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A qualitative study using interviews and focus groups to explore the current and potential for antimicrobial stewardship in community pharmacy informed by the Theoretical Domains Framework

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Abstract

Objectives

Community pharmacists and their staff have potential to contribute to antimicrobial stewardship (AMS). However, their barriers and opportunities are not well understood. The aim was to investigate the experiences and perceptions of community pharmacists and their teams around AMS.

Design

Interviews and focus groups were used to explore the views of pharmacists, pharmacy staff, general practitioners, members of pharmacy organisations and commissioners. The questioning schedule was developed using the Theoretical Domains Framework which was also used to inform intervention recommendations to facilitate AMS in community pharmacy.

Results

Eight GPs, 28 pharmacists, 13 pharmacy staff, six representatives from pharmacy organisations in England and Wales, and two local stakeholders participated.

Knowledge and skills both facilitated or hindered provision of self-care and compliance advice by different grades of pharmacy staff. Some staff were not aware of the importance or impact of giving self-care and compliance advice on helping to control antimicrobial resistance (AMR). The pharmacy environment created barriers to AMS; this included lack of time of well qualified staff leading to misinformation from under skilled staff to patients about the need for antibiotics or the need to visit the GP, this was exacerbated by lack of space. AMS activities were limited by absent diagnoses on prescriptions for antibiotics.

Several pharmacy staff felt that being able to undertake patient examinations or question antibiotic prescriptions would allow them to provide more tailored AMS advice.

Conclusions

Interventions are required to overcome lack of qualified staff, time and space to give patients AMS advice. Staff need to understand how self-care and antibiotic compliance advice can help control AMR. A multifaceted educational intervention including information for staff may help. Indication for prescription would enable pharmacists to provide more targeted antibiotic advice. Commissioners should consider the pharmacists' role in examining patients, and giving advice about antibiotic prescriptions.

Key words/phrases: community pharmacy, antimicrobial stewardship, antibiotics, self-care, common infections, qualitative, theoretical domains framework

Article summary

Strengths and limitations of this study

- This is the first study to explore pharmacists' and pharmacy staff attitudes and experiences around self-care advice for common infections, antibiotic compliance advice, AMS activities and antimicrobial resistance using the Theoretical Domains Framework (TDF).
- The use of the TDF and Behaviour Change Wheel is a novel use of behavioural theory in this context.
- Randomly selecting pharmacies from stratified lists facilitated recruitment of a wide ranging sample with a range of experiences.
- Despite using randomised lists for recruitment there is still a possibility that only AMR enthusiasts volunteered to take part.
- This study used focus groups and interviews including a mix of telephone and face to face methods. This ensured that participants could choose the method which was most convenient and appropriate for them.

Introduction

The World Health Organisation has reported concerns about the threat of antibiotic resistance and stressed the need for public awareness of the responsible use of antibiotics.[1] Patients have an important role to play in the control of antibiotic resistance, by reducing use of unnecessary antibiotics for common infections (such as for respiratory infections) and by adhering to their prescription instructions when they do receive antibiotics.[2] Community pharmacists can facilitate this through their contact with patients and by promoting antimicrobial stewardship (AMS) initiatives within their pharmacies.[3] Community pharmacists have the opportunity to influence patient expectation by educating patients on effective self-care treatments and the negative consequences of using antibiotics, such as side effects and resistance.[4]

Within England, the Department of Health (DOH) pharmacy strategy 2005 – 2015 aimed to enable community pharmacists and their staff to see themselves as important contributors to improving public health.[5] The DOH is currently incentivising community pharmacies (through the community pharmacy contractual framework) to meet criteria to expand and improve their range of clinical services. One of these criteria is to become a Healthy Living Pharmacy Level 1,[6] through demonstrating that the pharmacy team is actively engaging with the local community.[7] In addition, the National Health Service (NHS) in England have been expanding the services already provided by community pharmacies to include treatment for urgent minor ailments and common conditions including viral infections.[6] Indeed, research has shown that through various strategies community pharmacists can enhance their role in AMS,[8] by providing self-care and antibiotic compliance advice to patients [9] as well as the ability to recommend over the counter treatments for common infections.[10] However, this incentive scheme is not available nationally in England, therefore there is considerable variation in community pharmacy services.

Within Wales the Choose Pharmacy scheme encourages the general public to seek advice and treatment for minor ailments from community pharmacies. The scheme also aims to fully integrate

community pharmacies with GP surgeries and hospitals by linking their technology, such as providing pharmacy access to GP records in order to check the accuracy of prescribed medications.[11, 12]

The aim of this study is to identify opportunities for expanding AMS activities by exploring pharmacists' and pharmacy staff attitudes and experiences around self-care advice for common infections, antibiotic compliance advice, AMS activities and antimicrobial resistance (AMR). The findings from this study will contribute to recommending intervention strategies for community pharmacy teams in order to enhance their role in helping to control AMR.

Method

This was a qualitative study using semi-structured interviews and focus groups with community pharmacists, community pharmacy staff, GPs, pharmacy body representatives and commissioners.

Community pharmacy selection

UK pharmacies in Inner city Birmingham, Gloucestershire and South Wales were approached to recruit pharmacies with a mix of deprivation, ethnicity, rural and urban locations, varying customer numbers and customer demographics. Pharmacies in each area were stratified by rural/urban based on their postcode details[13] if relevant, and in order to obtain pharmacies with varying staffing levels and a range of corporate resources available, by chain/small chain/independent using a Google search of the pharmacies (later confirmed in the interview/focus group). Each stratified list was randomised using the random number generation function in Excel, and approached in random order by letter and then telephone until the required number of participants for each region and pharmacy type was reached. The target was to recruit 30 pharmacists and 8 pharmacy staff from across the regions and strata.

Participant recruitment

Pharmacies were sent invitation letters, study information sheets and a consent form inviting pharmacists and pharmacy staff to participate in interviews or focus groups for the study. If no

response was received after a week, the researchers telephoned the pharmacy. The most common reason for non-participation was lack of time.

Representatives from pharmacy body organisations, general practitioners (GPs) and Clinical Commissioning Groups (CCGs - CCGs are state funded and commission primary health care from general practices in England), were invited via contacts known to the researchers and by means of a Royal College of General Practitioners newsletter to also participate in interviews. See figure I for the recruitment flow chart.

Data collection

The question schedule was drafted by a researcher (LJ) and then adapted by a health psychologist (AS) using the Theoretical Domains Framework (TDF) in order to understand the influences on participant behaviour[14], and then reviewed by other researchers (CMCN, LJ and RO) for clinical relevance. The question schedule (Appendix 1) was piloted with one pharmacist. There were no changes made following the pilot and so the results from the pilot are included in the findings. The broad topic areas discussed were interviewees' attitudes and experiences of providing self-care advice for common infections, and antibiotic compliance advice, AMS activities and AMR. One trained qualitative researcher (LJ) from Public Health England (PHE) conducted the interviews and focus groups. All participants were assured of anonymity, confidentiality, and gave written informed consent. Participants were offered a £40 gift voucher for their time.

Focus groups were conducted within pharmacies where several members of staff expressed an interest in taking part. Interviews were conducted by telephone and face to face in order to accommodate participant preference. They lasted 30-60 minutes, were audio-recorded, transcribed verbatim and checked for accuracy.

Data analysis

Data was analysed by a PHE researcher, LJ, using a thematic framework and using QSR Nvivo 10. Themes were refined and redundant or infrequent codes were recoded. The remaining themes were

placed within the TDF framework with assistance from a health psychologist (AS), and where more than one domain was relevant the context was discussed and a consensus reached. Quotations from the transcripts are used in the results table to illustrate each domain. A researchers meeting was held to discuss the main themes from the results and to discuss themes to take forward for intervention recommendations. These were examined within the context of the Behaviour Change Wheel (BCW)[15] in order to identify intervention functions, policy categories and behaviour change techniques relevant for intervention recommendations and future developments.

10% of transcripts were double coded by a second PHE researcher. Codes were discussed and an agreed consensus was reached.

Patient involvement

Patients were not involved in this study.

Results

Sample characteristics

Twenty six out of 31 pharmacies were contacted in Birmingham. All pharmacies in the Gloucestershire and South Wales lists were approached in order to achieve the recruitment targets.

A total of 58 people took part in either interviews or focus groups for this study. Forty four interviews were conducted with 26 community pharmacists (10 from Gloucestershire, 8 from Birmingham and 8 from South Wales), one dispensing manager, eight GPs (three from Birmingham, one from Gloucestershire, two from Hertfordshire, one from London and one from Colchester), two primary care commissioners, one Programme Manager from a Local Authority, and six representatives from pharmacy organisations (Royal Pharmaceutical Society, Pharmacy Voice, The Centre for Pharmacy Postgraduate Education, The Pharmaceutical Services Negotiating Committee, Association of Pharmacy Technicians UK, NHS England and the National Pharmacy Association).

Three focus groups were conducted in three pharmacies, with two pharmacists and 12 other pharmacy staff. Other pharmacy staff included five dispensers, one pharmacy manager, one dispensing assistant, two health care assistants and one shop assistant.

Of all pharmacy participants, 16 worked in an independent pharmacy (a pharmacy which is independently owned), five in a small chain, 18 worked for a large chain (a chain refers to more than one pharmacy which is centrally managed or owned) and two pharmacists were locums. Pharmacists were aged 24 to 63, with a mean age of 41. Eighteen were male and 10 were female.

The analysis identified key domains from the TDF on influencing pharmacists' behaviour within community pharmacy which are relevant to our study, as outlined in table I.

Table I: Factors influencing pharmacists' self-care and compliance advice for common infections, and antimicrobial stewardship initiatives

	TDF domain	Giving self-care advice	Giving antibiotic compliance advice	Participating in antimicrobial stewardship initiatives
1	**Knowledge**	Pharmacists report being knowledgeable in giving self-care advice	Pharmacists are knowledgeable on what drugs to take for a particular illness/condition. *"I think doctors are brilliant at conditions, we're the best at the drugs. So we know what should be prescribed when, and we can try and minimise as much as we can." – Pharmacist 4, Gloucestershire* Pharmacists understand that misuse of antibiotics can lead to resistance. *"So if they don't take them appropriately it's going to build resistance and not only that but the patients won't be treated accordingly." – Pharmacist 7, Gloucestershire* Pharmacy staff also understand that misuse of antibiotics can lead to the return of infections. *"Yeah, so some, it's they don't finish the course…. The infection will come back again, because the*	Pharmacists lacked awareness of AMS initiatives and knowledge of what AMS is. *"I've heard the term but to be honest I couldn't recall a campaign going on at the moment, no." – Pharmacist 15, Birmingham (Talking about antimicrobial stewardship)*

			parents they don't come and grab the other bottle, they cannot be made up for the expiry date after we mix it." – Pharmacy staff, Gloucestershire	
2	**Skills**	Pharmacists report being skilled in giving self-care advice	Pharmacists report being skilled in giving compliance advice	This domain was not relevant in this context
3	**Professional Role and Identity**	Examining patients is not part of the pharmacists' role. Pharmacists reported that being unable to examine patients can make it difficult to give correct advice. *"…we always have to double check because we have no equipment in pharmacy to assess their breathing. I guess obviously that comes with training, so I don't expect to just have a stethoscope and listen to customers. But if a pharmacy can, if a pharmacist can do that, it would be a bonus to our profession and to the service that we can give." – Pharmacist 7, Gloucestershire* Pharmacists believe an integral part of their role is to provide self-care advice for all common ailments. *"That's like, that's what we do, that's what pharmacists are doing every day, we're not just dispensing the medication, we are actually talking to the patients, helping them in that respect." – Pharmacist 21, Birmingham*		It is unclear whether it is the pharmacist's role to query the appropriateness of antibiotic prescriptions. *"If a doctor's decided that person needs an antibiotic, then I would be on a sticky wicket questioning that really. That's outside of my authority as a pharmacist," – Pharmacist 25, Wales* *"in terms of where I see community pharmacy fitting in is where we do a clinical check on a prescription, it is our duty to decide whether or not it is clinically suitable or clinically appropriate for the patient to take the medication that we're checking…" – Pharmacist 15, Birmingham*
4	**Beliefs about capabilities**	Pharmacists are confident in their ability to give self-care advice	Pharmacists are confident in their ability to give compliance advice	This domain was not relevant in this context
5	**Optimism**	Pharmacists were optimistic that giving self-care advice can impact AMR	Pharmacists were optimistic that ensuring	Pharmacists were optimistic that giving self-care advice and

			compliance can impact AMR	ensuring compliance can impact AMR
6	**Beliefs about consequences**	One pharmacist highlighted the danger of missing something urgent that requires further medical attention if a culture of self-care is adopted. *"The only disadvantage is in terms of, is in terms of if they keep on doing self care, actually, it actually prevents them to actually go to see the doctors if it's something quite urgent." – Pharmacist 10, Wales*	Pharmacists believe that patients don't understand and don't remember their compliance advice and therefore believe compliance is poor. *"… it's a ten day course, not your typical seven day course so we have some of our patients that will come back again to collect their second course because once, because a bottle that we make lasts for seven days, it's fresh for seven days. And sometimes we find that they don't come back to complete their course, or those that come back and say they probably don't need the second bottle…" – Pharmacist 6, Gloucestershire*	There were no emerging themes within this domain
7	**Reinforcement**	A few GPs and stakeholders believe that pharmacists are financially motivated. *"there wouldn't be a community pharmacist if there wasn't money in it. They're not doing it for the love of the profession or the love of helping people get better, they're doing it because they're going to make money at the end of the day" – Stakeholder 9,* Pharmacists reported not being financially motivated. *"We refuse people quite regularly saying you need to see your doctor, I'm not serving you this product. So, I've always said to anyone who works in there. Yes we have to make money but, we're not unethically making money so,*	There were no emerging themes within this domain	There were no emerging themes within this domain

		actually, if that product is not suitable for that person we won't sell them. So, and that's how it works." – Pharmacist 2, Gloucestershire		
8	**Intentions**	Pharmacists reported intentions to offer self-care advice to everyone presenting with symptoms or purchasing an OTC medication. *"But if there's any OTC sale, we would always offer advice. We'd always make sure that any OTC sale, general sale list included, we would still check through WWHAM and make sure it is appropriate." – Pharmacist 20, Wales*	Pharmacists intend to give compliance advice with every antibiotic prescription	Pharmacists had no intentions to conduct AMS within the foreseeable future
		Pharmacists discourage visiting the GP and try and promote self-care as much as possible. *"I try as much as possible to stop that happening and saying, there's no point going to the doctors for this you just need to manage it, symptom control it and in a period of five to seven, ten days you'll probably feel a lot better" – Pharmacist 23, Wales*		
9	**Goals**	A pharmacist's main goal is to help their patients recover. *"it's caring for the patient. If we can give them advice and help them feel better then that's our aim." – Pharmacist 11, Birmingham*	There were no emerging themes within this domain	There were no emerging themes within this domain
10	**Memory, attention and decision making**	Pharmacists reported that they do not find it difficult to determine if a person needs an antibiotic or not. *"Sometimes you can tell, like for example, if they've tried medicines or something for a duration of a so called infection. It's more than like … You can generally tell when someone needs antibiotics so yeah. You can generally spot it, yeah." – Pharmacist 22, Birmingham*	Pharmacists reported not always ask for the diagnosis when giving compliance advice. *"I probably wouldn't, no, because we don't, unless they're obviously coughing or told us what it is, we wouldn't necessarily know what those antibiotics are for." – Pharmacist 8, Gloucestershire*	Some pharmacists were unaware of the link between giving self-care and compliance advice with tackling AMR. *"I am not thinking, oh this is helping antimicrobial resistance, I'll be thinking that, well, there's no point them trying to get antibiotics for this because it's just a viral infection, a cold, the, and they're going to get better anyway," – Pharmacist 11,*

				Birmingham
		Pharmacists did report that it can be more difficult to decide whether a child or an elderly person needs to be referred to the GP or not. *"Sometimes it can get very tricky. Especially with a young child at times, because obviously the child can't explain their symptoms to you, so you're relying on the mother to tell you everything. That gets very tricky then. You're thinking you're not, you're a bit unsure then. But obviously where they're elderly and you just don't want to put them at risk of complications. But otherwise, if the symptoms, when the symptom is generally, with the younger, healthy people it's more, much easier to guide them. It's when they're elderly or really little, or a child, then it's really hard." – Pharmacist 19, Birmingham* Pharmacists will refer patients to the GP if they are unsure whether the infection is viral or bacterial, or they feel that they can't help the patient. *"if there's something there we can't treat over the counter then we would refer it but we never would say that you need antibiotics, you just have something that needs to be looked into." – Pharmacist 10, Wales*	Pharmacists report giving compliance advice habitually with every antibiotic prescription. *"If we get a prescription for antibiotics then we advise on how to take them," – Pharmacist 1, Gloucestershire* Some pharmacists said that if they see several prescriptions over a short period of time for the same patient it will trigger them to have a discussion with that patient about potential resistance. *"So they come in and ask us and also there's a bit of education we do, if I notice that we're getting regular prescriptions or we're getting prescriptions from regular customers I will intervene sometimes and talk to them," – Pharmacist 8, Gloucestershire*	
11	**Environmental context and resources**	Pharmacists identified that pharmacy staff are more likely to deal with patients looking for advice for RTIs or UTIs than pharmacists, particularly in large pharmacies. *"…what you'll find is the interaction with the pharmacist isn't always the, is not probably the most common interaction that the patient has in the community pharmacy, it's more normal with the the healthcare assistant on the counter." –*	Pharmacists do not know diagnoses without asking the patient. This makes it difficult for pharmacists to query accuracy and appropriateness of prescriptions with GPs. *"Because for everything else I don't know what's been diagnosed, obviously even with UTIs you're*	AMR was described as not being promoted or advertised within community pharmacy settings. *"We know about it, and I did my initial training in a hospital so, I know about what happens. But, in the community it's not really, it's not something that would be heavily advertised I would say." – Pharmacist 2, Gloucestershire*

Pharmacist 15, Birmingham

Pharmacists report that during busy times advice is given over the counter instead of in the consultation room, therefore affecting the quality of the advice given.

"…the actual time engaged with customers where you get a chance to actually counsel and go through what they're taking, why they're taking it, how to take, it's, is very restricted. So you find that you're not giving that pharmaceutical advice that you'd like to give in a way that you'd want to give it. So I think it's not reinforced to the customer as best as it can be." Pharmacist 14, Birmingham

Some pharmacists were concerned that misinformation is given to patients from untrained and inexperienced pharmacy staff.

"if the assistant doesn't feel confident then, and you'll see it with newer assistants, then they're likely to just say, go to the doctor, which is obviously not a good thing" – Pharmacist 11, Birmingham

It was mentioned that as you don't need to book appointments with pharmacists it gives patients immediate access to a health care professional, unlike other primary care services.

"I mean the advantage is from a patient point of view, is they've kind of got a healthcare professional which is pretty much like I said, on demand, they can guessing, but if it's Trimethoprim or Nitrofurantoin you generally know. But I think sometimes it's hard for me to know if the doctor is being conscientious when I don't know what's being treated." – Pharmacist 18, Wales

Some believe that AMR needs to be tackled across all sectors of healthcare and not just one sector of healthcare e.g. just primary care, or just GPs.

"…it's not just one sector alone it has to be attacked at all angles, and I think the better information sharing that you get, the more successful it can be." – Pharmacist 10, Wales

Pharmacists are generally unaware of any AMS going on within their CCG.

"I can't recall a particular campaign, I don't think, but obviously I see a lot of pamphlets and leaflets, and I've seen a few adverts and things like that but I couldn't recall anything specific." – Pharmacist 15, Birmingham

Pharmacists in England reported not having much communication with their CCG.

"because they haven't really approached us in the pharmacy, so I would say it's probably not very active. I don't know how, I don't know what they do with the doctors though, because they haven't informed us of anything." – Pharmacist 19, Birmingham

Pharmacists in Wales reported that their Health Boards are very

		walk in. They might never have walked into your pharmacy ever but they can walk in and access that self-care." – Pharmacist 9, Wales		proactive within community pharmacy. *"They're really proactive. You've got several health campaigns every couple of months. We get the leaflets, we get audits, whatever. It's very proactive" – Pharmacist 20, Wales*
12	**Social influence**	Pharmacists believe that patients are given unnecessary prescriptions from their GP as a result of patient expectations. *"They just want, anything in a capsule they think is going to cure them. So they just want an antibiotic. I think some GPs they even succumb to pressures with giving out a prescription for it. And then you see the patient and I don't think they need that antibiotic." – Pharmacist 13, Birmingham*	Pharmacy staff have noticed that patients are disinterested in compliance advice and tend to be in a rush to go. *"Some people, yeah, you can talk, you can stay talking to them all day long and they don't mind but sometimes, like I said, especially for antibiotics, they just want to go." – Pharmacy staff, Gloucestershire*	Pharmacists believe that the general public find it difficult to understand AMR and this prevents them from attempting to discuss it with them. *"It's, I think it's very difficult for the public to get their head around," – Pharmacist 5, Gloucestershire* Pharmacists report that AMR isn't something that is discussed frequently with colleagues. *"It's not something that we would probably discuss as such within the pharmacy, yeah." – Pharmacist 1, Gloucestershire*
13	**Emotion**	This domain was not relevant in this context	This domain was not relevant in this context	All pharmacists were concerned about AMR, only very few expressed fear as a response. *"Because I am quite scared actually that we have, these antibiotics aren't in the next, I reckon in the next 20 odd years they're not going to be effective at all... So, yeah, that does frighten me a bit." – Pharmacist 13, Birmingham*
14	**Behavioural regulation**	Pharmacists receive informal feedback from regular customers on the advice they give and the products they recommend. *"patients do sometimes come back in and say, oh that worked really well" –*	There were no emerging themes within this domain	A few pharmacists in Wales reported the effectiveness of audits on raising awareness of AMR and changing practice. *"Well we had the audit so I think that raised a bit more awareness*

Pharmacist 12, Gloucestershire

of possibly what you should be doing" – Pharmacist 23, Wales

There isn't a way for pharmacists to find out if they give unhelpful or incorrect advice.

"Only if the patient really came in and told us about it, or if their relative mentioned it, but no, there's no way of finding out other than that" – Pharmacist 21, Birmingham

Giving self-care advice in community pharmacy

Pharmacists reported that giving self-care advice daily for common infections is an integral part of their role, and by using the WWHAM mnemonic [16], Who is the patient, What are the symptoms, How long have the symptoms been present, Action taken, Medication being taken, as well as their experience, many self-reported finding it relatively easy to determine whether most patients need an antibiotic or not. Pharmacists identified some difficulty in determining the need for antibiotics in the elderly or the very young. When pharmacists are uncertain or believe they are dealing with a serious condition, they refer the patient to their GP, or if a patient evidently needs immediate care they will refer to urgent care. Pharmacists' intentions are that anyone who presents with symptoms or is purchasing an over the counter medication will be given self-care advice by a member of the pharmacy team.

A minority of GPs and one pharmacy body representative expressed concern that pharmacists are financially motivated in the advice they give and the products which they recommend. Pharmacists reported that their main motivation is the health and wellbeing of their patients, not financial incentives.

The stated benefits of providing self-care in community pharmacy included; immediate access to a health professional as appointments are not needed in a pharmacy, equipping patients with knowledge for future infective episodes, and saving GP time. Indeed, pharmacists reported that they try and discourage patients visiting the GP and try and promote self-care as much as possible. Most believe that educating patients with self-care advice can contribute to tackling AMR by preventing future antibiotic use, and for some of those this was their main motivation, some however, were not aware of this link until it was mentioned by the researcher.

The GPs in this study view pharmacists as not only being knowledgeable about medications but also sufficiently skilled to make recommendations to patients. As such, they were confident in the ability of pharmacists to deal with minor respiratory tract infections.

Barriers to giving self-care advice in community pharmacy

Pharmacists and pharmacy staff identified that pharmacy staff usually have more interactions with patients looking for self-care advice for common infections than pharmacists would, particularly in large pharmacies where pharmacists spend little of their time at the medicines counter. Pharmacists expressed concern that misinformation can be given to patients if their staff are untrained or inexperienced.

Lack of time was perceived as a barrier to giving effective and thorough self-care advice and can lead to advice being given quickly over the counter rather than in the consultation room.

Some pharmacists felt that being unable to examine patients e.g. listen to their chest, is a barrier to giving accurate self-care advice. They believe that being able to conduct such examinations would enhance the service they could provide. One pharmacist highlighted a concern that focusing too much on providing self-care advice could potentially lead to not identifying a more serious infection. Despite pharmacists reporting that they receive informal feedback on their advice from many of their regular patients, many identified a lack of formal procedure to receive feedback on their self-care or compliance advice given. Some pharmacists believed that patients want an instant cure for their ailments and are not willing to wait for the duration of their illness to feel better.

Giving antibiotic compliance advice in community pharmacy

Pharmacists, their staff and GPs reported that a key responsibility in community pharmacies is to provide antibiotic advice and ensure patient compliance, and indeed they report giving compliance advice with every antibiotic prescription and being well skilled and knowledgeable to do so.

Amongst pharmacists, the idea that misuse of antibiotics results in resistant infections was well understood. For some, AMR was a concern and therefore a driver for giving compliance advice. Less qualified pharmacy staff did not display an in depth understanding of AMR but were aware that misuse of antibiotics can lead to recurrent or relapsing infections.

Barriers to giving antibiotic compliance advice in community pharmacy

Pharmacists are not provided with an indication of patients' diagnoses on prescriptions, and this was reported by some as a major barrier as it deters pharmacists from querying the accuracy of antibiotic prescriptions with prescribers. It was reported that when giving compliance advice it would be unusual for a pharmacist to ask what condition the antibiotics had been prescribed for. A few pharmacists suggested that they might discuss antibiotic resistance with a patient and intervene with a prescriber if they noticed the same patient with several consecutive prescriptions for the same antibiotic.

Pharmacists reported that many patients do not understand compliance advice and therefore believe that compliance is generally poor. Additionally, pharmacy staff noticed that patients tend to be disinterested in the compliance advice and appear to be in a rush to leave once they have received their antibiotic prescription.

Antimicrobial resistance and antimicrobial stewardship in community pharmacy

Pharmacists displayed a good knowledge of the mechanisms of AMR and the negative consequences, but were generally unaware of any stewardship initiatives from within and outside of the community pharmacy setting. Many had never heard of the term antimicrobial stewardship before. Despite this lack of awareness, when AMS was explained pharmacists believed they had a role in tackling AMR through educating the general public on how to self-care for common infections and the appropriate use of antibiotics.

It was reported that AMR is not a topic which is discussed frequently amongst pharmacy colleagues and is not well publicised in community pharmacy. Pharmacists in Wales had conducted self-care audits in their pharmacy which they felt had raised awareness of AMR and had contributed to improvements in their practice.

All pharmacists expressed concern about AMR and its implications. However, no one reported any intentions to adopt any AMS promotions or activities in their pharmacy in the foreseeable future.

Barriers to antimicrobial stewardship in community pharmacy

The biggest barrier identified was that many pharmacists and all pharmacy staff were not consciously aware of the link between giving self-care advice, compliance advice, and their impact on AMR. Many only became aware of the link once it was brought to their attention by the interviewing researcher. Once aware, they were optimistic that giving self-care advice and compliance advice could have a significant impact on AMR. Although, many pharmacists believed that discussing AMR with the general public would be difficult as their perception was that they would find it difficult to understand the concept.

Some reported that AMR needs to be tackled across all health care sectors, including primary and secondary care. Pharmacists in England reported very little communication with their CCG and were therefore unaware of any local AMS initiatives. However, pharmacists in Wales reported very proactive Health Boards (Health boards secure and deliver healthcare services across Wales).

Summary (Table II)

Identification of potential interventions

Analysis using the TDF has been applied here to the Behaviour Change Wheel [15]. By identifying key influential domains from the TDF, the BCW allows for identification of intervention functions, policy categories and alongside the BCT Taxonomy v1, behaviour change techniques to inform intervention recommendations in this context. Table II demonstrates this process of identifying key domains through to intervention recommendations.

Table II: Intervention recommendations for community pharmacy using the TDF, BCW and Behaviour Change Techniques Taxonomy V1

Finding	TDF domains	COM-B	Intervention functions (selected)	Behaviour change techniques (selected)	Recommendations and examples
1. Lack of communication with CCGs	Environmental context and resources	Physical opportunity	Training Environmental restructuring Enablement	Restructuring the physical environment Social support	Better communication links with CCGs are needed: CCGs to promote AMS in community pharmacies or lead on audits
2. Time is an issue for pharmacists 3. Misinformation can be given to patients	Environmental context and resources	Physical opportunity	Training Environmental restructuring Enablement	Adding objects to the environment Instruction on how to perform a behaviour	Resource for all pharmacy staff to provide self-care information to patients e.g. patient information leaflet
4. Belief that patients do not comply 5. Belief that patients are not interested in compliance advice	Beliefs about consequences	Reflective motivation	Education Persuasion	Information about health consequences (for patients) Credible sources Prompts/cues	Compliance advice resources: 1. A leaflet to be shared with the patient and discussed 2. A leaflet to be inserted into the prescription bag 3. Stickers to place on the box with pictorial compliance information
6. Lack of feedback on self-care advice given 7. Unaware of link between AMR and giving advice	Memory, attention and decision making	Psychological capability	Training Environmental restructuring Enablement	Feedback on behaviour Self-monitoring of behaviour Goal setting Action planning	Self-care advice audits: 1. An electronic audit within the pharmacy system 2. A hard copy audit to be completed manually Training on link between AMR and self-care advice
8. Lack of feedback on compliance advice given	Memory, attention and decision making	Psychological capability	Training Environmental restructuring Enablement	Feedback on behaviour Self-monitoring of behaviour Goal setting Action planning	Antibiotic compliance audits on advice given and actual compliance: 1. An electronic audit within the pharmacy system 2. A hard copy audit to be completed manually 3. Patient survey
9. Patient diagnosis is not available 10. Unclear whether it is the pharmacists role to query antibiotic prescriptions	Professional role and identity	Reflective motivation	Education Persuasion Modelling	Information about health consequences Feedback on outcomes of behaviour Prompts/cues Credible source	Provide prescription indications: 1. Provide coded diagnosis information on patient prescriptions 2. Provide access to patient records
11. Advice is limited as pharmacists cannot provide examinations	Professional role and identity	Reflective motivation	Education Persuasion Modelling	Demonstration Information about health consequences Credible source	Offer optional accredited medical training to pharmacists in patient examination to inform advice giving

Barriers such as under skilled staff giving misinformation to patients and time pressure both for patients and pharmacists are reported to be influential on the quality of advice given to patients. Therefore time saving resources need to be developed to assist pharmacists and pharmacy staff in giving self-care advice and antibiotic compliance advice to patients that can also double as educational resources for new pharmacy staff or pharmacy staff in training. Feedback from this study indicates that the TARGET Treating Your Infection leaflet for pharmacies could be an appropriate solution. Adapting the TARGET UTI leaflet or use of other pictorial leaflets may also help.[17, 18] Pharmacy staff also suggested pictorial stickers or simple leaflets in order to communicate and reinforce compliance advice with patients.

Audit templates to assess self-care and antibiotic compliance advice in pharmacies should increase awareness of the link between giving self-care advice and AMR, and improve the pharmacy service. Any such audits should provide firm action plans and allow for re-auditing with the aim of quality improvement.[19]

If the role of pharmacists is to consider the accuracy of antibiotic prescriptions or give the most appropriate self-care advice then they need to be aware of patients' diagnoses. Without diagnosis information, pharmacists are only able to identify that the prescription is the correct course and dosage for the specified antibiotic, and give appropriate compliance advice. A system should be developed to provide pharmacists with quick and easy access to prescription indications which will support pharmacists in their AMS activities, enabling them to provide tailored self-care advice alongside antibiotic prescriptions. Self-care advice will facilitate patients self-care for any future self-limiting infections. Providing coded diagnoses, similar to that of Read coding, offers a quick and confidential way of communicating diagnosis information to pharmacists. An alternative could be to provide pharmacists with access to patient records in order to access diagnosis. Indeed the Royal Pharmaceutical Society believes that pharmacists should have full access to patient records in the interest of safe and effective patient care.[20] However in community pharmacy, time would need

factoring in to the dispensing process to enable community pharmacists to check clinical appropriateness within local guidelines for each antibiotic prescription.

Extending pharmacy services to include patient examination, could be an optional additional training for pharmacists to enable more targeted advice. Further research would be required to evaluate the additional service to understand the added benefit versus risks to the wider health economy, and patients.

Discussion

Comparison with existing literature

A recent audit of over the counter medication sales and self-care advice demonstrated that community pharmacies are the first port of call for patients. During the audit period, over four in 10 instances where an over the counter product was not supplied was because the community pharmacy team identified that the patient required a referral to another health service, the most common being GP referrals.[21] With lack of time and staff skillset being an issue it is recommended here that a resource is developed to support pharmacists and their staff in giving effective self-care and compliance advice.

GPs and pharmacists both reported that common infections can be dealt with in community pharmacy as pharmacists are knowledgeable and well skilled in providing effective advice. Indeed, research has shown that patients are satisfied with consultations by non-medical prescribers such as pharmacists for acute respiratory tract infections.[22] Forty four percent of patients expected a physical examination from their non-medical prescriber and reported that it was important for reassurance. Similarly, non-medical prescribers used physical examinations to reassure patients, and as a form of evidence to justify their treatment decision. [22] Whilst pharmacists are not trained to listen to patient breathing it was reported by some pharmacists in this study that it would be a useful addition to community pharmacy services.

Strengths and limitations

To our knowledge, this is the first study to explore pharmacists' and pharmacy staff attitudes and experiences around self-care advice for common infections, antibiotic compliance advice, AMS activities and antimicrobial resistance (AMR) using the TDF . The use of the TDF and BCW to guide the question schedules, interpret the findings and inform intervention recommendations is a novel use of behavioural theory in this context.

By recruiting pharmacists and pharmacy staff through randomly selecting pharmacies from lists stratified by urban/rural, independent/small chain/large chain, facilitated recruitment of a wide ranging sample with a range of experiences. Some had hospital experience and therefore had first-hand experience of the implications of bacterial resistance, some had only worked in small independents and therefore had close relationships with their community and others worked with large teams in high street pharmacies with fewer familiar patients. Despite using randomised lists for recruitment there is still a possibility that only AMR enthusiasts volunteered to take part, however some participants were not aware of the link between giving self-care advice and AMR, therefore indicating that not only enthusiasts volunteered.

This study used focus groups and interviews including a mix of telephone and face to face methods. This ensured that participants could choose the method which was most convenient and comfortable for them. It could be argued that a large scale survey could be appropriate for this context but the depth and quality of the information gained here would not have been plausible with a survey design.

Conclusions

This study has highlighted a number of implications for community pharmacy practice. The authors suggest the development or adaptation of resources for use in community pharmacy including a resource to assist pharmacists and pharmacy staff in providing self-care advice to patients for common infections, a resource to assist pharmacists and pharmacy staff in giving antibiotic

compliance advice to patients and audits for pharmacists and pharmacy staff to monitor and improve self-care advice and antibiotic compliance advice.

Declarations

Data sharing statement

The data generated from this study is not suitable for sharing beyond what is contained within this article. Further information can be obtained from the corresponding author.

Ethics approval

Ethical approval was obtained from Cardiff University ethics committee (SMREC: 15/55).

Competing interests

Leah Jones works for Public Health England's Primary Care Unit on the development of the TARGET Antibiotics resources for primary care clinicians.

Cliodna McNulty leads Public Health England's Primary Care Unit, and leads the TARGET Antibiotic resources for primary care clinicians and Public Health England's quick reference antibiotic and diagnostic guides.

Tracey Thornley leads pharmacy practice research for Boots UK, and is Honorary Professor at the School of Pharmacy, University of Nottingham

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Author contributions

LJ	Commented on the protocol, conducted all interviews and focus groups, conducted the data analysis, and wrote the paper.
RO	Wrote the protocol with CMCN, oversaw the day to day running of the study, and

	commented on the paper.
AS	Commented on the protocol, adapted the interview schedule to the TDF, assisted with data analysis, and commented on the paper.
DAO	Commented on the protocol, assisted with recruitment, and commented on the paper.
TT	Worked with CMCN to devise the project, commented on the protocol, assisted with recruitment and commented on the paper.
NF	Commented on the protocol, assisted with recruitment, and commented on the paper.
CB	Commented on the protocol and commented on the paper.
CMCN	Wrote the first draft of the protocol, devised and oversaw the entire study.

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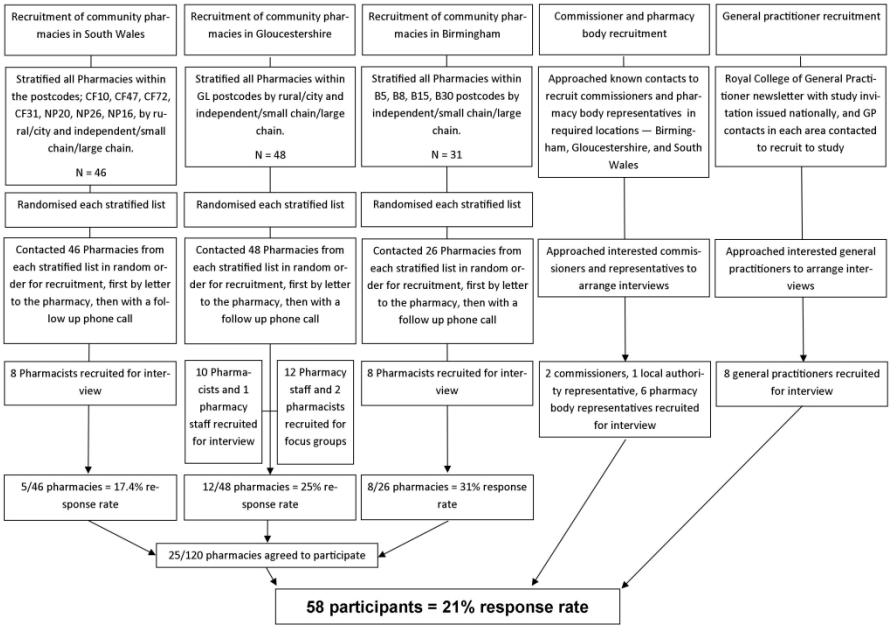
Figure I: Recruitment flow chart

The recruitment flow chart demonstrates the method and process of recruitment for each participant group.



297x209mm (300 x 300 DPI)

Centre Number:_____ Version 11 – 22/07/16
Participant Code:_____
Date:_____

Pharmacist Interview Schedule

Introduction *[please read this to the interviewee before the interview takes place]*

My name is XXX and I am interviewing you on behalf of Public Health England as part of a study to explore pharmacists attitudes to management of infections in the community. The interviews will be used to help us inform how we may improve the general public's use of antibiotics through the community pharmacy setting, and we would really value any information you can give us.

I would like to ask you about three topics.

- First I would like to talk to you about what you think about antibiotic resistance and others' attitudes towards antibiotics and giving self-care advice for suspected infectious illnesses.
- Then I would like to find out any suggestions you have for ways we could improve antibiotic use through community pharmacies.
- Finally, the third set of questions will cover how you think a resource might be implemented in pharmacies to assist in giving self-care advice and whether you think there are any potential barriers in implementing such a resource

If you don't mind, the interview will be recorded on tape and I will take a few notes.The notes and recording will be anonymised before we type it up, meaning we will not use your name or any other information that could be used to identify you. Are you happy to go ahead with the interview? Can I check that you have signed the consent form?

Background Questions

1. Representing company:
2. Do you work at this location only?
3. What is your role?
4. How long have you been qualified?
5. What is your age?
6. How long have you worked here?
7. Do you do extended hours or weekends?
8. Could you tell me a bit about this community pharmacy? Probe: Type of clientele

Centre Number:_____ Version 11 – 22/07/16
Participant Code:_____
Date:_____

Section One – We are now going to discuss your thoughts and opinions on antibiotic resistance, common infections, self-care and antibiotic use

1. Could you tell me a little bit about what you know about antibiotic resistance? *Probe: What do you think are the consequences of antibiotic resistance? To what extent do you think it's important to slow its development?* (Knowledge) (Beliefs about consequences)

Giving self-care advice

2. Could you tell me a bit about how the general public raise or discuss common infections with you in the pharmacy? (Environmental context and resources)
3. What skills are required for giving advice about common infections in community pharmacy? (Skills/interpersonal skills)
4. Are there any barriers in your role that limits your advice to patients about self-caring for common infections? (Social/professional role/identity)
5. How easy or difficult is it to know if a patient presenting to you with a common infection needs an antibiotic? (Beliefs about capability)
6. In a typical day, how often do you give self-care advice? *Probe: What about for people purchasing certain remedies? Are there any particular queues, prompts of characteristics which indicate that you should give advice?* (Memory, attention and decision processes)
7. What kind of attitudes have you encountered when giving self-care advice? *Probe: How satisfied are patients with the self-care advice you give? (*Social influence)
8. To what extent do patients raise the topic of antibiotics during a conversation about self-care? How do you respond when this happens? (Skills/interpersonal skills)
9. Tell me about the advantages and disadvantages of giving self-care advice in the pharmacy setting compared to in a GP practice? (Beliefs about consequences)

Centre Number:_____ Version 11 – 22/07/16
Participant Code:_____
Date:_____

10. What motivates you to give self-care advice? *Probe: to what extent do you consider antimicrobial resistance when giving self-care advice?* (Reinforcement)

11. Can you tell me about situations where you decide to not give self-care advice. *Probe: What makes you decide that it's not required?* (Memory, attention and decision processes)

12. To what extent do you think managing common infections in community pharmacy can slow antimicrobial resistance? (Beliefs about consequences)

13. Do you seek colleagues' opinions before giving self-care advice? Probe: In pharmacy meetings? Training? One to one discussions etc. (Social Influence)

14. Do you receive any feedback on your advice? How do you know you gave good advice? Probe: Training, feedback, from colleagues, case reviews? (Behavioural regulation)

15. Do you receive feedback if you advised a patient to only self-care who might have benefited from an antibiotic? *Probe: To what extent do you consider this when giving advice? How useful would it be for you to receive feedback on this?* (Beliefs about consequences)

16. Do you receive feedback if you advise a patient to go to their GP but they get advised to self-care or take over the counter medication? *Probe: How useful would it be for you to receive feedback on this?* (Beliefs about consequences)

17. If you wanted to improve or advance your own practice to managing self-care advice to patients how would you do it? *(training, self change, shop level change, chain level change, professional spread). Probe: If so – what kind of training/change/layout etc.* (Behavioural regulation) – If training is mentioned, ask about CPPE.

18. Can you tell me about any education you have had about managing common infections with self-care advice and antimicrobial resistance? Probe: Probe: To what extent are these topics linked in your training? (Skills/interpersonal skills)

Antibiotic use and advice

Centre Number:_____ Version 11 – 22/07/16
Participant Code:_____
Date:_____

19. Could you tell me a little about how you currently discuss / raise antibiotic use with the general public? *Probe: IF YES: How do you discuss it? IF NO: Why not? Public taking antibiotics as intended and/or whether should be taking them at all. (Skills/interpersonal skills)*

20. What do you think the issues are that make it difficult for the general public to take antibiotics appropriately? *Probe: How do you think they may be overcome? Public taking antibiotics as intended and/or whether should be taking them at all.* (Social Influence)

21. What kind of attitudes have you encountered when giving antibiotic advice? *Probe: How satisfied are patients with the advice you give?* (Social influence)

22. Is there anything about your professional role that limits your advice to patients about antibiotics? (Social/professional role/identity)

23. How do you deal with situations where you suspect a customer has been prescribed antibiotics unnecessarily? Probe: Would you educate them about resistance? (Skills/interpersonal skills)

24. Do you think it's an appropriate part of your job to:

    - Consider whether a patient needs an antibiotic?
    - Manage patients who have been refused an antibiotic?

    (Social/professional role/identity)

25. To what extent can you personally help optimise the publics' antibiotic use? *Probe: Is it important to educate the public about these topics?* (Beliefs about consequences)

26. To what extent do you think CRP testing could be used in community pharmacy? *Probe: would you use it? What about for difficult and demanding patients?*

27. What motivates you to give antibiotic advice? Probe: *to what extent do you consider antimicrobial resistance when giving antibiotic advice*? (Reinforcement)

Centre Number:_____
Participant Code:_____
Date:_____

28. Is there anything that you could do in your role to reduce the number of patients who think they need antibiotics? (Behavioural regulation)

29. Could you tell me a bit about what your organisation's (employer's) attitude is to antibiotic resistance? *Probe: How does your organisation communicate this message?* (Social Influence)

30. What do you understand by the term "antimicrobial stewardship"? (knowledge)

31. Are you aware of local or national antimicrobial stewardship initiatives? Probe: Within your CCG? Within your company? (Knowledge)

Section Two – We are now going to discuss suggestions you have for ways we could improve antibiotic use in community pharmacies

32. Are you using or have you used any type of resource to assist you in providing self-care advice to patients? *Probe: Leaflet, posters, campaigns etc.* (Environmental context and resources)

33. Are you using or have you used any type of resource to assist you in providing antibiotic advice to patients? *Probe: Leaflet, posters, campaigns etc.* (Environmental context and resources)

34. What kind of support, if at all, would you like for providing self-care or antibiotic advice to patients? *Probe: Information/guidance/leaflets/posters etc.* (Skills/interpersonal skills)

35. Do you have any suggestions for resources on antibiotic resistance for the general public in pharmacies? *Probe: If not antibiotic resistance what about self-care for uncomplicated infections, or both?* (Skills/interpersonal skills)

36. What sort of messages on:

    1. resistance

2. antibiotic use

… do you think you would feel most comfortable promoting? (Beliefs about capability)

37. Do you think there is a role for back-up/delayed antibiotics in this context? Probe: if yes, how? Could you facilitate its use? (Environmental context and resources)

38. Do you think there is a role for electronic prescribing in improving antibiotic use in community pharmacies? *Probe: if yes, how? Could you facilitate its use? (Environmental context and resources)*

Section Three – We are now going to discuss how you think a resource for pharmacists might be implemented in pharmacies and any potential barriers

39. If a resource was created to aid in

    a. giving self-care advice
    b. antibiotic advice
    c. educating the public about resistance

do you think you would use it, and why? (Memory, attention and decision processes)

40. What do you think would make pharmacists and pharmacist staff interested in using such a resource? *Probe: What would be a good selling point for pharmacists and pharmacies? (reinforcement)*

41. Can you foresee any challenges in implementing such a resource? *Probe: follow up on issues e.g. age, time, repeat prescriptions, competing sales, training requirement– how would they overcome them? (Beliefs about consequences)*

42. Can you foresee any advantages or benefits with such a resource? *Probe: For the pharmacy, community,* antimicrobial resistance*? (reinforcement)*

43. These resources have been developed for General Practitioners to aid them in reducing antibiotic prescriptions for common infections – to what extent do you think they could be modified for use in pharmacies? *(Here, show the participant the Treating Your Infection*

*leaflet, the When Should I Worry Leaflet and the Gloucestershire adaptation of the PHE National Antibiotic Management Guidance) (*Environmental context and resources)

Standards for Reporting Qualitative Research (SRQR)*

http://www.equator-network.org/reporting-guidelines/srqr/

	Page/line no(s).
Title and abstract	
Title - 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 - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	2-3
Introduction	
Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	1
Purpose or research question - Purpose of the study and specific objectives or questions	1-2
Methods	
Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	5
Researcher characteristics and reflexivity - 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	NA
Context - Setting/site and salient contextual factors; rationale**	5
Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	5
Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	16
Data collection methods - 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**	6

Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	6
Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	7-8
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	6-7
Data analysis - 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**	6-7
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	7

Results/findings

Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	9-14
Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	Table 1

Discussion

Integration with prior work, implications, transferability, and contribution(s) to the field - 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 contribution(s) to scholarship in a discipline or field	14-16
Limitations - Trustworthiness and limitations of findings	15

Other

Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	16
Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	16

*The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.

**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.

Reference:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. **Standards for reporting qualitative research: a synthesis of recommendations.** *Academic Medicine*, Vol. 89, No. 9 / Sept 2014
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BMJ Open

A qualitative study using interviews and focus groups to explore the current and potential for antimicrobial stewardship in community pharmacy informed by the Theoretical Domains Framework

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A qualitative study using interviews and focus groups to explore the current and potential for antimicrobial stewardship in community pharmacy informed by the Theoretical Domains Framework

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Abstract

Objectives

Community pharmacists and their staff have potential to contribute to antimicrobial stewardship (AMS). However, their barriers and opportunities are not well understood. The aim was to investigate the experiences and perceptions of community pharmacists and their teams around AMS to inform intervention development.

Design

Interviews and focus groups were used to explore the views of pharmacists, pharmacy staff, general practitioners, members of pharmacy organisations and commissioners. The questioning schedule was developed using the Theoretical Domains Framework which helped inform recommendations to facilitate AMS in community pharmacy.

Results

Eight GPs, 28 pharmacists, 13 pharmacy staff, six representatives from pharmacy organisations in England and Wales, and two local stakeholders participated.

Knowledge and skills both facilitated or hindered provision of self-care and compliance advice by different grades of pharmacy staff. Some staff were not aware of the impact of giving self-care and compliance advice to help control antimicrobial resistance (AMR). The pharmacy environment created barriers to AMS; this included lack of time of well qualified staff leading to misinformation from under skilled staff to patients about the need for antibiotics or the need to visit the GP, this was exacerbated by lack of space. AMS activities were limited by absent diagnoses on antibiotic prescriptions.

Several pharmacy staff felt that undertaking patient examinations, questioning the rationale for antibiotic prescriptions and performing audits would allow them to provide more tailored AMS advice.

Conclusions

Interventions are required to overcome lack of qualified staff, time and space to give patients AMS advice. Staff need to understand how self-care and antibiotic compliance advice can help control AMR. A multifaceted educational intervention including information for staff with feedback about advice given may help. Indication for prescription would enable pharmacists to provide more targeted antibiotic advice. Commissioners should consider the pharmacists' role in examining patients, and giving advice about antibiotic prescriptions.

Key words/phrases: community pharmacy, antimicrobial stewardship, antibiotics, self-care, common infections, qualitative, theoretical domains framework

Article summary

Strengths and limitations of this study

- This is the first study to explore pharmacists' and pharmacy staff attitudes and experiences around self-care advice for common infections, antibiotic compliance advice, AMS activities and antimicrobial resistance using the Theoretical Domains Framework (TDF).
- The use of the TDF and Behaviour Change Wheel is a novel use of behavioural theory in this context.
- Randomly selecting pharmacies from stratified lists facilitated recruitment of a wide ranging sample with a range of experiences.
- Despite using randomised lists for recruitment there is still a possibility that only AMR enthusiasts volunteered to take part.
- This study used focus groups and interviews including a mix of telephone and face to face methods. This ensured that participants could choose the method which was most convenient and appropriate for them.

Introduction

The World Health Organisation has reported concerns about the threat of antibiotic resistance and stressed the need for public awareness of the responsible use of antibiotics.[1] Patients have an important role to play in the control of antibiotic resistance, by reducing use of unnecessary antibiotics for common infections (such as for respiratory infections) and by adhering to their prescription instructions when they do receive antibiotics.[2] Community pharmacists can facilitate this through their contact with patients and by promoting antimicrobial stewardship (AMS) initiatives within their pharmacies.[3] Community pharmacists have the opportunity to influence patient expectation by educating patients on effective self-care treatments and the negative consequences of using antibiotics, such as side effects and resistance.[4]

Within England, the Department of Health (DOH) pharmacy strategy 2005 – 2015 aimed to enable community pharmacists and their staff to see themselves as important contributors to improving public health.[5] The DOH is currently incentivising community pharmacies (through the community pharmacy contractual framework) to meet criteria to expand and improve their range of clinical services. One of these criteria is to become a Healthy Living Pharmacy Level 1,[6] through demonstrating that the pharmacy team is actively engaging with the local community.[7] In addition, the National Health Service (NHS) in England have been expanding the services already provided by community pharmacies to include treatment for urgent minor ailments and common conditions including viral infections.[6] Indeed, research has shown that through various strategies community pharmacists can enhance their role in AMS,[8] by providing self-care and antibiotic compliance advice to patients [9] as well as the ability to recommend over-the-counter treatments for common infections.[10] However, this incentive scheme is not available nationally in England, therefore there is considerable variation in community pharmacy services.

Within Wales the Choose Pharmacy scheme encourages the general public to seek advice and treatment for minor ailments from community pharmacies. The scheme also aims to fully integrate

community pharmacies with GP surgeries and hospitals by linking their technology, such as providing pharmacy access to GP records in order to check the accuracy of prescribed medications.[11, 12]

The aim of this study is to identify opportunities for expanding AMS activities by exploring pharmacists' and pharmacy staff attitudes and experiences around self-care advice for common infections, antibiotic compliance advice, AMS activities and antimicrobial resistance (AMR). The findings from this study will contribute to recommending intervention strategies for community pharmacy teams in order to enhance their role in helping to control AMR.

Method

This was a qualitative study using semi-structured interviews and focus groups with community pharmacists, community pharmacy staff, GPs, pharmacy body representatives and commissioners.

Community pharmacy selection

UK pharmacies in Inner city Birmingham, Gloucestershire and South Wales were approached to recruit pharmacies with a mix of deprivation, ethnicity, rural and urban locations, varying customer numbers and customer demographics. Pharmacies in each area were stratified by rural/urban based on their postcode details[13] if relevant, and in order to obtain pharmacies with varying staffing levels and a range of corporate resources available, by chain/small chain/independent using a Google search of the pharmacies (later confirmed in the interview/focus group). Each stratified list was randomised using the random number generation function in Excel, and approached in random order by letter and then telephone until the required number of participants for each region and pharmacy type was reached. The target was to recruit 30 pharmacists and 8 pharmacy staff from across the regions and strata.

Participant recruitment

Pharmacies were sent invitation letters, study information sheets and a consent form inviting pharmacists and pharmacy staff to participate in interviews or focus groups for the study. If no

response was received after a week, the researchers telephoned the pharmacy. The most common reason for non-participation was lack of time.

Representatives from pharmacy body organisations, general practitioners (GPs) and Clinical Commissioning Groups (CCGs - CCGs are state funded and commission primary health care from general practices in England), were invited via contacts known to the researchers and by means of a Royal College of General Practitioners newsletter to also participate in interviews. See figure I for the recruitment flow chart.

Data collection

The question schedule was drafted by a researcher (LJ) and then adapted by a health psychologist (AS) using the Theoretical Domains Framework (TDF) in order to understand the influences on participant behaviour[14], and then reviewed by other researchers (CMCN, LJ and RO) for clinical relevance. The question schedule (Appendix 1) was piloted with one pharmacist. There were no changes made following the pilot and so the results from the pilot are included in the findings. The broad topic areas discussed were interviewees' attitudes and experiences of providing self-care advice for common infections, and antibiotic compliance advice, AMS activities and AMR. One trained qualitative researcher (LJ) from Public Health England (PHE) conducted the interviews and focus groups. All participants were assured of anonymity, confidentiality, and gave written informed consent. Participants were offered a £40 gift voucher for their time.

Focus groups were conducted within pharmacies where several members of staff expressed an interest in taking part. Interviews were conducted by telephone and face to face in order to accommodate participant preference. They lasted 30-60 minutes, were audio-recorded, transcribed verbatim and checked for accuracy.

Data analysis

Data was analysed by a PHE researcher, LJ, using a thematic framework and using QSR Nvivo 10. Themes were refined and redundant or infrequent codes were recoded. The remaining themes were

placed within the TDF framework with assistance from a health psychologist (AS), and where more than one domain was relevant the context was discussed and a consensus reached. Quotations from the transcripts are used in the results table to illustrate each domain. A researchers meeting was held to discuss the main themes from the results and to discuss themes to take forward for intervention recommendations. These were examined within the context of the Behaviour Change Wheel (BCW)[15] in order to identify intervention functions, policy categories and behaviour change techniques relevant for intervention recommendations and future developments.

10% of transcripts were double coded by a second PHE researcher. Codes were discussed and an agreed consensus was reached.

Patient involvement

Patients were not involved in this study.

Results

Sample characteristics

Twenty six out of 31 pharmacies were contacted in Birmingham. All pharmacies in the Gloucestershire and South Wales lists were approached in order to achieve the recruitment targets.

A total of 58 people took part in either interviews or focus groups for this study. Forty four interviews were conducted with 26 community pharmacists (10 from Gloucestershire, 8 from Birmingham and 8 from South Wales), one dispensing manager, eight GPs (three from Birmingham, one from Gloucestershire, two from Hertfordshire, one from London and one from Colchester), two primary care commissioners, one Programme Manager from a Local Authority, and six representatives from pharmacy organisations (Royal Pharmaceutical Society, Pharmacy Voice, The Centre for Pharmacy Postgraduate Education, The Pharmaceutical Services Negotiating Committee, Association of Pharmacy Technicians UK, NHS England and the National Pharmacy Association).

Three focus groups were conducted in three pharmacies, with two pharmacists and 12 other pharmacy staff. Other pharmacy staff included five dispensers, one pharmacy manager, one dispensing assistant, two health care assistants and one shop assistant.

Of all pharmacy participants, 16 worked in an independent pharmacy (a pharmacy which is independently owned), five in a small chain, 18 worked for a large chain (a chain refers to more than one pharmacy which is centrally managed or owned) and two pharmacists were locums. Pharmacists were aged 24 to 63, with a mean age of 41. Eighteen were male and 10 were female.

The analysis identified key domains from the TDF on influencing pharmacists' behaviour within community pharmacy which are relevant to our study, as outlined in table I.

Table I: Factors influencing pharmacists' self-care and compliance advice for common infections, and antimicrobial stewardship initiatives

	TDF domain	Giving self-care advice	Giving antibiotic compliance advice	Participating in antimicrobial stewardship initiatives
1	**Knowledge**	Pharmacists report being knowledgeable in giving self-care advice	Pharmacists are knowledgeable on what drugs to take for a particular illness/condition. *"I think doctors are brilliant at conditions, we're the best at the drugs. So we know what should be prescribed when, and we can try and minimise as much as we can." – Pharmacist 4, Gloucestershire* Pharmacists understand that misuse of antibiotics can lead to resistance. Pharmacy staff also understand that misuse of antibiotics can lead to the return of infections.	Pharmacists lacked awareness of AMS initiatives and knowledge of what AMS is. *"I've heard the term but to be honest I couldn't recall a campaign going on at the moment, no." – Pharmacist 15, Birmingham (Talking about antimicrobial stewardship)*
2	**Skills**	Pharmacists report being skilled in giving self-care advice	Pharmacists report being skilled in giving compliance advice	This domain was not relevant in this context
3	**Professional Role and Identity**	Examining patients is not part of the pharmacists' role. Pharmacists reported that being unable to examine patients can make it difficult to give correct advice. *"…we always have to double check because we have no equipment in pharmacy to assess their breathing. I guess obviously that comes with training, so I don't*		It is unclear whether it is the pharmacist's role to query the appropriateness of antibiotic prescriptions. *"If a doctor's decided that person needs an antibiotic, then I would be on a sticky wicket questioning that really. That's outside of my authority as a pharmacist," – Pharmacist 25, Wales*

		expect to just have a stethoscope and listen to customers. But if a pharmacy can, if a pharmacist can do that, it would be a bonus to our profession and to the service that we can give." – Pharmacist 7, Gloucestershire		*"in terms of where I see community pharmacy fitting in is where we do a clinical check on a prescription, it is our duty to decide whether or not it is clinically suitable or clinically appropriate for the patient to take the medication that we're checking…" – Pharmacist 15, Birmingham*
		Pharmacists believe an integral part of their role is to provide self-care advice for all common ailments.		
4	**Beliefs about capabilities**	Pharmacists are confident in their ability to give self-care advice	Pharmacists are confident in their ability to give compliance advice	This domain was not relevant in this context
5	**Optimism**	Pharmacists were optimistic that giving self-care advice can impact AMR	Pharmacists were optimistic that ensuring compliance can impact AMR	Pharmacists were optimistic that giving self-care advice and ensuring compliance can impact AMR
6	**Beliefs about consequences**	One pharmacist highlighted the danger of missing something urgent that requires further medical attention if a culture of self-care is adopted. *"If they keep on doing self care, actually, it actually prevents them to actually go to see the doctors if it's something quite urgent." – Pharmacist 10, Wales*	Pharmacists believe that patients don't understand and don't remember their compliance advice and therefore believe compliance is poor. *"…And sometimes we find that they don't come back to complete their course, or those that come back and say they probably don't need the second bottle…" – Pharmacist 6, Gloucestershire*	There were no emerging themes within this domain
7	**Reinforcement**	A few GPs and stakeholders believe that pharmacists are financially motivated. *"They're not doing it for the love of the profession or the love of helping people get better, they're doing it because they're going to make money at the end of the day" – Stakeholder 9,*	There were no emerging themes within this domain	There were no emerging themes within this domain

		Pharmacists reported not being financially motivated. *"So, I've always said to anyone who works in there. Yes we have to make money but, we're not unethically making money so, actually, if that product is not suitable for that person we won't sell them. So, and that's how it works." – Pharmacist 2, Gloucestershire*		
8	**Intentions**	Pharmacists reported intentions to offer self-care advice to everyone presenting with symptoms or purchasing an OTC medication. *"We'd always make sure that any OTC sale, general sale list included, we would still check through WWHAM and make sure it is appropriate." – Pharmacist 20, Wales* Pharmacists discourage visiting the GP and try and promote self-care as much as possible. *"I try as much as possible to stop that happening and saying, there's no point going to the doctors for this you just need to manage it, symptom control it and in a period of five to seven, ten days you'll probably feel a lot better" – Pharmacist 23, Wales*	Pharmacists intend to give compliance advice with every antibiotic prescription	Pharmacists had no intentions to conduct AMS within the foreseeable future
9	**Goals**	A pharmacist's main goal is to help their patients recover. *"it's caring for the patient. If we can give them advice and help them feel better then that's our aim." – Pharmacist 11, Birmingham*	There were no emerging themes within this domain	There were no emerging themes within this domain
10	**Memory, attention and**	Pharmacists reported that they do not find it difficult in most instances to determine if a person needs an antibiotic or not. *"Sometimes you can tell, like for example, if they've tried medicines or*	Pharmacists reported not always asking for the diagnosis when giving compliance advice. *"I probably wouldn't, no, because we don't, unless*	Some pharmacists were unaware of the link between giving self-care and compliance advice with tackling AMR. *"I am not thinking, oh this is helping antimicrobial resistance, I'll*

	decision making	*something for a duration of a so called infection. It's more than like … You can generally tell when someone needs antibiotics so yeah. You can generally spot it, yeah." – Pharmacist 22, Birmingham* Pharmacists did report that it can be more difficult to decide whether a child or an elderly person needs to be referred to the GP or not. *"Sometimes it can get very tricky. Especially with a young child at times, because obviously the child can't explain their symptoms to you, so you're relying on the mother to tell you everything… It's when they're elderly or really little, or a child, then it's really hard." – Pharmacist 19, Birmingham* Pharmacists will refer patients to the GP if they are unsure whether the infection is viral or bacterial, or they feel that they can't help the patient. *"if there's something there we can't treat over-the-counter then we would refer it but we never would say that you need antibiotics, you just have something that needs to be looked into." – Pharmacist 10, Wales*	*they're obviously coughing or told us what it is, we wouldn't necessarily know what those antibiotics are for." – Pharmacist 8, Gloucestershire* Pharmacists report giving compliance advice habitually with every antibiotic prescription. Some pharmacists said that if they see several prescriptions over a short period of time for the same patient it will trigger them to have a discussion with that patient about potential resistance. *"if I notice that we're getting regular prescriptions or we're getting prescriptions from regular customers I will intervene sometimes and talk to them," – Pharmacist 8, Gloucestershire*	*be thinking that, well, there's no point them trying to get antibiotics for this because it's just a viral infection, a cold, the, and they're going to get better anyway," – Pharmacist 11, Birmingham*
11	**Environmental context and resources**	Pharmacists identified that pharmacy staff are more likely to deal with patients looking for advice for RTIs or UTIs than pharmacists, particularly in large pharmacies. *"…what you'll find is the interaction with the pharmacist isn't always the, is not probably the most common interaction that the patient has in the community pharmacy, it's more normal with the healthcare assistant on the counter." – Pharmacist 15, Birmingham*	Pharmacists do not know diagnoses without asking the patient. This makes it difficult for pharmacists to query accuracy and appropriateness of prescriptions with GPs. *"…I don't know what's been diagnosed, obviously even with UTIs you're guessing, but if it's Trimethoprim or Nitrofurantoin you generally know.*	AMR was described as not being promoted or advertised within community pharmacy settings. *"We know about it, and I did my initial training in a hospital so, I know about what happens. But, in the community it's not really, it's not something that would be heavily advertised I would say." – Pharmacist 2, Gloucestershire*

Pharmacists report that during busy times advice is given over the counter instead of in the consultation room, therefore affecting the quality of the advice given.

"…the time engaged with customers where you get a chance to actually counsel and go through what they're taking, why they're taking it, how to take, it's, is very restricted. So you find that you're not giving that pharmaceutical advice that you'd like to give in a way that you'd want to give it. So I think it's not reinforced to the customer as best as it can be." Pharmacist 14, Birmingham

Some pharmacists were concerned that misinformation is given to patients from untrained and inexperienced pharmacy staff.

"if the assistant doesn't feel confident then, and you'll see it with newer assistants, then they're likely to just say, go to the doctor, which is obviously not a good thing" – Pharmacist 11, Birmingham

It was mentioned that as you don't need to book appointments with pharmacists it gives patients immediate access to a health care professional, unlike other primary care services.

"The advantage is from a patient point of view, is they've kind of got a healthcare professional …on demand… They might never have walked into your pharmacy ever but they can walk in and access that self-care." – Pharmacist 9, Wales

But… it's hard for me to know if the doctor is being conscientious when I don't know what's being treated." – Pharmacist 18, Wales

Some believe that AMR needs to be tackled across all sectors of healthcare and not just one sector of healthcare e.g. just primary care, or just GPs.

Pharmacists are generally unaware of any AMS going on within their CCG.

"I can't recall a particular campaign, I don't think," – Pharmacist 15, Birmingham

Pharmacists in England reported not having much communication with their CCG.

"because they haven't really approached us in the pharmacy, so I would say it's probably not very active…I don't know what they do with the doctors though, because they haven't informed us of anything." – Pharmacist 19, Birmingham

Pharmacists in Wales reported that their Health Boards are very proactive within community pharmacy.

"They're really proactive. You've got several health campaigns every couple of months. We get the leaflets, we get audits, whatever. It's very proactive" – Pharmacist 20, Wales

12	**Social influence**	Pharmacists believe that patients are given unnecessary prescriptions from their GP as a result of patient expectations. *"I think some GPs they even succumb to pressures with giving out a prescription for it. And then you see the patient and I don't think they need that antibiotic." – Pharmacist 13, Birmingham*	Pharmacy staff have noticed that patients are disinterested in compliance advice and tend to be in a rush to go. *"You can stay talking to them all day long and they don't mind but sometimes, like I said, especially for antibiotics, they just want to go." – Pharmacy staff, Gloucestershire*	Pharmacists believe that the general public find it difficult to understand AMR and this prevents them from attempting to discuss it with them. *"It's, I think it's very difficult for the public to get their head around," – Pharmacist 5, Gloucestershire* Pharmacists report that AMR isn't something that is discussed frequently with colleagues. *"It's not something that we would probably discuss as such within the pharmacy, yeah." – Pharmacist 1, Gloucestershire*
13	**Emotion**	This domain was not relevant in this context	This domain was not relevant in this context	All pharmacists were concerned about AMR, only very few expressed fear as a response. *"Because I am quite scared actually that…these antibiotics in the next 20 odd years they're not going to be effective at all... So, yeah, that does frighten me a bit." – Pharmacist 13, Birmingham*
14	**Behavioural regulation**	Pharmacists receive informal feedback from regular customers on the advice they give and the products they recommend. *"patients do sometimes come back and say, oh that worked really well" – Pharmacist 12, Gloucestershire* There is not a way for pharmacists to find out if their advice was unhelpful. *"Only if the patient really came in and told us about it, but no, there's no way of finding out other than that" – Pharmacist 21, Birmingham*	There were no emerging themes within this domain	A few pharmacists in Wales reported the effectiveness of audits on raising awareness of AMR and changing practice. *"Well we had the audit so I think that raised a bit more awareness of possibly what you should be doing" – Pharmacist 23, Wales*

Giving self-care advice in community pharmacy

Pharmacists reported that giving self-care advice daily for common infections is an integral part of their role, and by using the WWHAM mnemonic [16], Who is the patient, What are the symptoms, How long have the symptoms been present, Action taken, Medication being taken, as well as their experience. Pharmacists identified some difficulty in determining the need for antibiotics in the elderly or the very young. When pharmacists are uncertain or believe they are dealing with a serious condition, they refer the patient to their GP, or if a patient evidently needs immediate care they will refer to urgent care.

A minority of GPs and one pharmacy body representative expressed concern that pharmacists are financially motivated in the advice they give and the products which they recommend. Pharmacists reported that their main motivation is the health and wellbeing of their patients, not financial incentives.

The stated benefits of providing self-care in community pharmacy included immediate access to a health professional, equipping patients with knowledge for future infective episodes, and saving GP time. Indeed, pharmacists reported that they try and discourage patients visiting the GP, and try and promote self-care when possible. Most believe that educating patients with self-care advice can contribute to tackling AMR by preventing future antibiotic use. For some, preventing future antibiotic use was their main motivation, some however, were not aware of this link until it was mentioned by the researcher.

The GPs in this study view pharmacists as not only being knowledgeable about medications but also sufficiently skilled to make recommendations to patients. As such, they were confident in the ability of pharmacists to deal with minor respiratory tract infections.

Barriers to giving self-care advice in community pharmacy

Pharmacists and other pharmacy staff identified that pharmacy staff usually have more interactions with patients looking for self-care advice as pharmacists spend little of their time at the medicines

counter in large pharmacies. Pharmacists expressed concern that misinformation can be given to patients if their staff are untrained or inexperienced. Lack of time was perceived as a barrier to giving effective and thorough self-care advice and can lead to advice being given quickly over the counter.

Some pharmacists felt that being unable to examine patients (e.g. listen to their chest) is a barrier to giving accurate self-care advice. They believe that being able to conduct such examinations would enhance the service they could provide. One pharmacist highlighted a concern that focusing too much on providing self-care advice could potentially lead to not identifying a more serious infection. Despite pharmacists reporting that they receive informal feedback on their advice from many of their regular patients, many identified a lack of formal procedure to receive feedback on their self-care or compliance advice given. Some pharmacists believed that patients want an instant cure for their ailments and are not willing to wait for the duration of their illness to feel better.

Giving antibiotic compliance advice in community pharmacy

Pharmacists, their staff and GPs reported that a key responsibility in community pharmacies is to provide antibiotic advice and ensure patient compliance. Amongst pharmacists, the idea that misuse of antibiotics results in resistant infections was well understood. For some, AMR was a concern and therefore a driver for giving compliance advice. Less qualified pharmacy staff did not display an in depth understanding of AMR but were aware that misuse of antibiotics can lead to recurrent or relapsing infections.

Barriers to giving antibiotic compliance advice in community pharmacy

Pharmacists are not provided with an indication of patients' diagnoses on prescriptions, and this was reported by some as a major barrier as it deters pharmacists from querying the accuracy of antibiotic prescriptions with prescribers. It was reported that when giving compliance advice it would be unusual for a pharmacist to ask what condition the antibiotics had been prescribed for.

Pharmacists reported that many patients do not understand compliance advice and therefore believe that compliance is generally poor. Additionally, pharmacy staff noticed that some patients tend to be disinterested in the compliance advice.

Antimicrobial resistance and antimicrobial stewardship in community pharmacy

Pharmacists were generally unaware of any stewardship initiatives from within and outside of the community pharmacy setting. Many had never heard of the term antimicrobial stewardship before. Despite this lack of awareness, when AMS was explained pharmacists believed they had a role in tackling AMR through educating the general public on how to self-care for common infections and the appropriate use of antibiotics.

Pharmacists in Wales had conducted self-care audits in their pharmacy which they felt had raised awareness of AMR and had contributed to improvements in their practice.

All pharmacists expressed concern about AMR and its implications. However, no one reported any intentions to adopt any AMS promotions or activities in their pharmacy in the foreseeable future.

Barriers to antimicrobial stewardship in community pharmacy

The biggest barrier identified was that many pharmacists and all pharmacy staff were not consciously aware of the link between giving self-care advice, compliance advice, and their impact on AMR. Many only became aware of the link once it was brought to their attention by the interviewing researcher. Once aware, they were optimistic that giving self-care advice and compliance advice could have a significant impact on AMR. Although, many pharmacists believed that discussing AMR with the general public would be difficult as their perception was that they would find it difficult to understand the concept.

Summary (Table II)

Identification of potential interventions

Analysis using the TDF has been applied here to the Behaviour Change Wheel [15]. By identifying key influential domains from the TDF, the BCW allows for identification of intervention functions, policy categories and alongside the BCT Taxonomy v1, behaviour change techniques to inform intervention recommendations in this context. Table II demonstrates this process of identifying key domains through to intervention recommendations.

Table II: Intervention recommendations for community pharmacy using the TDF, BCW and Behaviour Change Techniques Taxonomy V1

Finding	TDF domains	COM-B	Intervention functions (selected)	Behaviour change techniques (selected)	Recommendations and examples
1. Lack of communication with CCGs	Environmental context and resources	Physical opportunity	Training Environmental restructuring Enablement	Restructuring the physical environment Social support	Better communication links with CCGs are needed: CCGs to promote AMS in community pharmacies or lead on audits
2. Time is an issue for pharmacists 3. Misinformation can be given to patients	Environmental context and resources	Physical opportunity	Training Environmental restructuring Enablement	Adding objects to the environment Instruction on how to perform a behaviour	Resource for all pharmacy staff to provide self-care information to patients e.g. patient information leaflet
4. Belief that patients do not comply 5. Belief that patients are not interested in compliance advice	Beliefs about consequences	Reflective motivation	Education Persuasion	Information about health consequences (for patients) Credible sources Prompts/cues	Compliance advice resources: 1. A leaflet to be shared with the patient and discussed 2. A leaflet to be inserted into the prescription bag 3. Stickers to place on the box with pictorial compliance information
6. Lack of feedback on self-care advice given 7. Unaware of link between AMR and giving advice	Memory, attention and decision making	Psychological capability	Training Environmental restructuring Enablement	Feedback on behaviour Self-monitoring of behaviour Goal setting Action planning	Self-care advice audits: 1. An electronic audit within the pharmacy system 2. A hard copy audit to be completed manually Training on link between AMR and self-care advice
8. Lack of feedback on compliance advice given	Memory, attention and decision making	Psychological capability	Training Environmental restructuring Enablement	Feedback on behaviour Self-monitoring of behaviour Goal setting Action planning	Antibiotic compliance audits on advice given and actual compliance: 1. An electronic audit within the pharmacy system 2. A hard copy audit to be completed manually 3. Patient survey
9. Patient diagnosis is not available 10. Unclear whether it is the pharmacists role to query antibiotic prescriptions	Professional role and identity	Reflective motivation	Education Persuasion Modelling	Information about health consequences Feedback on outcomes of behaviour Prompts/cues Credible source	Provide prescription indications: 1. Provide coded diagnosis information on patient prescriptions 2. Provide access to patient records
11. Advice is limited as pharmacists cannot provide examinations	Professional role and identity	Reflective motivation	Education Persuasion Modelling	Demonstration Information about health consequences Credible source	Offer optional accredited medical training to pharmacists in patient examination to inform advice giving

Discussion

Implications for practice

Barriers such as under skilled staff giving misinformation to patients and time pressure both for patients and pharmacists are reported to be influential on the quality of advice given to patients. Therefore time saving resources need to be developed to assist pharmacists and pharmacy staff in giving self-care advice and antibiotic compliance advice to patients that can also double as educational resources for new pharmacy staff or pharmacy staff in training. Feedback from this study indicates that the TARGET Treating Your Infection leaflet for pharmacies could be an appropriate solution, as shown by a recent pilot study of the TARGET leaflet in community pharmacy which concluded that the leaflet will act as a cue to have infection-related self-care conversations with patients and facilitate a short consultation.[17] Adapting the TARGET UTI leaflet or use of other pictorial leaflets may also help.[18, 19] Pharmacy staff also suggested pictorial stickers or simple leaflets in order to communicate and reinforce compliance advice with patients.

Audit templates to assess self-care and antibiotic compliance advice in pharmacies should increase awareness of the link between giving self-care advice and AMR, and improve the pharmacy service. Any such audits should provide firm action plans and allow for re-auditing with the aim of quality improvement.[20]

If the role of pharmacists is to consider the accuracy of antibiotic prescriptions or give the most appropriate self-care advice then they need to be aware of patients' diagnoses. Without diagnosis information, pharmacists are only able to identify that the prescription is the correct course and dosage for the specified antibiotic, and give appropriate compliance advice. A system should be developed to provide pharmacists with quick and easy access to prescription indications which will support pharmacists in their AMS activities, enabling them to provide tailored self-care advice alongside antibiotic prescriptions. Self-care advice will facilitate patients self-care for any future self-limiting infections. Providing coded diagnoses, similar to that of Read coding, offers a quick and

confidential way of communicating diagnosis information to pharmacists. An alternative could be to provide pharmacists with access to patient records in order to access diagnosis. Indeed the Royal Pharmaceutical Society believes that pharmacists should have full access to patient records in the interest of safe and effective patient care.[21] However in community pharmacy, time would need factoring in to the dispensing process to enable community pharmacists to check clinical appropriateness within local guidelines for each antibiotic prescription.

Extending pharmacy services to include patient examination could be an optional additional training for pharmacists to enable more targeted advice. Further research would be required to evaluate the additional service to understand the added benefit versus risks to the wider health economy, and patients.

Implications for research

It is recommended that future research uses behavioural theory such as the TDF and the BCW in the development of AMS interventions for community pharmacy, in order to understand the behavioural domains, intervention functions and policy categories relevant to successful implementation. It will be important to develop any interventions alongside input from target users such as pharmacists, pharmacy staff and stakeholders, including the general public for any patient facing interventions; in order to understand potential barriers and facilitators to implementation, and any recent changes to perceptions of AMR and AMS since this study. The effect of any interventions or resources needs to be evaluated in a range of pharmacy settings.

Comparison with existing literature

A recent audit of over-the-counter medication sales and self-care advice demonstrated that community pharmacies are the first port of call for patients. During the audit period, over four in 10 instances where an over-the-counter product was not supplied was because the community pharmacy team identified that the patient required a referral to another health service, the most common being GP referrals.[22] With lack of time and staff skillset being an issue it is recommended

here that a resource is developed to support pharmacists and their staff in giving effective self-care and compliance advice.

GPs and pharmacists both reported that common infections can be dealt with in community pharmacy as pharmacists are knowledgeable and well skilled in providing effective advice. Indeed, research has shown that patients are satisfied with consultations by non-medical prescribers such as pharmacists for acute respiratory tract infections.[23] Forty four percent of patients expected a physical examination from their non-medical prescriber and reported that it was important for reassurance. Similarly, non-medical prescribers used physical examinations to reassure patients, and as a form of evidence to justify their treatment decision. [23] Whilst pharmacists are not trained to listen to patient breathing it was reported by some pharmacists in this study that it would be a useful addition to community pharmacy services.

Strengths and limitations

To our knowledge, this is the first study to explore pharmacists' and pharmacy staff attitudes and experiences around self-care advice for common infections, antibiotic compliance advice, AMS activities and antimicrobial resistance (AMR) using the TDF . The use of the TDF and BCW to guide the question schedules, interpret the findings and inform intervention recommendations is a novel use of behavioural theory in this context.

By recruiting pharmacists and pharmacy staff through randomly selecting pharmacies from lists stratified by urban/rural, independent/small chain/large chain, facilitated recruitment of a wide ranging sample with a range of experiences. Some had hospital experience and therefore had first-hand experience of the implications of bacterial resistance, some had only worked in small independents and therefore had close relationships with their community and others worked with large teams in high street pharmacies with fewer familiar patients. As with qualitative studies there is always the possibility that only AMR enthusiasts volunteered to take part, however the study team believe that randomisation of the pharmacy lists and the £40 financial incentive to participate

enabled and attracted non-enthusiasts to participate. Furthermore, pharmacy staff admitted not understanding the link between self-care and compliance with AMR indicating that they were probably not enthusiasts.

This study used focus groups and interviews including a mix of telephone and face to face methods. This ensured that participants could choose the method which was most convenient and comfortable for them. It could be argued that a large scale survey could be appropriate for this context but the depth and quality of the information gained here would not have been plausible with a survey design.

Conclusions

This study has highlighted a number of implications for community pharmacy practice. The authors suggest the development or adaptation of resources for use in community pharmacy including a resource to assist pharmacists and pharmacy staff in providing self-care advice to patients for common infections, a resource to assist pharmacists and pharmacy staff in giving antibiotic compliance advice to patients and audits for pharmacists and pharmacy staff to monitor and improve self-care advice and antibiotic compliance advice.

Declarations

Data sharing statement

All qualitative data from this study is held by Public Health England, Primary Care Unit.

Ethics approval

Ethical approval was obtained from Cardiff University ethics committee (SMREC: 15/55).

Competing interests

Leah Jones works for Public Health England's Primary Care Unit on the development of the TARGET Antibiotics resources for primary care clinicians.

Cliodna McNulty leads Public Health England's Primary Care Unit, and leads the TARGET Antibiotic resources for primary care clinicians and Public Health England's quick reference antibiotic and diagnostic guides.

Tracey Thornley leads pharmacy practice research for Boots UK, and is Honorary Professor at the School of Pharmacy, University of Nottingham

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Author contributions

LJ, Commented on the protocol, conducted all interviews and focus groups, conducted the data analysis, and wrote the paper. RO, Wrote the protocol with CMCN, oversaw the day to day running of the study, and commented on the paper. AS, Commented on the protocol, adapted the interview schedule to the TDF, assisted with data analysis, and commented on the paper. DAO, Commented on the protocol, assisted with recruitment, and commented on the paper. TT, Worked with CMCN to devise the project, commented on the protocol, assisted with recruitment and commented on the paper. NF, Commented on the protocol, assisted with recruitment, and commented on the paper. CB, Commented on the protocol and commented on the paper. CMCN, Wrote the first draft of the protocol, devised and oversaw the entire study.

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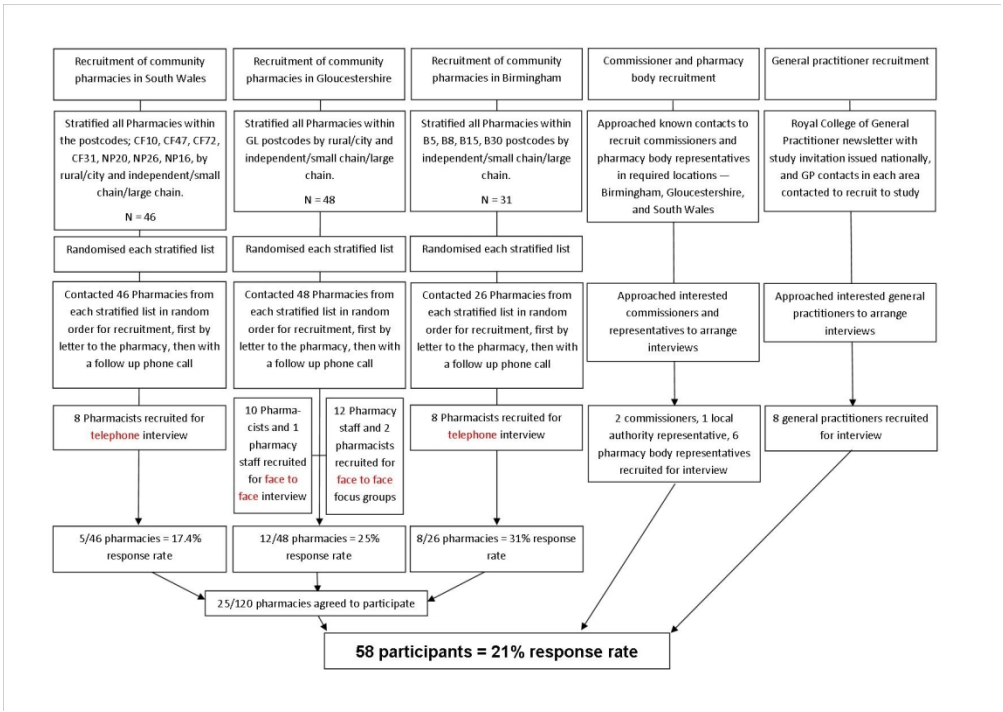
Figure I: Recruitment flow chart

The recruitment flow chart demonstrates the method and process of recruitment for each participant group.



297x209mm (150 x 150 DPI)

Centre Number:_____ Version 11 – 22/07/16
Participant Code:_____
Date:_____

Pharmacist Interview Schedule

Introduction *[please read this to the interviewee before the interview takes place]*

My name is XXX and I am interviewing you on behalf of Public Health England as part of a study to explore pharmacists attitudes to management of infections in the community. The interviews will be used to help us inform how we may improve the general public's use of antibiotics through the community pharmacy setting, and we would really value any information you can give us.

I would like to ask you about three topics.

- First I would like to talk to you about what you think about antibiotic resistance and others' attitudes towards antibiotics and giving self-care advice for suspected infectious illnesses.
- Then I would like to find out any suggestions you have for ways we could improve antibiotic use through community pharmacies.
- Finally, the third set of questions will cover how you think a resource might be implemented in pharmacies to assist in giving self-care advice and whether you think there are any potential barriers in implementing such a resource

If you don't mind, the interview will be recorded on tape and I will take a few notes.The notes and recording will be anonymised before we type it up, meaning we will not use your name or any other information that could be used to identify you. Are you happy to go ahead with the interview? Can I check that you have signed the consent form?

Background Questions

1. Representing company:
2. Do you work at this location only?
3. What is your role?
4. How long have you been qualified?
5. What is your age?
6. How long have you worked here?
7. Do you do extended hours or weekends?
8. Could you tell me a bit about this community pharmacy? Probe: Type of clientele

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Date:_____

Section One – We are now going to discuss your thoughts and opinions on antibiotic resistance, common infections, self-care and antibiotic use

1. Could you tell me a little bit about what you know about antibiotic resistance? *Probe: What do you think are the consequences of antibiotic resistance? To what extent do you think it's important to slow its development?* (Knowledge) (Beliefs about consequences)

Giving self-care advice

2. Could you tell me a bit about how the general public raise or discuss common infections with you in the pharmacy? (Environmental context and resources)

3. What skills are required for giving advice about common infections in community pharmacy? (Skills/interpersonal skills)

4. Are there any barriers in your role that limits your advice to patients about self-caring for common infections? (Social/professional role/identity)

5. How easy or difficult is it to know if a patient presenting to you with a common infection needs an antibiotic? (Beliefs about capability)

6. In a typical day, how often do you give self-care advice? *Probe: What about for people purchasing certain remedies? Are there any particular queues, prompts of characteristics which indicate that you should give advice?* (Memory, attention and decision processes)

7. What kind of attitudes have you encountered when giving self-care advice? *Probe: How satisfied are patients with the self-care advice you give? (*Social influence)

8. To what extent do patients raise the topic of antibiotics during a conversation about self-care? How do you respond when this happens? (Skills/interpersonal skills)

9. Tell me about the advantages and disadvantages of giving self-care advice in the pharmacy setting compared to in a GP practice? (Beliefs about consequences)

10. What motivates you to give self-care advice? *Probe: to what extent do you consider antimicrobial resistance when giving self-care advice?* (Reinforcement)

11. Can you tell me about situations where you decide to not give self-care advice. *Probe: What makes you decide that it's not required?* (Memory, attention and decision processes)

12. To what extent do you think managing common infections in community pharmacy can slow antimicrobial resistance? (Beliefs about consequences)

13. Do you seek colleagues' opinions before giving self-care advice? Probe: In pharmacy meetings? Training? One to one discussions etc. (Social Influence)

14. Do you receive any feedback on your advice? How do you know you gave good advice? Probe: Training, feedback, from colleagues, case reviews? (Behavioural regulation)

15. Do you receive feedback if you advised a patient to only self-care who might have benefited from an antibiotic? *Probe: To what extent do you consider this when giving advice? How useful would it be for you to receive feedback on this?* (Beliefs about consequences)

16. Do you receive feedback if you advise a patient to go to their GP but they get advised to self-care or take over the counter medication? *Probe: How useful would it be for you to receive feedback on this?* (Beliefs about consequences)

17. If you wanted to improve or advance your own practice to managing self-care advice to patients how would you do it? *(training, self change, shop level change, chain level change, professional spread). Probe: If so – what kind of training/change/layout etc.* (Behavioural regulation) – If training is mentioned, ask about CPPE.

18. Can you tell me about any education you have had about managing common infections with self-care advice and antimicrobial resistance? Probe: Probe: To what extent are these topics linked in your training? (Skills/interpersonal skills)

Antibiotic use and advice

Centre Number:_____ Version 11 – 22/07/16
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Date:_____

19. Could you tell me a little about how you currently discuss / raise antibiotic use with the general public? *Probe: IF YES: How do you discuss it? IF NO: Why not? Public taking antibiotics as intended and/or whether should be taking them at all. (Skills/interpersonal skills)*

20. What do you think the issues are that make it difficult for the general public to take antibiotics appropriately? *Probe: How do you think they may be overcome? Public taking antibiotics as intended and/or whether should be taking them at all.* (Social Influence)

21. What kind of attitudes have you encountered when giving antibiotic advice? *Probe: How satisfied are patients with the advice you give?* (Social influence)

22. Is there anything about your professional role that limits your advice to patients about antibiotics? (Social/professional role/identity)

23. How do you deal with situations where you suspect a customer has been prescribed antibiotics unnecessarily? Probe: Would you educate them about resistance? (Skills/interpersonal skills)

24. Do you think it's an appropriate part of your job to:

    - Consider whether a patient needs an antibiotic?
    - Manage patients who have been refused an antibiotic?

    (Social/professional role/identity)

25. To what extent can you personally help optimise the publics' antibiotic use? *Probe: Is it important to educate the public about these topics?* (Beliefs about consequences)

26. To what extent do you think CRP testing could be used in community pharmacy? *Probe: would you use it? What about for difficult and demanding patients?*

27. What motivates you to give antibiotic advice? Probe: *to what extent do you consider antimicrobial resistance when giving antibiotic advice*? (Reinforcement)

28. Is there anything that you could do in your role to reduce the number of patients who think they need antibiotics? (Behavioural regulation)

29. Could you tell me a bit about what your organisation's (employer's) attitude is to antibiotic resistance? *Probe: How does your organisation communicate this message?* (Social Influence)

30. What do you understand by the term "antimicrobial stewardship"? (knowledge)

31. Are you aware of local or national antimicrobial stewardship initiatives? Probe: Within your CCG? Within your company? (Knowledge)

Section Two – We are now going to discuss suggestions you have for ways we could improve antibiotic use in community pharmacies

32. Are you using or have you used any type of resource to assist you in providing self-care advice to patients? *Probe: Leaflet, posters, campaigns etc.* (Environmental context and resources)

33. Are you using or have you used any type of resource to assist you in providing antibiotic advice to patients? *Probe: Leaflet, posters, campaigns etc.* (Environmental context and resources)

34. What kind of support, if at all, would you like for providing self-care or antibiotic advice to patients? *Probe: Information/guidance/leaflets/posters etc.* (Skills/interpersonal skills)

35. Do you have any suggestions for resources on antibiotic resistance for the general public in pharmacies? *Probe: If not antibiotic resistance what about self-care for uncomplicated infections, or both?* (Skills/interpersonal skills)

36. What sort of messages on:

    1. resistance

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Date:_____

2. antibiotic use

… do you think you would feel most comfortable promoting? (Beliefs about capability)

37. Do you think there is a role for back-up/delayed antibiotics in this context? Probe: if yes, how? Could you facilitate its use? (Environmental context and resources)

38. Do you think there is a role for electronic prescribing in improving antibiotic use in community pharmacies? *Probe: if yes, how? Could you facilitate its use? (Environmental context and resources)*

Section Three – We are now going to discuss how you think a resource for pharmacists might be implemented in pharmacies and any potential barriers

39. If a resource was created to aid in

    a. giving self-care advice
    b. antibiotic advice
    c. educating the public about resistance

do you think you would use it, and why? (Memory, attention and decision processes)

40. What do you think would make pharmacists and pharmacist staff interested in using such a resource? *Probe: What would be a good selling point for pharmacists and pharmacies? (reinforcement)*

41. Can you foresee any challenges in implementing such a resource? *Probe: follow up on issues e.g. age, time, repeat prescriptions, competing sales, training requirement– how would they overcome them? (Beliefs about consequences)*

42. Can you foresee any advantages or benefits with such a resource? *Probe: For the pharmacy, community,* antimicrobial resistance*? (reinforcement)*

43. These resources have been developed for General Practitioners to aid them in reducing antibiotic prescriptions for common infections – to what extent do you think they could be modified for use in pharmacies? *(Here, show the participant the Treating Your Infection*

*leaflet, the When Should I Worry Leaflet and the Gloucestershire adaptation of the PHE National Antibiotic Management Guidance) (*Environmental context and resources)

Standards for Reporting Qualitative Research (SRQR)*

http://www.equator-network.org/reporting-guidelines/srqr/

	Page/line no(s).
Title and abstract	
Title - 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 - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	2-3
Introduction	
Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	1
Purpose or research question - Purpose of the study and specific objectives or questions	1-2
Methods	
Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	5
Researcher characteristics and reflexivity - 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	NA
Context - Setting/site and salient contextual factors; rationale**	5
Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	5
Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	16
Data collection methods - 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**	6

Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	6
Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	7-8
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	6-7
Data analysis - 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**	6-7
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	7

Results/findings

Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	9-14
Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	Table 1

Discussion

Integration with prior work, implications, transferability, and contribution(s) to the field - 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 contribution(s) to scholarship in a discipline or field	14-16
Limitations - Trustworthiness and limitations of findings	15

Other

Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	16
Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	16

*The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.

**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.

Reference:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. **Standards for reporting qualitative research: a synthesis of recommendations.** *Academic Medicine*, Vol. 89, No. 9 / Sept 2014
DOI: 10.1097/ACM.0000000000000388