amongst all professional groups)?

PROMPTS (categories & examples)

a. National influences
    i. National Institute for Health & Clinical Excellence (NICE)
    ii. Other guidelines
    iii. Contract (e.g. Quality & Outcomes Framework (QOF))
    iv. Regional Medicines Optimisation Committee (RMOC) information or advice
b. Local influences
    i. Advice from the local prescribing committee (may be called Area Prescribing Committee)
    ii. Local prescribing incentive schemes
    iii. Clinical Commissioning Group (CCG) (e.g. practice visits, guidelines)
    iv. Patient factors (population, specific patients)
    v. Electronic prescribing 'rules'
c. Education, feedback and information
    i. Local primary care education programmes
    ii. Informal learning (e.g. from colleagues)
    iii. Access to electronic data about prescribing in the area or region or national (e.g. RightCare, ePACT2)
    iv. Information from pharmaceutical industry

3. What is your experience of variation in prescribing practice in your area (or region or nationally)?

4. (As you know) pharmacists are increasingly based in general practices. What is your opinion about whether practice-based pharmacists could play a part in influencing prescribing behaviour in general practice?

PROMPTS

a. Do you have any thoughts on how practice-based pharmacists should be employed (by the practice/CCG)?
b. What training or support may be necessary for practice-based pharmacists to work effectively in the general practice?

5. Is there anything else you would like to say about your current role, or about prescribing in general practice in your area (or region or nationally)?

Mary Carter, completed reporting checklist for qualitative study (based on the SRQR guidelines)

		Reporting Item	Page Number
Title			
	#1	Concise description of the nature and topic of the study identifying the study as qualitative or indicating the approach (e.g. ethnography, grounded theory) or data collection methods (e.g. interview, focus group) is recommended	1
Abstract			
	#2	Summary of the key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results and conclusions	2
Introduction			
Problem formulation	#3	Description and signifcance of the problem / phenomenon studied: review of relevant theory and empirical work; problem statement	3
Purpose or research question	#4	Purpose of the study and specific objectives or questions	3
Methods			

Qualitative approach and research paradigm	#5	Qualitative approach (e.g. ethnography, grounded theory, case study, phenomenolgy, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g. postpositivist, constructivist / interpretivist) is also recommended; rationale. The rationale should briefly discuss the justification for choosing that theory, approach, method or technique rather than other options available; the assumptions and limitations implicit in those choices and how those choices influence study conclusions and transferability. As appropriate the rationale for several items might be discussed together.	3, 4
Researcher characteristics and reflexivity	#6	Researchers' characteristics that may influence the research, including personal attributes, qualifications / experience, relationship with participants, assumptions and / or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results and / or transferability	4
Context	#7	Setting / site and salient contextual factors; rationale	4
Sampling strategy	#8	How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g. sampling saturation); rationale	4

Ethical issues pertaining to human subjects	#9	Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	12
Data collection methods	#10	Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources / methods, and modification of procedures in response to evolving study findings; rationale	4
Data collection instruments and technologies	#11	Description of instruments (e.g. interview guides, questionnaires) and devices (e.g. audio recorders) used for data collection; if / how the instruments(s) changed over the course of the study	4
Units of study	#12	Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	4, 5
Data processing	#13	Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymisation / deidentification of excerpts	4
Data analysis	#14	Process by which inferences, themes, etc. were identified and developed, including the researchers	4

		involved in data analysis; usually references a specific paradigm or approach; rationale	
Techniques to enhance trustworthiness	#15	Techniques to enhance trustworthiness and credibility of data analysis (e.g. member checking, audit trail, triangulation); rationale	4
Results/findings			
Syntheses and interpretation	#16	Main findings (e.g. interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	5-10
Links to empirical data	#17	Evidence (e.g. quotes, field notes, text excerpts, photographs) to substantiate analytic findings	5-9
Discussion			
Integration with prior work, implications, transferability and contribution(s) to the field	#18	Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application / generalizability; identification of unique contributions(s) to scholarship in a discipline or field	9, 10
Limitations	#19	Trustworthiness and limitations of findings	9, 10
Other			
Conflicts of interest	#20	Potential sources of influence of perceived influence on study conduct and conclusions; how these were managed	12

Funding	#21	Sources of funding and other support; role of funders in data collection, interpretation and reporting	12

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TITLE

Multiplicity and complexity: a qualitative exploration of influences on prescribing in UK general practice

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ABSTRACT

Objectives

Despite widespread availability of evidence-based guidelines to inform rational use of medicines, considerable unwarranted variation exists in prescribing. A greater understanding of key determinants of contemporary prescribing in UK general practice could inform strategies to promote evidence-based prescribing. This study explored (1) current influences on prescribing in general practice and (2) the possibility that general practice-based pharmacists (PBPs) may contribute to greater engagement with evidence-based prescribing.

Design

Semi-structured, telephone interviews and a focus group were conducted, audio-recorded and transcribed verbatim. Thematic analysis was undertaken.

Participants

(i) General practice prescribers: General Practitioners (GPs), PBPs, nurses.
(ii) Key informants: Individuals within the National Health Service (NHS) with responsibility for influencing, monitoring and measuring general practice prescribing.

Setting

General practices and NHS organisations in England.

Results

Interviews with 17 prescribers (GPs (n=6), PBPs (n=6), nurses (n=5)) and six key informants, and one focus group with five key informants were undertaken between November 2018 and April 2019. Determinants operating at individual, practice and societal levels impacted prescribing and guideline use. Prescribers' professional backgrounds e.g. nursing, pharmacy, patient populations and patient pressure were perceived as substantial influences, as well as media portrayal and public perceptions of medicines.

Prescribers identified practice-level determinants of prescribing, including practice culture and shared beliefs. Key informants tended to emphasise higher-level influences, including NHS policies, availability of support and advice from secondary care and generic challenges associated with medicines use e.g. multi-morbidity.

Participants expressed mixed views about the potential of PBPs to promote evidence-based prescribing in general practice.

Conclusion

Prescribing in UK general practice is influenced by multiple intersecting factors. Strategies to promote evidence-based prescribing should target modifiable influences at practice and individual levels. Customising strategies for medical and non-medical prescribers may maximise their effectiveness.

Keywords

General practice, guideline, evidence-based, pharmacist, qualitative, prescribing

ARTICLE SUMMARY

Strengths and limitations of this study

- This study explored a range of perspectives, including:
  - Medical and non-medical professionals prescribing in general practice (doctors, pharmacists and nurses)
  - Key informants working at various NHS levels who are influencing, monitoring and measuring general practice prescribing
- The interview/focus group topic guides were developed flexibly to allow for exploration of additional topics
- This study investigated the use of guidelines in general; research to explore the uptake of guidelines for specific medical conditions may reveal a different picture

INTRODUCTION

Medicines are the most common intervention used within the NHS [1]. They are vital to the prevention and treatment of illness, maintenance of health and management of chronic conditions. NHS expenditure on medicines is eclipsed only by the staff budget [2]. Despite annual increases in spending to £17.4 billion (2016/17) [3], there is substantial evidence that medicines are not always used judiciously [4 5], with considerable unwarranted variation in practice [6 7] and sub-optimal patient outcomes [8 9].

Although the National Institute for Health and Care Excellence (NICE) , established in 1999 to address problematic variation in NHS treatment availability and quality [10], issues a huge volume of prescribing advice and guidance to prescribers, inconsistent prescribing behaviour persists and is not fully explained by practice and patient variation [11]. In accordance with major professional bodies, NICE endorses 'Medicines Optimisation' principles. [12] These explicitly promote prescribing based on individual patient experience, evidence and safety and highlight a balance between strict observance of guidelines and clinician judgement for individual patients.

In contrast with most other countries, non-medical prescribing is a key feature of UK healthcare [13]. Whilst prescribing is embedded in undergraduate and postgraduate medical curricula, non-medical professionals undertake additional training to prescribe within their scope of competency. Currently there are approximately 48,000 nurse (independent or supplementary) prescribers [14] and 9,000 pharmacist independent prescribers [15]. Many of these prescribers work in general practice.

This study investigated influences (including the use of guidelines) on prescribing and the PBPs' potential to optimise the use of evidence in prescribing in general practice. The objectives were to explore:

i. General practice prescribers' perceptions of influences on their prescribing
ii. Key informants' perspectives about the ways in which prescribing in general practice is influenced, monitored and measured, including the use of NICE and other guidelines
iii. The role and potential of PBPs to promote greater use of evidence in prescribing in general practice

METHOD

Study design

The study adopted pragmatist principles [16], seeking to gain a practical understanding of participants' experience of prescribing; data collection methods (interviews and focus group) suited to eliciting knowledge based on experience reflected this epistemological underpinning.

To encourage participation, participants were offered either a telephone or face-to-face interview. As a further boost to recruitment and to encourage an exchange of perspectives and experiences between key informants [17],

members of a Regional Medicines Optimisation Committee comprising five members were invited to attend a focus group as an adjunct to one of their half-yearly meetings.

Recruitment

Potential interviewees were initially identified through local, regional and national NHS networks and contacts and thereafter by snowball sampling [18]. Individual and practice characteristics reported to influence prescribing (e.g. experience, [19] and patient profile [20]) were included in a sample matrix (Table 1). Matrix elements were used to guide recruitment of (i) medical and non-medical prescribers in general practice and (ii) key informants working at local (one clinical commissioning group (CCG)), regional (across CCGs) and national NHS levels in roles connected with general practice prescribing. Recruitment ceased when all the matrix elements were addressed.

Initial contact with potential participants was by email. Sampling ceased when all matrix elements were filled.

TABLE 1: Target recruitment matrix

GENERAL PRACTICE PRESCRIBERS		**KEY INFORMANTS**	
Gender	Male Female	Gender	Male Female
Role	General Practitioner Practice-based pharmacist Nurse	NHS Level	Local Regional National
Years since qualification	≤10 >10	Years in current post	≤ 2 >2
Employment	Clinical Commissioning Group Practice NHS England	Direct contact with general practice	Yes No
Practice size (patient list)	Small (< 5000 patients) Medium (5000 - ≤ 10000 patients) Large (> 10000 patients)		
Practice level of deprivation*	≤ 5 > 5		
**Information from National General Practice Profiles [21] (lower numbers indicate more deprivation)*			

Data collection

Potential participants were sent an information sheet and asked to provide written informed consent prior to participation. The topic guides (interview for prescribers and interview/focus group for key informants) (see Supplementary Information) were informed by the literature and information from preliminary discussions with local and regional NHS contacts. Questions focused on the participant's role, perceived influences on prescribing, the experience of variation in prescribing and the role and potential of PBPs. Guides were piloted with non-participating pharmacists to check for relevance of questions and terminology and were refined during the study as new topics were identified [22]. Prior to the interview, participants were asked to provide brief details about themselves and the general practice or organisation in which they worked.

All one-to-one interviews were conducted by telephone by one researcher (MC). MC led the focus group, supported by a facilitator (NA, post-doctoral researcher) who made brief notes to support transcription of the

recorded discussion. The interviews and focus group were digitally recorded, transcribed verbatim and identifying information removed (MC). MC made short reflexive field notes.

Data collection took place between November 2018 and April 2019.

Data analysis

Transcripts were coded using standard software QSR NVivo v11©. Data were analysed interpretatively, focussing on participants' perception and understanding of influences on prescribing [23], in two groups 1) from interviews with prescribers and 2) from interviews and focus group for key informants. Topic guides included the same areas of investigation and allowed common experiences and perceptions between the groups to be identified. Codes about the influences on prescribing and the PBP's role were generated using reflexive thematic analysis techniques [24] by which participants' experiences and perceptions were understood and categorised. MC developed an initial framework of codes, which was applied by a mixed-methods researcher (AD, PhD student) to analyse and code a subset (n=6) of transcripts. Both researchers subsequently discussed commonalities and differences in coding. The framework was amended to reflect these discussions, and thereafter all transcripts were coded by MC using the refined coding framework. Main themes and links between themes from all transcripts were discussed by MC and AD and agreed with the entire team.

Both MC and AD had previously conducted qualitative research with general practices, but neither was a pharmacist or prescriber. Two interviewees were known professionally to MC prior to participating.
This report conforms to the Standards for Reporting Qualitative Research (SRQR) [25] and Consolidated Criteria for Reporting Qualitative Research (COREQ) [26] guidelines

PATIENT AND PUBLIC INVOLVEMENT

This study specifically focussed on the influences on prescribing; prescribers, key informants and patients were not involved in the design or conduct of the research.

RESULTS

Twenty-three interviews were completed with six GPs, 11 non-medical, independent prescribers (PBPs (n=6), nurses (n=5)) (Table 2) and six key informants. One focus group was conducted with five key informants (Table 3) comprising representatives from a Regional Medicines Optimisation Committee (RMOC) whose members (decision-makers, healthcare professionals and patients) support and optimise local prescribing practice and reduce unwarranted variation regionally and nationally (in England). Interviews lasted a mean of 41 minutes (range 24 – 53 minutes). The focus group lasted 59 minutes.

Most participating PBPs had direct experience of the Clinical Pharmacists in General Practice programme [27], a scheme funded by NHS England to support the introduction of pharmacists into general practice. PBPs' current roles varied, with most including responsibility for medicines reviews, repeat prescriptions and some audit work.

The results are presented under theme headings in three sections: (i) Prescribers' perspectives, (ii) Key informants' perspectives, (iii) Comparison of prescriber and key informant perspectives. The contributor of each quotation is denoted by a unique P (participant) number and role (GP, nurse, PBP, KI - key informant). For key informants the NHS level at which s/he worked and I-interview or FG-focus group is indicated.

TABLE 2: Prescriber and general practice characteristics

Individual characteristics					General practice characteristics	
Participant no.	**Gender**	**Employer and work location**	**Years since registration**	**Years since qualifying as independent prescriber**	**Practice list size**	**Indices of Multiple Deprivation (IMD) decile***
General Practitioners (GPs)						
P10	F	Practice, England (West)	20		5000 – ≤ 10,000	≤ 5
P12	M	Practice, England (South West)	36		5000 – ≤ 10,000	> 5
P13	F	Practice, Scotland	26		5000 – ≤ 10,000	> 5**
P14	F	Practice, England (South West)	31		5000 – ≤ 10,000	> 5
P16	F	Practice, England (South West)	26		> 10,000	> 5
P18	F	Practice, England (Midlands)	12		5000 – ≤ 10,000	≤ 5
Practice-based pharmacists (PBPs)						
P3	M	Practice, England (South)	> 10	> 5	> 10,000	> 5
P9	M	Group of 4 practices, England (London)	< 10	≤ 5	<5000 >10,000 >10,000 >10,000	≤ 5 > 5 <5 <5
P11	M	Practice, England (West)	< 10	≤ 5	> 10,000	> 5
P22	M	Practice, England (South)	> 10	≤ 5	> 10,000	≤ 5
P29	F	Practice, England (East)	< 10	≤ 5	> 10,000	> 5
P32	M	Community pharmacy/ Practice, England (South)	> 10	≤ 5	5000 – ≤ 10,000	> 5
Nurses						
P5	F	Practice, Wales	> 10	> 5	> 10,000	> 5**
P1	M	Practice, England (West)	> 10	> 5	> 10,000	> 5
P15	F	Practice, England (West)	> 10	> 5	> 10,000	> 5
P19	F	Practice, England (Midlands)	> 10	> 5	> 10,000	≤ 5
P21	F	Practice, England (South)	> 10	≤ 5	> 10,000	> 5

**Information from National General Practice Profiles[21] (lower numbers indicate more deprivation)*

***Derived from participant's depiction of patient population*

P9 worked in four practices; P3 and P21 worked in the same practice

All PBPs and nurses were independent prescribers

TABLE 3: Key informant characteristics

Participant no.	Gender	Age	National Health Service level Local*/regional**/national*** (England)	Time in post	Direct contact with general practices	Interview or focus group
P2	F	>30 to ≤50 years	Local	≤ 2 years	Y	Interview
P4	F	>50 years	Regional	>2 years	Y	Interview

P8	F	>30 to ≤50 years	Local	≤ 2 years	Y	Interview
P17	F	>50 years	National	>2 years	N	Interview
P23	F	>50 years	Local & regional	>2 years	Y	Interview
P24	M	>50 years	Local & regional	>2 years	N	Focus Group
P25	F	>30 to ≤50 years	Local & regional	>2 years	Y	Focus Group
P26	M	>30 to ≤50 years	National & regional	>2 years	Y	Focus Group
P27	M	>50 years	Local & regional	>2 years	Y	Focus Group
P28	F	>50 years	National & regional	>2 years	Y	Focus Group
P31	M	>50 years	National & regional	>2 years	N	Interview

* Local: working at individual Clinical Commissioning group level

** Regional: working across Clinical Commissioning Groups or regional body

*** National: representative of/working on national body

(i) PRESCRIBERS' PERSPECTIVES

Summary of prescribers' perspectives (themes in bold text)

Prescribers acknowledged that **guidelines** from NICE and other bodies were a predominant influence on their prescribing. They also discussed the impact of their **professional background** and training, as well as experience and **individual characteristics**. **Patient characteristics**, such as socio-economic features of local **populations** were frequently cited as an important determinant of prescribing, as was the **organisational culture** of the general practice. Prescribers expressed a range of views about the current and potential **roles of PBPs**.

National and local guidelines

Prescribers from all professional groups reported that their prescribing was fundamentally influenced by information provided by NICE guidelines, their local Clinical Commissioning Group (CCG), condition-specific organisations and Royal Colleges:

> *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.* P1, Nurse

> *NICE guidance we're heavily influenced by … number 1 is* [name of CCG formulary] *… number 2 is the NICE guidance and then I suppose number 3 is the British National Formulary, it's every GP's bible really.* P14, GP

Guidelines were often amplified by financial incentive schemes, such as the national Quality and Outcomes Framework (QOF) [28] and local initiatives e.g. from the CCG [29]. Prescribers commented on the impact of computerised decision-support tools, such as ScriptSwitch [30] and Optimise RX [31]. Some prescribers appreciated the real-time prompts from these systems:

> *I personally find it a huge source of assurance and reassurance in my prescribing practice.* P1, Nurse

Others reported being overwhelmed by the information:

> *There's so much information sometimes like 'do not prescribe this in pregnancy' and it's someone in their 50s … we are inclined to ignore that kind of information and then suddenly realise that … what it was flagging up was actually important.* P13, GP

Professional background

Many participants mentioned their own and colleagues' professional background as influencing their prescribing. PBPs and nurses were frequently characterised, by themselves and others, as aware of their professional boundaries and 'sphere of competence' and therefore more likely to follow prescribing guidelines than their GP colleagues:

> *I guess I'd make the distinction between GPs and independent prescribers …* [the latter] *… are a bit more cautious … you … have your area and you … won't stray outside that. So being educated before prescribing in new areas is much more important. Whereas I think as far as the GPs go, they can prescribe anything and everything from day 1.* P11, PBP

Individual experience and qualities

Individual prescribers' accumulated experience and access to support, education and development opportunities were also considered to be important determinants of prescribing:

> *So we might have a specialist in the field … recently we had a cardiologist consultant and he spoke about heart failure, so it was educational … it really helped weighing up the prescribing techniques that we use.* P22, PBP

Individual qualities, such as confidence and ambition were also mentioned as influences on prescribing:

> *I think you're willing to learn, you're willing to try new things and look at your own confidence and you've got to be really honest.* P29, PBP

Patient characteristics

The socio-economic profile of the local patient population was identified by prescribers as an influence on their prescribing. Several reported responding to the needs of deprived patient populations:

> *Where I work, it's quite a deprived area, life expectancy is generally a lot lower ... So our approach is very different, we really try to serve the needs of the local demographic... if it was in a different setting we would be saying 'go and buy this over the counter' … that patient's not really in a position where they would afford it.* P22, PBP

Some also mentioned the pressure of prescribing for an affluent and assertive population:

> [We] *encourage* [sic] *people that things that are cheaper to buy over the counter would be better buying over the counter … But some of our patients are a bit resistant to the idea… a case of 'why should we? We've paid tax, we should be getting these things.'* P13, GP

Prescribers identified guidance from authoritative sources, such as NICE, as a tool for managing challenging demands from individual patients:

> *NICE is what you turn to when the patient says 'I want the drug that was in the Daily Mail last week'. And you say 'sorry I can't prescribe that, it's not been agreed by NICE yet.'* P12, GP

Comments about managing patient demand highlighted differences between individual prescribers:

> *I'm probably a bit too nice sometimes! One of my colleagues is very good at just saying 'no'. For things like sleeping tablets. I tend to do more negotiation, short supplies or weaning courses … rather than being a point blank 'no' person.* P18, GP

Organisational culture

Prescribers discussed the culture within their general practice, including opportunities for informal learning from colleagues about new developments in guidelines and prescribing:

> *We take group learning very seriously, we have clinical catch up at coffee, where if anyone has found any new exciting evidence or guidelines or examples of good practice we do tend to talk inter-professionally.* P29, PBP

> *In practice, we don't as a group kind of get together … as clinicians and feeding back information, events that have happened … significant events … we don't have joint CPD* [continuing professional development] *events.* P22, PBP

Although prescribers often reported limited influence from the pharmaceutical industry (noted by some as being different from close relationships in the past), contact between practices and "drug reps" still continued in other forms:

> *Every practice I've worked in has stopped seeing drug reps. I think there is still advertising in Monthly Index of Medical Specialities and in things like the British Medical Journal … some of the fairly accessible GP free education has still got drug reps attending. I don't talk to them, but I'm always made to feel slightly bad for not talking to them because you're always encouraged to.* P10, GP

Practice-based pharmacist (PBP) roles

PBPs had differing employment models and patterns, with some individuals working as full members of the general practice team and others shared between several practices. Experience varied considerably as did their access to training, support and development.

Although other prescribers often mentioned the positive impact of PBPs' complementary knowledge and skills, some GPs were cautious about PBPs' potential impact on prescribing in general practice:

> *Prescribing in the context of multi-morbidity is the sort of thing that experienced GPs offer … I think prescribing pharmacists could do really well, but when they're into the more complex, multi-faceted, social, psychological issues and stuff that the generalist patients have, they would find it more difficult.* P12, GP

Participants expressed mixed views about PBPs' potential to influence their colleagues' prescribing practice, but many mentioned the importance of PBPs' particular knowledge of medicines:

> *They (PBPs) were invaluable as a source of information, in terms of kind of combinations of things and interactions* P18, GP

Some identified the types of tasks most appropriate for PBPs, including medicines review and reconciliation, repeat prescribing and patient education, but cautioned against PBPs duplicating tasks commonly undertaken by nurses.

> *They're certainly looking at the sheer burden of repeat prescribing and medicine management … that's going to … be more pharmacist-driven to take some of the pressure off ourselves.* P13, GP

(ii) KEY INFORMANTS' PERSPECTIVES

Summary of key informants' perspectives (themes in bold text)

Key informants emphasised the fundamental influence of **guidelines** produced by NICE, CCGs and professional bodies on prescribing in general practice. They highlighted the effect of strategic developments, the roll-out of **NHS policies** and **medicines optimisation** principles. Key informants often suggested that a prescriber's **professional background** and **patient characteristics** were important determinants of their prescribing and were concerned about variation in **PBP roles** and access to career support.

National and local guidelines

Key informants cited NICE guidelines as a key source of evidence used by prescribers in general practice, but also emphasised the guidance and associated formularies developed by local commissioning bodies, condition-specific organisations and Royal Colleges as equally important and invariably in tune with the national guidelines:

> *If it's on the formulary it's accepted, you know, it is the formulary choice. And actually now it's the GPs who are pushing back, if a specialist says 'why not use this?' 'yeah, but it's not on the formulary.* P27, KI, local/regional, focus group

NHS policies and organisation of services

Several key informants were involved in developing NHS policies which they believed had a direct influence on prescribing:

> *I think there is also a significant amount of influence resulting from national policy initiatives, so two recent examples that I could cite would be the items that shouldn't be routinely prescribed in primary care and also conditions for which medicines shouldn't be routinely prescribed.* P31, KI, regional/national, interview

They also highlighted that the availability of external support (e.g. from secondary care) affects prescribing in general practice:

> *Some areas have community geriatricians who help to support the prescribing with GPs and the pharmacists in the team, for people in care homes and those complex ones. And in other places … that support isn't there.* P28, KI, regional/national, focus group

Medicines Optimisation

Key informants expressed concern about medicines and prescribing-related problems which they explicitly connected with an impetus to develop and embed medicines optimisation principles.

Influences on prescribing in general practice included an increase in problematic polypharmacy, and the importance of patient-centred and safe prescribing:

> *So it … will say first line this, add in that, add in this as a third drug … So you've only got to have two long term conditions …and you'll be on six drugs before you know it.* P4, KI, regional, interview

> *The fact that your liver might need some fancy drug might be of completely no interest to you if it means that you're trekking off to the hospital all the time and you're suffering from side effects and actually what you want to do is spend some time with your grandchildren.* P28, KI, regional/national, focus group

> *If I want to get somebody to really think twice about the way they prescribe, then I always play the safety card … our prescribing incentive scheme for GPs is called the 'quality prescribing and safety scheme'.* P23, KI, local/regional, interview

Professional differences

Key informants attributed variation in prescribing to different professional backgrounds and training. They mainly characterised nurses and PBPs as risk-averse and prescribing within strict limits, whereas GPs were considered to have the greatest ability and appetite for risk-taking and managing complex patients:

> *I think nurses tend to be … a bit more protocol-driven and so tend to be quite focussed on an individual disease entity. … Pharmacists I see have a slightly different risk appetite and they're willing to juggle maybe two or three comorbidities and then, I would hope, what should come about is that GPs and doctors should be able to then multiple* [sic] *the more complex, multi comorbidities.* P27, KI, local/regional, focus group

Patient characteristics

Key informants reflected upon the influence of patients as individuals as well as populations (general and local). Public opinion and media messages about medicines were particularly mentioned:

> *I mean just because it's cancer doesn't mean that the drugs always work, if only you can get your hands on them, which is how they're portrayed in the media, isn't it? If only we could get this drug funded all would be well.* P28, KI, regional/national, focus group

Key informants also recognised the importance of socio-economic factors in influencing prescribing in an area:

> *Self-care is hugely on the agenda at the moment, encouraging patients to buy things over the counter, rather than getting them prescribed.* [Our] *GPs are in a more deprived area and tend to feel that patients can't*

afford to buy those products and therefore they end up prescribing them. P8, KI, local, interview

Practice-based pharmacists (PBPs)

Key informants recognised that PBPs had hugely variable roles, responsibilities and models of employment. Participants expressed mixed opinions about the best model; most favoured situating pharmacists within general practices. Some believed that PBPs' skills and time may be most effectively used within the emerging primary care networks, in which groups of practices are working together to provide a range of healthcare services for the local population.

Participants reported variation between PBPs, particularly in terms of experience and skills, and expressed concern about differing levels of support and training available. Some saw opportunities for career development as crucial to allowing PBPs to achieve their potential:

> *We have this varied pattern of some people who come in more or less newly qualified to the role in a GP practice. So the NHS England training is good, actually, but it only goes up to a certain point. What happens to those people … where do they go next?* (P28, KI, regional/national, focus group)

(iii) COMPARISON: Prescribers' and key informants' perspectives

There was general agreement between prescribers and key informants about many of the influences on general practice prescribing (Figure 1, Comparison of prescriber and key informant perspectives).

Both groups acknowledged that national and other prominent guidelines had considerable influence and emphasised the effects of prescribers' professional backgrounds and experience. Both groups identified individual patients, populations, the media and public opinion as having a substantial influence on prescribing.

While prescribers identified influences on prescribing that may be shaped at a general practice level, such as attitudes towards shared learning, key informants highlighted the effect of NHS organisational policies and the availability of external support (e.g. from secondary care). Key informants mentioned universal problems with medicines (e.g. polypharmacy) and the benefits of medicines optimisation principles for patient outcomes. Participants in both groups mentioned current wide variation in the role of the PBP. Prescribers had mixed views about the potential for the PBP to address underlying workforce problems in general practice, and key informants emphasised the need for ongoing training, support and career progression.

DISCUSSION

Principal findings

This study identified a range of influences on prescribing in general practice by exploring the perspectives of prescribers and key informants. Although the guidance provided by NICE and other bodies is frequently described as fundamental to informing prescribing decisions in general practice, this study highlighted a complex range of intersecting factors which impact on prescribers' abilities or inclination to prescribe according to the available evidence. The application of guidelines differs between professional groups, whose attitudes are shaped by their early and continuing training. Patient characteristics (both individuals and populations) are also key influences. The role of the PBP varies between general practices, and this study has revealed some caution (especially amongst GPs) about the potential for increasing PBPs' impact on general practice prescribing.

Strengths and limitations

Whilst prescribers were evenly drawn from the different professional groups identified at the study outset, most were from practices with medium to large list sizes (>5,000 patients) and with less deprivation. All GPs recruited to the study had several years of experience. Prescribers in smaller general practices, in areas of greater

deprivation, and with less experience may have provided additional insights into the factors influencing their prescribing. Key informant participants were working at various levels within the NHS and encompassed a broad range of roles and perspectives.

Flexible evolution of the interview topic guides allowed for exploration of additional issues raised by individual participants which had not been anticipated at the research design stage. The focus group discussion with key informants was less researcher-led than the interviews and offered an opportunity for participants to interact with, probe and challenge each other. A similar session with prescribers may have yielded alternative or additional observations, but this was not possible.

This study explored the use of guidelines in general and the factors which intersect with them to influence general practice prescribing. Research to explore the uptake of guidelines for specific medical conditions or to investigate prescribing in instances where evidence is unclear or existing guidelines are considered unhelpful, may provide different insights.

Comparison with existing literature

Previous research has highlighted differences between evidence, such as NICE guidelines, and prescribing in a range of healthcare settings [8 32]. This study identified several influences which general practice prescribers balance with the evidence-based approach promoted in guidelines when making prescribing decisions, in particular their own professional background. Sharing of responsibilities among prescribers from differing professional backgrounds may have resulted in variation in the use of guidelines, but some see non-medical prescribers as suited to promoting an evidence-based approach to prescribing [33]. Although all professional groups represented in this study acknowledged the importance of guidelines, nurses and pharmacists were perceived by themselves, GPs and key informants as more likely to prescribe in accordance with the available evidence than GPs. This suggests that strategies to increase evidence-based prescribing should be tailored for professional groupings and reflect their different routes to acquiring prescribing skills. Differences in the scope of prescribing routinely undertaken by medical and non-medical prescribers should also be considered. Participants explicitly mentioned the impact of local demographics on prescribing, which corresponds with previous research linking practice prescribing patterns with patient populations [34 35]. Taking account of local demographics and providing patient-centred care may impact the professional's prescribing and perceptions about the appropriateness of guidelines. This tension echoes previous research which identified competing 'macro' and 'micro' influences on prescribing [20] and the 'explicit' and 'tacit' types of knowledge which inform prescribing decisions [36].

Previous research with GPs found that openness to sharing knowledge amongst general practice colleagues can shape and develop prescribing [37]. Some participants in this study worked in practices which encouraged diverse professionals to share new evidence and some did not. Their reflections suggest that a collaborative culture may facilitate greater use of guidelines and reduce problematic variation in prescribing within teams.

This study revealed more cautious attitudes, particularly among GPs, towards PBPs' contribution to the general practice team than reported elsewhere [38 39]. PBPs who had been part of the NHS England scheme [27 40] were positive about the associated training, support and networking opportunities and these have previously been identified as important factors which optimise the complementary skills of prescribers from a pharmacy background; the ambition and aptitude of the individual are also influential [41].

Implications for research and practice

This study has demonstrated a range of complex and intersecting factors that affect prescribing in general practice and impact prescribers' use of the evidence presented in guidelines. These influences are not all amenable to modification and further analysis of the data to pinpoint flexible behaviours and determinants would be a useful next step. Participants in our study expressed a range of views about the potential for PBPs to influence prescribing in general practice. Capturing the views and experiences of a greater number of PBPs working in diverse practice contexts will provide a robust basis for developing strategies which involve PBPs in promoting the use of guidelines in general practice prescribing. These strategies should focus on the more flexible

influences on prescribing and take account of the different use of guidelines between prescribers from a range of professional backgrounds.

Conclusion

A multiplicity of influences impact prescribing in general practice and intersect with guidance from NICE and other bodies. The effect of these influences is often experienced differently by medical prescribers who are less focused on guideline use than their non-medical colleagues. Pharmacists and their general practice colleagues require a clearer definition of the PBP role to allow them to fulfil their potential to contribute to greater evidence-based prescribing in general practice.

Figure 1, Comparison of prescriber and key informant perspectives

ADDITIONAL INFORMATION

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Ethical approval

This study was approved by the Research Ethics Approval Committee for Health (ref. EP 17/18 233), University of Bath.

Competing interests

There are no competing interests

Author contributions

Authors: MC, MW and SC contributed to the design of the study; MC collected and analysed all the data; MC, MW and SC contributed to the interpretation of the data for this manuscript. MC drafted the manuscript and MW and SC critically revised and gave approval for the final version. All authors agree to be accountable for all aspects of the work.

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Data sharing statement

Data are available on reasonable request.

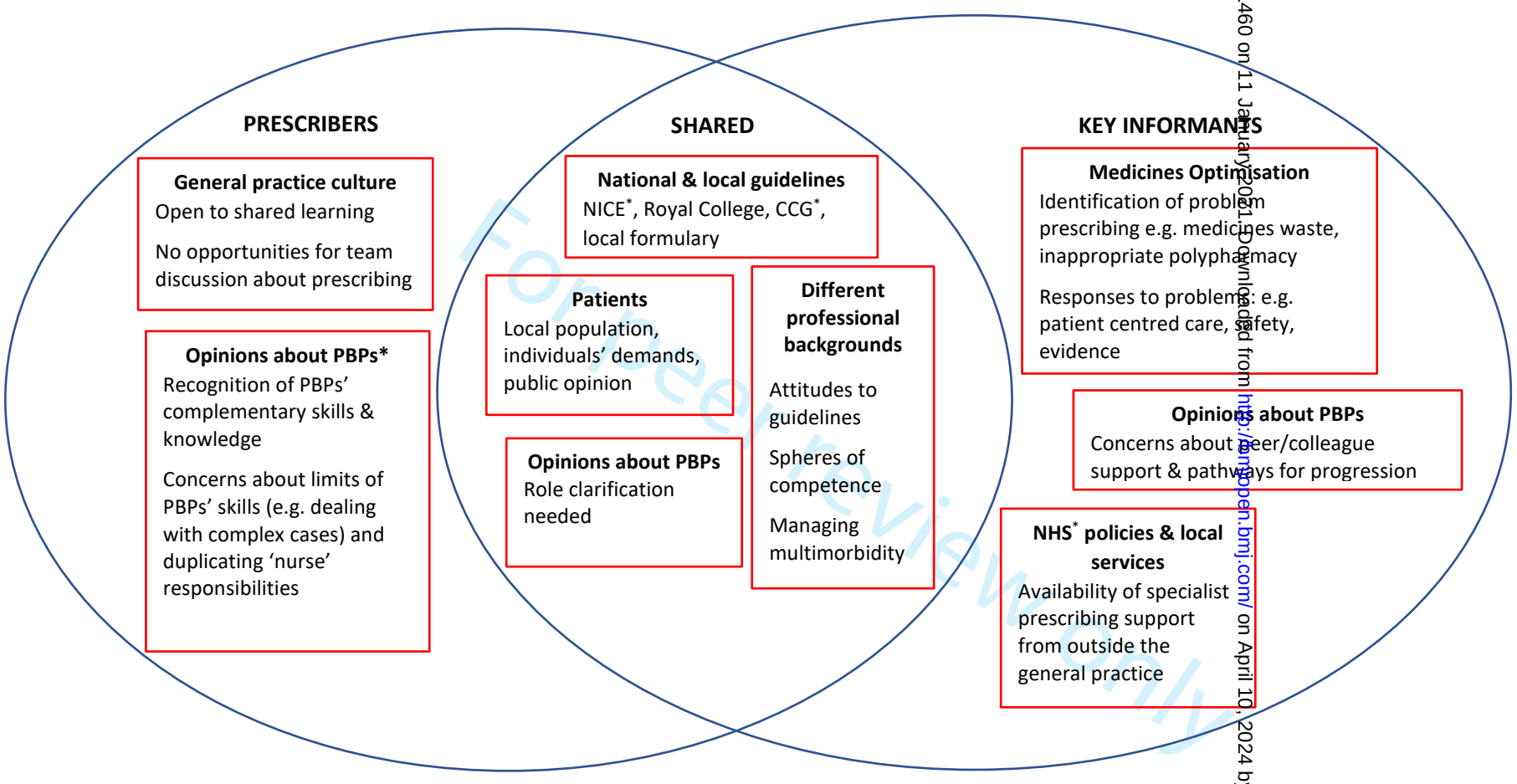
Exclusive licence statement

REFERENCES

1. Royal Pharmaceutical Society. Medicines Optimisation: Helping patients to make the most of medicines 2013 [Available from: https://www.england.nhs.uk/medicines/medicines-optimisation/ accessed October 2020.
2. NHS Digital. Prescribing and medicines team 2018 [Available from: https://digital.nhs.uk/data-and-information/data-insights-and-statistics/prescribing-and-medicines-team accessed October 2020.
3. The Kings Fund. The rising cost of medicines to the NHS: what's the story?, 2018.
4. Garfield S, Barber N, Walley P, et al. Quality of medication use in primary care - Mapping the problem, working to a solution: A systematic review of the literature. *BMC Med* 2009;7:50. doi: 10.1186/1741-7015-7-50
5. Trueman P, Lowson K, Blighe A, et al. Evaluation of the Scale, Causes and Costs of Waste Medicines, 2010.
6. Public Health England. Atlas of Variation 2019 [Available from: https://fingertips.phe.org.uk/profile/atlas-of-variation accessed October 2020.
7. Flodgren G, Hall AM, Goulding L, et al. Tools developed and disseminated by guideline producers to promote the uptake of their guidelines. *Cochrane Database Syst Rev* 2016(8) doi: 10.1002/14651858.CD010669.pub2
8. Foy R, Leaman B, McCrorie C, et al. Prescribed opioids in primary care: cross-sectional and longitudinal analyses of influence of patient and practice characteristics. *BMJ Open* 2016;6(5):e010276. doi: 10.1136/bmjopen-2015-010276 [published Online First: 2016/05/15]
9. Soyombo S, Stanbrook R, Aujla H, et al. Socioeconomic status and benzodiazepine and Z-drug prescribing: a cross-sectional study of practice-level data in England. *Fam Pract* 2019 doi: 10.1093/fampra/cmz054 [published Online First: 2019/10/24]
10. National Institute for Health and Care Excellence. History of NICE 2020 [Available from: https://www.nice.org.uk/about/who-we-are/history-of-nice accessed October 2020.
11. Willis TA, West R, Rushforth B, et al. Variations in achievement of evidence-based, high-impact quality indicators in general practice: An observational study. *PLoS One* 2017;12(7):e0177949. doi: 10.1371/journal.pone.0177949 [published Online First: 2017/07/14]
12. National Institute for Health and Care Excellence. Medicines Optimisation 2016 [Available from: https://www.nice.org.uk/guidance/qs120 accessed October 2020
13. Cope L, Abuzour A, Tully M. Nonmedical prescribing: where are we now? *Therapeutic advances in drug safety* 2016;7(4):165-72. doi: 10.1177/2042098616646726 [published Online First: 2016/04/29]
14. Nursing and Midwifery Council. The NMC register, 1 April 2019 – 31 March 2020. London, 2020.
15. General Pharmaceutical Council. General Pharmaceutical Council 2019 [Available from: https://www.pharmacyregulation.org/ accessed October 2020.
16. Morgan DL. Pragmatism as a Paradigm for Social Research. *Qualitative Inquiry* 2014;20(8):1045-53. doi: 10.1177/1077800413513733
17. Peek L, Fothergill A. Using focus groups: lessons from studying daycare centers, 9/11, and Hurricane Katrina. *Qualitative Research* 2009;9(1):31-59. doi: 10.1177/1468794108098029
18. Coyne IT. Sampling in qualitative research. Purposeful and theoretical sampling; merging or clear boundaries? *J Adv Nurs* 1997;26(3):623-30. [published Online First: 1997/09/26]
19. Haastrup PF, Rasmussen S, Hansen JM, et al. General practice variation when initiating long-term prescribing of proton pump inhibitors: a nationwide cohort study. *BMC Fam Pract* 2016;17:57. doi: 10.1186/s12875-016-0460-9 [published Online First: 2016/05/29]
20. Grant A, Sullivan F, Dowell J. An ethnographic exploration of influences on prescribing in general practice: why is there variation in prescribing practices? *Implement Sci* 2013;8:72. doi: 10.1186/1748-5908-8-72 [published Online First: 2013/06/27]
21. Public Health England. National General Practice Profiles 2019 [Available from: https://fingertips.phe.org.uk/profile/general-practice/data#page/0/gid/2000005/pat/152/par/E38000204/ati/7/are/D83005 accessed October 2020.
22. Gioia DA, Corley KG, Hamilton AL. Seeking Qualitative Rigor in Inductive Research: Notes on the Gioia Methodology. *Organizational Research Methods* 2012;16(1):15-31. doi: 10.1177/1094428112452151
23. Green J, Thorogood N. Qualitative methods for health research. London: SAGE Publications 2004.
24. Braun V, Clarke V. Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health* 2019;11(4):589-97. doi: 10.1080/2159676X.2019.1628806

25. O'Brien BC, Harris IB, Beckman TJ, et al. Standards for reporting qualitative research: a synthesis of recommendations. *Acad Med* 2014;89(9):1245-51. doi: 10.1097/ACM.0000000000000388 [published Online First: 2014/07/01]
26. Tong A, Craig J, Sainsbury P. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care* 2007;19(6):349-57. doi: 10.1093/intqhc/mzm042
27. NHS England. Pharmacy Integration Fund 2016 [Available from: https://www.england.nhs.uk/commissioning/primary-care/pharmacy/integration-fund/ accessed October 2020.
28. NHS England. 2019/20 General Medical Services (GMS) contract: Quality and Outcomes Framework (QOF) 2019 [Available from: https://www.england.nhs.uk/publication/2019-20-general-medical-services-gms-contract-quality-and-outcomes-framework-qof/ accessed October 2020.
29. Basildon & Brentwood Clinical Commissioning Group. Prescribing Incentive Scheme 2019-2020 2019 [Available from: https://basildonandbrentwoodccg.nhs.uk/your-health/medicines-management accessed October 2020.
30. Optum Inc. ScriptSwitch 2018 [Available from: http://www.optum.co.uk/how-we-help/scriptswitch.html accessed October 2020.
31. First Databank. FDB OptimiseRX [Available from: https://www.fdbhealth.co.uk/solutions/fdb-optimiserx/ accessed October 2020.
32. Duncan P, Cabral C, McCahon D, et al. Efficiency versus thoroughness in medication review: a qualitative interview study in UK primary care. *Br J Gen Pract* 2019;69(680):e190-e98. doi: 10.3399/bjgp19X701321 [published Online First: 2019/02/13]
33. Barnett NL. Opportunities for collaboration between pharmacists and clinical pharmacologists to support medicines optimisation in the UK. *Br J Clin Pharmacol* 2019 doi: 10.1111/bcp.13966 [published Online First: 2019/04/16]
34. Guthrie B, Makubate B, Hernandez-Santiago V, et al. The rising tide of polypharmacy and drug-drug interactions: population database analysis 1995-2010. *BMC Med* 2015;13:74. doi: 10.1186/s12916-015-0322-7 [published Online First: 2015/04/19]
35. Tobin H, Bury G, Cullen W. Mental illness in primary care: a narrative review of patient, GP and population factors that affect prescribing rates. *Ir J Psychol Med* 2018:1-8. doi: 10.1017/ipm.2018.35 [published Online First: 2018/10/03]
36. Gabbay J, May Al. Evidence based guidelines or collectively constructed "mindlines?" Ethnographic study of knowledge management in primary care. *BMJ* 2004;329(7473):1013. doi: 10.1136/bmj.329.7473.1013
37. Thomson JS, Anderson K, Haesler E, et al. The learner's perspective in GP teaching practices with multi-level learners: a qualitative study. *BMC Med Educ* 2014;14:55. doi: 10.1186/1472-6920-14-55 [published Online First: 2014/03/22]
38. Maskrey M, Johnson CF, Cormack J, et al. Releasing GP capacity with pharmacy prescribing support and New Ways of Working: a prospective observational cohort study. *Br J Gen Pract* 2018;68(675):e735-e42. doi: 10.3399/bjgp18X699137 [published Online First: 2018/09/27]
39. Anderson C, Zhan K, Boyd M, et al. The role of pharmacists in general practice: A realist review. *Research in Social and Administrative Pharmacy* 2019;15(4):338-45. doi: https://doi.org/10.1016/j.sapharm.2018.06.001
40. National Health Service. NHS Long Term Plan 2019 [Available from: https://www.longtermplan.nhs.uk/publication/nhs-long-term-plan/ accessed October 2020.
41. Butterworth J, Sansom A, Sims L, et al. Pharmacists' perceptions of their emerging general practice roles in UK primary care: a qualitative interview study. *Br J Gen Pract* 2017;67(662):e650-e58. doi: 10.3399/bjgp17X691733

FIGURE 1: Comparison of prescriber and key informant perspectives: Influences on prescribing and practice-based pharmacists (PBPs)



NICE	National Institute of Health and Care Excellence
CCG	Clinical Commissioning Group
NHS	National Health Service
PBP	Practice-based pharmacist

SUPPLEMENTARY BOX 1: General practice prescriber interview topic guide

1. Please briefly describe your role as a prescriber in general practice

PROMPTS

   a. How long since you qualified/registered?
   b. How long have you been in your current/most recent post?
   c. Who is your employer?
   d. Do you have a specialism?

2. What are the factors which underpin prescribing decisions in your general practice?

PROMPTS

   a. How much do decisions vary amongst different professional groups?

PROMPTS (examples)

   b. National influences
      i. National Institute for Health & Clinical Excellence (NICE)
      ii. Other guidelines
      iii. Contract (e.g. Quality & Outcomes Framework (QOF))
      iv. Regional Medicines Optimisation Committee (RMOC) information or advice
   c. Local influences
      i. Advice from the local prescribing committee (may be called Area Prescribing Committee)
      ii. Local prescribing incentive schemes
      iii. Clinical Commissioning Group (CCG) (e.g. practice visits, guidelines)
      iv. Patient factors (population, specific patients)
      v. Electronic prescribing 'rules'
   d. Education, feedback and information
      i. Feedback (e.g. from CCG) about prescribing practice
      ii. Local primary care education programmes
      iii. Informal learning (e.g. from colleagues)
      iv. Access to electronic data about prescribing in the area or region or national (e.g. RightCare, ePACT2)
      v. Information from pharmaceutical industry

3. How do the same or other factors currently influence your own prescribing?

4. What is your experience of variation in prescribing practice in your general practice?

5. FOR GPs & NURSE PRESCRIBERS: What can you tell me about how a practice-based pharmacist may influence prescribing in your general practice, and you as a prescriber?

   FOR PRACTICE-BASED PRESCRIBING PHARMACISTS: What can you tell me about how you, as a prescriber, could influence prescribing in your general practice?

PROMPTS

   a. Do you have any thoughts on how practice-based pharmacists should be employed (by the practice/CCG)?
   b. What training or support may be necessary for practice-based pharmacists to work effectively in the general practice?

6. Is there anything else you would like to say about your current role, or about prescribing in your general practice (or area)?

SUPPLEMENTARY BOX 2: Key Informant interview and focus group topic guide

1. Please briefly describe your role with regard to prescribing in general practices in your area/region/nationally

PROMPTS

a. How long since you qualified/registered?
b. How long have you been in your current/most recent post?
c. Who is your employer?
d. Do you have a specialism?
e. Do you have direct contact with general practices (or CCGs)?
f. Are you involved in monitoring prescribing practice?
g. Are you involved in supporting general practices to make changes to their prescribing practice?

2. In your experience what are the main influences on prescribing practice in general practices (amongst all professional groups)?

PROMPTS (categories & examples)

a. National influences
    i. National Institute for Health & Clinical Excellence (NICE)
    ii. Other guidelines
    iii. Contract (e.g. Quality & Outcomes Framework (QOF))
    iv. Regional Medicines Optimisation Committee (RMOC) information or advice
b. Local influences
    i. Advice from the local prescribing committee (may be called Area Prescribing Committee)
    ii. Local prescribing incentive schemes
    iii. Clinical Commissioning Group (CCG) (e.g. practice visits, guidelines)
    iv. Patient factors (population, specific patients)
    v. Electronic prescribing 'rules'
c. Education, feedback and information
    i. Local primary care education programmes
    ii. Informal learning (e.g. from colleagues)
    iii. Access to electronic data about prescribing in the area or region or national (e.g. RightCare, ePACT2)
    iv. Information from pharmaceutical industry

3. What is your experience of variation in prescribing practice in your area (or region or nationally)?

4. (As you know) pharmacists are increasingly based in general practices. What is your opinion about whether practice-based pharmacists could play a part in influencing prescribing behaviour in general practice?

PROMPTS

a. Do you have any thoughts on how practice-based pharmacists should be employed (by the practice/CCG)?
b. What training or support may be necessary for practice-based pharmacists to work effectively in the general practice?

5. Is there anything else you would like to say about your current role, or about prescribing in general practice in your area (or region or nationally)?

Mary Carter, completed reporting checklist for qualitative study (based on the SRQR guidelines)

		Reporting Item	Page Number
Title			
	#1	Concise description of the nature and topic of the study identifying the study as qualitative or indicating the approach (e.g. ethnography, grounded theory) or data collection methods (e.g. interview, focus group) is recommended	1
Abstract			
	#2	Summary of the key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results and conclusions	2
Introduction			
Problem formulation	#3	Description and signifcance of the problem / phenomenon studied: review of relevant theory and empirical work; problem statement	3
Purpose or research question	#4	Purpose of the study and specific objectives or questions	3
Methods			

Qualitative approach and research paradigm	#5	Qualitative approach (e.g. ethnography, grounded theory, case study, phenomenolgy, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g. postpositivist, constructivist / interpretivist) is also recommended; rationale. The rationale should briefly discuss the justification for choosing that theory, approach, method or technique rather than other options available; the assumptions and limitations implicit in those choices and how those choices influence study conclusions and transferability. As appropriate the rationale for several items might be discussed together.	3, 4
Researcher characteristics and reflexivity	#6	Researchers' characteristics that may influence the research, including personal attributes, qualifications / experience, relationship with participants, assumptions and / or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results and / or transferability	4
Context	#7	Setting / site and salient contextual factors; rationale	4
Sampling strategy	#8	How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g. sampling saturation); rationale	4

Ethical issues pertaining to human subjects	#9	Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	12
Data collection methods	#10	Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources / methods, and modification of procedures in response to evolving study findings; rationale	4
Data collection instruments and technologies	#11	Description of instruments (e.g. interview guides, questionnaires) and devices (e.g. audio recorders) used for data collection; if / how the instruments(s) changed over the course of the study	4
Units of study	#12	Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	4, 5
Data processing	#13	Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymisation / deidentification of excerpts	4
Data analysis	#14	Process by which inferences, themes, etc. were identified and developed, including the researchers	4

		involved in data analysis; usually references a specific paradigm or approach; rationale	
Techniques to enhance trustworthiness	#15	Techniques to enhance trustworthiness and credibility of data analysis (e.g. member checking, audit trail, triangulation); rationale	4
Results/findings			
Syntheses and interpretation	#16	Main findings (e.g. interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	5-10
Links to empirical data	#17	Evidence (e.g. quotes, field notes, text excerpts, photographs) to substantiate analytic findings	5-9
Discussion			
Integration with prior work, implications, transferability and contribution(s) to the field	#18	Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application / generalizability; identification of unique contributions(s) to scholarship in a discipline or field	9, 10
Limitations	#19	Trustworthiness and limitations of findings	9, 10
Other			
Conflicts of interest	#20	Potential sources of influence of perceived influence on study conduct and conclusions; how these were managed	12

Funding	#21	Sources of funding and other support; role of funders in data collection, interpretation and reporting	12

None The SRQR checklist is distributed with permission of Wolters Kluwer © 2014 by the Association of American Medical Colleges. This checklist can be completed online using https://www.goodreports.org/, a tool made by the EQUATOR Network in collaboration with Penelope.ai