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Factors associated with medication adherence among people living with COPD: Pharmacists' perspectives

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ABSTRACT

Background: While medication is an integral part of the effective management of COPD, more than 50% of people living with COPD do not adhere to their prescribed medications. The drivers underpinning this observed behaviour are poorly understood. As pharmacists generally have the final interaction with patients prior to their use of medications, their perspectives may offer insights about patients' medication use that may improve our understanding of this complex issue.

Objective: This study explored pharmacists' experiences of providing care for patients living with COPD to gain insight about factors that impact their medication-taking behaviour.

Methods: Fourteen pharmacists who worked in practice settings across the South-East Queensland region of Australia participated in interviews between March 2019 and January 2020. Interviews were audio-recorded, transcribed verbatim, and thematically analysed.

Results: Two overarching themes were identified which modulated medication-taking behaviour. Barriers comprised patient-related factors including, financial constraints, poor inhaler technique, and inaccurate beliefs; alongside pharmacist-related factors such as a lack of COPD-specific training and time constraints. Factors that promote adherence included patient education and monitoring and collaborative relationships between key stakeholders.

Conclusions: Medication non-adherence is common. While pharmacists expressed a desire to better support their patients, practical strategies to overcome the challenges that they face in clinical settings are lacking. Future research should focus on exploring ways to engage patients at the pharmacy level thereby enhancing the provision of services that would optimise medication adherence.

1. Introduction

Chronic obstructive pulmonary disease (COPD) is a persistent and progressive airway disease characterized by difficulty breathing, coughing, and sputum production.¹ People aged 45 years and over are most frequently affected, with disease progression commonly associated with continuous exposure to inhaled particulates, such as cigarette smoke.^{2,3} Globally, it is estimated that almost 300 million people live with this chronic and often debilitating disease, making it the sixth leading cause of disability and mortality.^{4,5} Despite the availability of effective pharmacological treatment, it is predicted that by 2030, COPD will become the third leading cause of death globally.⁶

Effective management of COPD requires not only a range of lifestyle modifications such as smoking cessation, but also a life-long commitment to treatment, especially using medications as prescribed.⁷ There is strong evidence highlighting the positive impact of proper medication use

combined with lifestyle modifications including reducing the rate of COPD exacerbations, minimizing hospital admissions, and increased survival rates.^{8,9} However, studies reveal that more than half of all patients who are prescribed medications for the management of their COPD fail to take their medications as prescribed.^{8,10–12} Non-adherence to medications may result in disease progression and subsequently, reduce the patient's quality of life as well as increase the burden on health systems.

In Australia, it is estimated that almost 5% of the population aged 45 years and over (approximately 464,000 people) live with COPD.¹³ Placed fifth among the leading causes of death for the Australian population, COPD not only places the burden of ill health on individuals and their families, but also places a considerable economic burden on the health system.¹³ For example, between 2015 and 16 an estimated AUD\$977 million was spent on medicines and other health services for the management of COPD.¹³ It is important to note that Australia's universal health insurance program, Medicare, enables Australian residents and those from countries

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that have reciprocal health care agreements with Australia, to access a wide variety of medication and health services subsidised by the Australian Government.¹⁴ Almost all medicines for the management of COPD are dispensed to patients at a government-subsidised price. While ultimately patients are responsible for taking their medications, health professionals have an obligation to provide education, advice, counselling, and resources to support patients to use their medications safely and effectively.¹⁵ In the past decade, the Australian government has implemented a range of initiatives that aim to optimise outcomes for people living with chronic health conditions, including COPD, that encompass services delivered by pharmacists.^{16,17} These services include clinical interventions, medication reviews, screening, and management of chronic diseases.^{16,17}

Pharmacists within their professional roles and practice settings are often the most accessible health professional that patients interact with when collecting their medications.^{18,19} In the community setting, pharmacists are easily accessible due to the extended hours of business operation, and often serve as the first point of contact between the public and the health care system. Pharmacists are also often the last point of contact when medications are prescribed for ongoing management of chronic health conditions.²⁰ Most patients visit a community pharmacy to have their prescription dispensed and to seek advice about managing their symptoms.²¹ Importantly, pharmacists play a crucial role in supporting patients in the management of their health by providing medication-related and lifestyle support, education and advice. For people living with COPD, pharmacists' role may include providing education about risk factors, assisting patients to cease smoking, and providing guidance about the correct use of medications, including inhaler devices.^{22,23} Pharmacists also play a role in the early diagnosis of COPD by conducting regular screening, and referrals to medical practitioners when necessary. Other services that community and hospital pharmacists provide to COPD patients include inhaler technique reviews, influenza and pneumococcal vaccination, and medication reconciliation.²⁴

Despite initiatives to support people living with COPD, studies reveal the rate of non-adherence among Australian residents is not dissimilar to those reported in countries that do not have the same level of universal health coverage.^{25,26} These findings suggest that current strategies for optimising outcomes may not be reaching the target population for COPD patients in Australia. Whilst to date, much of the literature has explored patients' perspectives of the barriers and facilitators to their medicine adherence,^{25–28} there has been limited research on the experiences of pharmacists in managing COPD patients' adherence to medication.²⁶ Of the few qualitative studies, one study sought to understand community pharmacists' perspectives on the challenges and enablers of implementing COPD screening services,²⁹ another examined hospital pharmacists' viewpoints of the barriers and strategies to manage chronic illness,³⁰ and a third study focused on health care providers (HCPs) views about factors affecting self-management of COPD.³¹ Although both challenges to and facilitators of medication adherence were identified by participants, the findings from these studies reflected a wide range of other chronic diseases and did not focus on the specific factors to COPD medicine adherence.³⁰ This knowledge is vital to the development of future initiatives to enhance medication adherence and subsequently, optimise outcomes for patients living with COPD. Therefore, this study aimed to examine pharmacists' experiences in providing care for patients living with COPD with the specific objective of understanding pharmacists' perspectives of the factors which may contribute to COPD medication non-adherence.

2. Methods

2.1. Study design, setting, and participants

This qualitative study was conducted in South-East Queensland, Australia, and used semi-structured interviews to gather narrative data from participants. Participant recruitment utilised personal networks of the research team, visits to pharmacies, convenience sampling³² and snow-ball techniques.³³ Target participants were pharmacists who were

involved in providing health and medication-related services to people living with COPD across community and hospital settings. Specifically, participants' roles included dispensing COPD medications, counselling about the correct use of inhalers and conducting medication reviews. The community and hospital pharmacies were contacted by email or through in-person pharmacy visits. In the case of those who refused to participate or showed no responses, additional participants suitable to our research were invited. Potential participants were contacted and interviewed until thematic saturation was reached. Interviews were conducted at locations preferred by the interviewees, including their workplaces and coffee shops. This study was approved by the University Human Research Ethics Committee (GU ref. no: 2018/929).

2.2. Data collection

Face-to-face semi-structured interviews were conducted between March 2019 and January 2020. An interview guide was used to generate a conversation that focused on participants' experiences of providing care to people with COPD and their perspectives on potential moderators of medication-taking behaviour. The summary of interview questions is provided in the supplementary file.

The interview guide was tested with three HCPs experienced in providing care for people living with COPD for face and content validity and then standardised, incorporating their feedback. Prior to each interview, participants were provided with a project information sheet, briefed about the purpose of the interview, and asked to provide written consent that included consent for their interview to be audio recorded. All interviews were conducted by one researcher (BB) who also made observational notes. The interviews ranged between 22 and 51 min in duration (mean = 38 min). Data collection continued until thematic saturation was reached, achieved by concurrent collection and analysis. Interview transcripts were offered to participants, however, none of the participants elected to receive their transcript.

2.3. Data analysis

Interviews were transcribed verbatim by a professional transcription provider. The quality of the transcripts was checked by two members of the research team (BB and AM) who read each transcript while listening to the audio recordings. All the transcripts were anonymised and only the researchers had access to the information. The checked transcripts were then imported to QSR NVivo 12 to facilitate analysis.³⁴ Meetings between the team members were held to discuss the coding framework and emerging themes. Informed by Braun and Clarke's six-step thematic analysis process,³⁵ each transcript was read multiple times by BB to become familiar with the content. The inductive coding approach (reading raw data to derive themes or concepts) was used to analyse the interview data.³⁶ Similar ideas or patterns across the data set were grouped together to develop the code. Similar codes were further sorted and refined throughout the data interpretation process to identify new emerging themes. Subsequently, these were reviewed and refined to generate the final themes. Dialogue between the research team members continued throughout analyses and reporting of this study. The consolidated criteria for reporting qualitative research (COREQ) checklist was used to report the findings of this study.³⁷

3. Results

A total of 14 pharmacists ($n = 7$ male, $n = 7$ female) were interviewed, the majority of whom ($n = 9$) worked in community pharmacy settings while the remainder ($n = 5$) worked in hospital settings. The characteristics of the participants are summarised in Table 1. Most of the participants were aged 40 years or younger, held a master's degree in pharmacy, and had 15 years or less working experience in their professional roles. However, one participant had been working as a pharmacist for more than 33 years. Most participants reported that they had not received COPD-specific training or education during their practical experience.

Table 1
Characteristics of participants.

Characteristics	N
Age	
25–30	7
31–40	6
>40	1
Sex	
Male	7
Female	7
Highest level of education	
Bachelor of Pharmacy	4
Graduate Diploma of Clinical Pharmacy	2
Master of Pharmacy	8
Years of experience	
0–5	6
6–10	4
11–15	3
>15	1
COPD related training/education	
Yes	3
No	11

Participants' reported that COPD patients who visited the pharmacy and with whom they had engaged were older, smoked cigarettes, and lived with multiple health conditions. Data analysis revealed two overarching themes that modulated medication-taking behaviour which are discussed below according to whether they are barriers to or facilitators of medication adherence. A summary of the themes and sub-themes is depicted in Table 2. Supporting quotes have been coded to indicate whether the participant worked in a hospital (PH) or community pharmacy (PC) setting, the numerical order in which their interview took place, and their gender (M/F).

3.1. Barriers to medication adherence

Barriers to proper use of medications include the cost of medications, inaccurate beliefs, poor inhaler techniques, differences between medications prescribed for use in the community compared with hospital settings, the retail environment of community pharmacies, and lack of COPD-specific training. These sub-themes are discussed below according to whether they are patient or pharmacist and pharmacy-related.

3.1.1. Patient-related factors

3.1.1.1. Cost of medications. Medication cost was frequently discussed as a barrier to adherence by the participants. Even when the cost of medicines was subsidised, patients with COPD were often prescribed multiple medications which compounded the total cost:

“...inevitably when they're on lots of different medicines, it's going to cost them a lot of money and some patients...can't afford their medicines.” (PH,10,M).

Some participants speculated that when patients are faced with financial constraints, they forego their preventer medications. They also highlighted that the majority of medications for relieving symptoms are less expensive than those that are for preventing symptoms, and thus, some patients were more inclined to use their reliever medications because the positive effect is more tangible:

“You know for somebody that uses a reliever or where they actually feel like they're getting a result straight away...They sort of perceive benefit from it, and whether they feel like they're getting a benefit immediately.” (PC,14,F).

Several participants revealed that patients who do not have concession status have an increased financial burden to buy their medicines:

“...these inhalers cost them upwards of \$40 [each] a month, which adds up over the course of the year.” (PH,9,M).

Polypharmacy was identified as a major contributor to non-adherence as exemplified by the comment below:

“...often people are going to forget every now and then because they just have this sheer volume all of the other things that they need to take.” (PH,10,M).

3.1.1.2. Inaccurate beliefs. Participants expressed that some patients appeared to have the belief that if they have been using their device for some time, then they know how to use it correctly:

“...you start talking to them about the medication they are like, “I know. Okay. I have been using it for years. It's all right. If you could just give me my medication that would be enough.” (PC,4,M).

However, participants reported that in most cases, patients did not use their devices correctly when asked to demonstrate their technique in the pharmacy. Even after identifying the error, participants reported that it was difficult to change the patient's behaviour. They speculated that this was due to the patient's devaluing of pharmacists' advice:

“Sometimes you sort of have to accept that a patient doesn't want to talk to you about it [inhaler], especially in the community. If they're just racing in to pick up an inhaler that they think they know how to use them, and they just say no, “I don't wanna – don't wanna go through this with you.” (PC,14,F).

Moreover, participants expressed the view that many people are unaware of the role of pharmacists:

“...a lot of assumptions by our patient population is that the doctor is the expert in medicines, not the pharmacist. So we seem to kind of have lost our identity as a knowledgeable medicine person.” (PH,13,F).

3.1.1.3. Poor inhaler technique. As previously discussed, participants commonly reported that patients were not using their inhalers correctly:

“...50% of people don't understand how to use it. You can show them, and they come back to you and three months down the line, they're not doing it correctly.” (PC,6,M).

Participants highlighted that co-existing health conditions such as arthritis and age-related issues negatively impacted on patient's ability to use their inhaler device correctly:

“The Ultibro® where you put the capsule in, that can get quite tricky for them especially when they have got difficulty with eyesight...It can sometimes be a

Table 2
Summary of themes and sub-themes specifying factors impacting medication adherence.

Themes	Sub-themes
1) Barriers to medication adherence	Patient-related factors <ul style="list-style-type: none"> • Cost of medications • Inaccurate beliefs • Poor inhaler technique Pharmacist and pharmacy-related factors <ul style="list-style-type: none"> • Formulary differences between hospital and community settings • Retail environment of the pharmacy • Lack of COPD-specific training
2) Facilitators of medication adherence	<ul style="list-style-type: none"> • Providing education and regularly monitoring • Collaborative relationships between pharmacists, patients, and doctors

bit confusing...So then I think they are missing doses due to that.” (PC,2,F).

Participants also reported that they often see patients being prescribed medications that are delivered via inhaler devices which the patients are not able to manage.

“...sometimes doctors don't really think about the device, they're just thinking about the medication...so they're not recognising that now they've prescribed three different types of medications and they all get delivered with different devices...that could be very confusing for the patient and it just introduces more areas where somebody can make an error in how they're using the different devices.” (PC,14,F).

However, their attempts to support the patients are often met with resistance as previously discussed.

3.1.2. Pharmacist and pharmacy-related factors

3.1.2.1. Formulary differences between hospital and community settings. The limited range of inhalers in Queensland public hospitals posed a barrier to customising choice. As explained by participants, during a patient's stay in a public hospital, it is common practice for the patient's medication to be replaced by hospital stock. This often results in a new medication and/or device being used during the patient's hospital stay:

“The other issue that we have, specific to Queensland Health, is not all of the inhalers that are available on the PBS are available on the hospital system... If they [patients] don't bring it in, we don't really have stock of it in the hospital here. So, we would have to change into alternatives whilst they are in hospital.” (PH,10,M).

3.1.2.2. Retail environment of the pharmacy. Participants shared their thoughts that community pharmacy as a health service provider conflicted with its retail business. Some expressed concerns that in their experience, pharmacy owners placed greater emphasis on the retail aspect of the business, limiting the time and care that the employee pharmacist provides to patients:

“Unfortunately, some of the pharmacies, and I don't want to name the big pharmacies, but especially discounted pharmacies are making things more about money and less about your health.” (PC,4,M).

Participants expressed the view that such business practices serve to devalue pharmacists' roles in optimising patients' health, compounded by the impetus to sell products through companion selling.

“...we have to try to do up-selling like if they ask for advice about puffers, we try to sell them the spacer or if they're coughing...we try to sell them lozenges.” (PC,7,F).

In terms of the services that pharmacists provide, some speculated that pharmacies generally do not advertise their services. They assume that due to a lack of awareness, patients tend to perceive the role of pharmacists to be centred on the dispensing of medicines:

“People are like “I didn't realise that's a service you provide.” (PC,1,F).

Participants expressed mixed opinions regarding the remuneration for the services that they provide. A few participants perceived that providing pharmacy services is a regular part of their job and supports the building of therapeutic relationships with their patients. In contrast, a small number of participants expressed that they have been offered less remuneration for the services they provide compared to the time they spend on providing these services:

“There are probably thousands of services we do that we don't get paid for...I mean we deliver a lot to our elderly patients that can't get out.” (PC,3,F).

It was also commonly identified that a high volume of prescriptions alongside other workload issues limited the time that participants were able to provide to their patients:

“I do not have the time to go and spend 10-20 minutes with one person because there will be 50 baskets waiting for me when I come back and then great people.” (PC,12,F).

However, participants' commitment to providing patient-centred care was clearly expressed:

“...I will go down and go through everything and go through lifestyle management strategies and other interventions [that] they can do beyond just using their medication and inhaler.” (PC,2,F).

Participants urged employers to reconsider work models that utilises their knowledge and skills to positively impact patient health outcomes:

“I would let the pharmacists be pharmacists and nothing else... let them focus on the therapeutics, give them encouragement, motivation, and time to develop the patient's therapy, without worrying about sales or KPIs.” (PH,9,M).

3.1.2.3. Lack of COPD-specific training. Participants highlighted a lack of accessible COPD educational resources for supporting their practice needs. They expressed the opinion that COPD is given less priority when compared to other chronic conditions. The majority of participants had not undertaken any COPD specific training during their work experience, although they had received training for other chronic diseases:

“The last time I learned about COPD properly was way back in university whereas things like diabetes, asthma, dementia, and those bigger topics, we constantly get training on them or they are well-promoted, but COPD, it is like an unspoken kind of condition.” (PC,7,F).

With regard to communication between HCPs, participants noted that there is no clear flow of information among the different health professionals involved in the provision of care, which they identified to negatively impact on patient outcomes:

“There are a lot of people involved in a patient's COPD journey. So, from the diagnostic physician...to the care team...And I think sometimes that message can get a little bit muddled up along the way.” (PH,9,M).

3.2. Facilitators of medication adherence

Two sub-themes were identified as facilitators to adherence: 1) providing education and regularly monitoring and 2) collaborative relationships between pharmacists, patients, and doctors.

3.2.1. Providing education and regularly monitoring

The majority of the participants reported that providing education facilitated medication adherence. Group education sessions were identified as being particularly helpful:

“I found out that each time when I had the class...a lot of people showed up, and it gives them support as well because then they know they're actually not alone. And that sometimes you see them compare the medications, like, “Hey, I am on this, too and I like that...” (PH,8,M).

These sessions were also reported to provide an opportunity to check inhaler technique and to demonstrate correct use of inhaler devices in a non-threatening, supportive environment. With the arrival of newer inhaler devices, the need for such education sessions was highlighted:

“...so not only telling them about the drug but telling them about the device, how to use the device, how to troubleshoot the device if they have issues with

using the particular devices. It is basically an education session to make sure that they understand their medicine.” (PH,10,M).

3.2.2. Collaborative relationships between pharmacists, patients, and doctors

Participants reported that good relationships between pharmacists and doctors can improve health outcomes for their patients. For example, when patients, doctors, and pharmacists worked together as a team, it helped to minimize the confusion that often arises during the patient's care continuum. Participants identified that if the pharmacist has a good relationship with the patient, then the pharmacist's advice is more likely to be valued:

“Often if you have good rapport, they [patients] are likely to take on board what you say when you try and educate them about how to use it [inhaler device] and the importance of using it and getting an effective dose from your medication.” (PC,3,F).

Furthermore, the opportunity to discuss issues related to the patient's medications enabled solutions to be found:

“That relationship that I have personally created with a few selected ones [doctors] increases the patient's health outcome drastically because then you start working as a multidisciplinary team....So, I guess developing that relationship has allowed us to better the health outcomes for these particular patients.” (PC,2,F).

A reminder service was considered helpful to prompt patients when they are close to finishing their regular medication.

“I've had patients that don't remember to get their next inhaler or medication. Therefore, reminder services are effective.” (PH,9,M).

Participants also explained that providing free services such as dose administration aid helped patients to take their medicines regularly, which also supported the development and nurturing of therapeutic relationships.

4. Discussion

Understanding the experiences of pharmacists and their observations of why COPD patients do not adhere to their prescribed medications is important as it allows for the identification of barriers and facilitators to medication adherence at a pivotal point in the care continuum. This study highlighted that although pharmacists are aware of the implications of non-adherence and want to provide medication-related support for their patients, they encounter challenges which they do not have strategies to overcome. Among their greatest concerns were the practices of some patients who they speculated may be experiencing financial hardship. Even when the cost of medications is subsidised, the total cost can be high. For example, in 2021 patients may pay up to AUD\$41.30 for each of their medications. As patients with COPD often have comorbidities resulting in the need for multiple medications,³⁸ the cumulative cost may be several hundred dollars. The literature is rich with studies that have reported the cost of medication to be a major factor contributing to the underuse of medication, simply because patients are not able to afford them.^{39,40} As polypharmacy is widespread among COPD patients, pharmacists have an important role in minimizing costs by critically reviewing their pharmacotherapy.⁴¹ The use of combination products and generic options are other alternatives to reduce the cost of medicines.⁴²

Participants emphasized that usually when asked to show their inhaler technique, patients do not demonstrate it correctly. Some participants in the present study also believed that patients use their relievers more often compared to their maintenance medications. They suspect that this is because relievers are cheaper and provide quick symptom relief. This aligns with the findings of another study where patients were using their relievers more frequently and only taking their inhaled corticosteroids when symptomatic.⁴³ This study identified that limited medication knowledge, poor inhaler technique, and having multiple medications and devices as part of the medication regimen, interplayed to result in non-

adherence.^{44–46} Numerous interventions have reported that providing device use education is an important approach to improve adherence.^{47,48} In this study, participants also reported that device use education alongside regular review helped to ensure proper inhaler use.⁷

The Global Initiative for Chronic Obstructive Lung Disease (GOLD) reports that it is crucial to regularly assess inhaler technique and adherence for the appropriate management of COPD.⁷ Even though studies have identified that inhaler technique education is important,^{44,47} in the last 40 years there has been no improvement in inhaler technique among patients with COPD and asthma.⁴⁹ Therefore, it is imperative to note that new approaches to education should be implemented among patients to enhance adherence to the inhaler device. On the other hand, pharmacists themselves need to be trained to correctly demonstrate inhaler device usage for their patients. Due to the frequent arrival of new devices and medications in Australia, pharmacists need to update their skills and knowledge accordingly. To provide improved health care among COPD patients, pharmacists require continuing education about new ideas and evidence regarding COPD management.⁵⁰ Australian pharmacists and patients can access information about inhaler techniques on the Lung Foundation Australia website “Primary Care Respiratory Toolkit.” In addition, the National Asthma Council (Australia) has shared many videos demonstrating the proper use of inhaler devices.⁵¹

Pharmacists expressed the belief that some patients do not follow their recommendations and can show a negative response when counselling was provided about their medication use. Similar responses were observed with patients in studies when pharmacists provided lifestyle advice.^{52,53} Although participants experienced some patients not following their recommendations, developing trust between patients and pharmacists was recommended for improving adherence. One study has shown that pharmacists who build a therapeutic relationship with patients showed improved health outcomes.⁵⁴ The COPD National Action Plan (US) encourages HCPs to create written, patient-focused COPD management plans with clear and simple instructions, considering proper cultural and health literacy. Therefore, building good relationships and communication with patients is essential to improve adherence.⁵⁵

Although participants expressed their willingness to provide care to improve the health of COPD patients, it was not always possible due to the retail environment of the pharmacy. There was a view that, due to some pharmacies' business objectives, the professional image of the community pharmacy has been impacted. This is in line with the existing research in Australia.⁵⁶ Pharmacists perceived that their professional role has not been clearly understood among the public and that many people devalue their role, escalated by the identification of pharmacists as shopkeepers. Another pressing issue hindering patient-focused care is time constraints for pharmacists. This in turn appeared to be underpinned by meeting sales and key performance indicators, resulting in a conflict over the pharmacist's role as a health care provider or as a business employee. This supports the previous qualitative research conducted with pharmacists from England.⁵² In that study, time pressure and the business environment were challenges to providing lifestyle advice to patients with chronic disease.⁵² Lack of time among pharmacists is not a new problem; it is a barrier to adherence that has been repeatedly found in studies in several clinical settings in Australia and internationally.^{57–61} To overcome work overload issues, studies have suggested that handling a lower volume of prescriptions could provide pharmacists more time for patient consultation.^{62,63} A possible solution is that pharmacy technicians could support pharmacists in dispensing roles so that pharmacists can engage in additional clinical services.⁶⁴ Moreover, other administrative tasks, and non-specialized chores could be conducted by other pharmacy staff.⁶⁵

Lack of advertisement of the services offered by the pharmacy was another barrier for patients to identify these services, contributing to patients' beliefs that the pharmacists' major role is just dispensing.¹⁷ While services such as inhaler technique checks, clinical interventions, medication reviews, health promotion, and smoking cessation are offered by most of the community pharmacies in Australia, patients lack awareness regarding such services.¹⁷ In line with one previous study,¹⁷ interviewed pharmacists

acknowledge that pharmacies rarely raised awareness among consumers of the services that they offer. Although a lot of effort has been undertaken to emphasize the pharmacy as a health destination in recent years, there have only been slight positive changes among peoples' perceptions regarding pharmacy services. Lower remuneration for the services offered was another barrier to community pharmacy services that was identified by the pharmacists in the present study. This is in line with a study conducted in Australian community pharmacies which identified the lack of remuneration to pharmacists as a challenge to delivering services.⁶⁶ The limitations to pharmacy services likely contribute to a lower level of care for patients with COPD.⁴² Therefore, it is important to note that government could consider increasing funding for the management of COPD and provide higher remuneration for the pharmacy services offered.

Aligned with existing literature, the present study highlights that collaborative relationships between pharmacists and physicians result in a range of ascribed benefits for patients.^{67,68} However, a lack of proper flow of information among the healthcare team can lead to a limited understanding of the treatment process. Participants identified the communication gap between the health care team members was a barrier to delivering care to patients. Rathbone et al. in their study revealed that interactions between pharmacists and doctors can improve adherence among patients.⁶⁸ Despite increasing evidence of improved patient care through pharmacist and doctor collaboration, challenges exist for its implementation. For example, a recent cross-sectional study showed that almost 50% of the members of both professionals had never practiced collaboratively in the past.⁶⁹ Lack of routine face-to-face interaction between two HCPs poses a significant barrier to successful collaboration, such as conducting a medication review.⁷⁰ Group learnings and experiences sharing between health professionals could deliver positive impacts on practice changes.⁷¹ Therefore, building mutual trust, developing a culture of collaboration between physicians and pharmacists, and working as a multidisciplinary team are all important for improving patients' health outcomes.

4.1. Limitations

Although this was an in-depth qualitative study conducted with pharmacists from the community and hospital settings in South-East Queensland, Australia, the findings may not represent the views of pharmacists from other states in Australia or from more regional areas of Queensland. The sample size for this study is relatively small; however, data saturation was reached in this study.^{72,73} The current study interviewed pharmacists with different ranges of experience, and some of the pharmacists may not regularly provide health and medication-related services to patients with COPD.

5. Conclusions

This study has broadened our understanding of factors that modulate medication-taking behaviour among people living with COPD. In particular, the study has highlighted the need for the development of strategies to overcome challenges faced by pharmacists in their practice settings. Future research should focus on identifying strategies for pharmacists to engage with their patients, thereby allowing for the development and nurturing of therapeutic relationships and ascribed benefits.

Declarations of competing interest

None.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.rcsop.2021.100049>.

References

- Vogelmeier CF, Criner GJ, Martinez FJ, et al. Global strategy for the diagnosis, management, and prevention of chronic obstructive lung disease 2017 report. GOLD executive summary. *Am J Respir Crit Care Med* 2017;195:557–582. <https://doi.org/10.1164/ajrccm.164.4.2003167>.
- Feenstra TL, van Genuyten ML, Hoogenveen RT, Wouters EF, Rutten-van Mölken MP. The impact of aging and smoking on the future burden of chronic obstructive pulmonary disease: a model analysis in the Netherlands. *Am J Respir Crit Care Med* 2001;164:590–596. <https://doi.org/10.1164/ajrccm.164.4.2003167>.
- Buist AS, McBurnie MA, Vollmer WM, et al. International variation in the prevalence of COPD (the BOLD study): a population-based prevalence study. *Lancet* 2007;370:741–750. [https://doi.org/10.1016/S0140-6736\(07\)61377-4](https://doi.org/10.1016/S0140-6736(07)61377-4).
- Vos T, Lim SS, Abbafati C, et al. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the global burden of disease study 2019. *Lancet* 2020;396:1204–1222. [https://doi.org/10.1016/S0140-6736\(20\)30925-9](https://doi.org/10.1016/S0140-6736(20)30925-9).
- Soriano JB, Kendrick PJ, Paulson KR, et al. Prevalence and attributable health burden of chronic respiratory diseases, 1990–2017: a systematic analysis for the global burden of disease study 2017. *Lancet Respir Med* 2020;8:585–596. [https://doi.org/10.1016/S2213-2600\(20\)30105-3](https://doi.org/10.1016/S2213-2600(20)30105-3).
- World Health Organization (WHO). Chronic obstructive pulmonary disease (COPD): key facts 2016. Available from: <https://www.who.int/news-room/fact-sheets/detail/chronic-obstructive-pulmonary-disease-copd>. (accessed 14 September 2020).
- Global Initiative for Chronic Obstructive Lung Disease (GOLD). *Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease (2020 report)*. 2020.
- Toy EL, Beaulieu NU, McHale JM, et al. Treatment of COPD: relationships between daily dosing frequency, adherence, resource use, and costs. *Respir Med* 2011;105:435–441. <https://doi.org/10.1016/j.rmed.2010.09.006>.
- Vestbo J, Anderson JA, Calverley P, et al. Adherence to inhaled therapy, mortality, and hospital admission in COPD. *Thorax* 2009;64:939–943. <https://doi.org/10.1136/thx.2009.113662>.
- Huetsch JC, Uman JE, Udris EM, Au DH. Predictors of adherence to inhaled medications among veterans with COPD. *J Gen Intern Med* 2012;27:1506–1512. <https://doi.org/10.1007/s11606-012-2130-5>.
- Chrystyn H, Small M, Milligan G, Higgins V, Gil EG, Estruch J. Impact of patients' satisfaction with their inhalers on treatment compliance and health status in COPD. *Respir Med* 2014;108:358–365. <https://doi.org/10.1016/j.rmed.2013.09.021>.
- Albrecht JS, Yujin P, Hur P, et al. Adherence to maintenance medications among older adults with chronic obstructive pulmonary disease. The role of depression. *J Gen Intern Med* 2016;13:1497–1504. <https://doi.org/10.1513/AnnalsATS.201602-136OC>.
- Australian Government-Australian Institute of Health and Welfare (AIHW). Chronic obstructive pulmonary disease (COPD). Available from: <https://www.aihw.gov.au/reports/chronic-respiratory-conditions/copd/contents/copd> 2020. (accessed 14 September 2020).
- Australian Government-Department of Health. Post-market review of chronic obstructive pulmonary disease (COPD) medicines. Available from: <https://www.pbs.gov.au/info/reviews/post-market-review-chronic-obstructive-pulmonary-disease> 2018. (accessed 11 November 2020).
- van Boven JFM, Ryan D, Eakin MN, Canonica GW, Barot A, Foster JM. Enhancing respiratory medication adherence: the role of health care professionals and cost-effectiveness considerations. *J Gen Intern Med* 2016;4:835–846. <https://doi.org/10.1016/j.jaip.2016.03.007>.
- Australian Government-Department of Health. Seventh community pharmacy agreement. Available from: https://www.guild.org.au/_data/assets/pdf_file/0028/93655/20200611-7CPA-signed-Agreement.pdf 2020. (accessed 14 September 2020).
- Buss VH, Shield A, Kosari S, Naunton M. The impact of clinical services provided by community pharmacies on the Australian healthcare system: a review of the literature. *J Pharm Pol Pract* 2018;11:22. <https://doi.org/10.1186/s40545-018-0149-7>.
- van der Molen T, van Boven JF, Maguire T, Goyal P, Altman P. Optimizing identification and management of COPD patients—reviewing the role of the community pharmacist. *Br J Clin Pharmacol* 2017;83:192–201. <https://doi.org/10.1111/bcp.13087>.
- Gowan J, Roller L. Chronic obstructive pulmonary disease and the role of the pharmacist. *Aust J Pharm* 2014;95:62–69.
- The Pharmacy Guild of Australia. The Roadmap: The strategic direction for community pharmacy. Available from: https://www.guild.org.au/_data/assets/pdf_file/0026/4769/here-.pdf 2010. (accessed 21 September 2020).

21. The Pharmacy Guild of Australia. Vital facts on community pharmacy. 2018, https://www.guild.org.au/_data/assets/pdf_file/0020/12908/Vital-facts-on-community-pharmacy.pdf 2018. (accessed 21 September 2020).
22. Tommelein E, Mehuys E, Van Hees T, et al. Effectiveness of pharmaceutical care for patients with chronic obstructive pulmonary disease (PHARMACOP): a randomized controlled trial. *Br J Clin Pharmacol* 2014;77:756–766. <https://doi.org/10.1111/bcp.12242>.
23. The Pharmacy Guild of Australia. Pharmacies role in COPD management. Available from: <https://www.guild.org.au/news-events/blog/2018/pharmacies-role-in-copd-management> 2018. (accessed 4 November 2020).
24. Hudd TR. Emerging role of pharmacists in managing patients with chronic obstructive pulmonary disease. *Am J Health Syst Pharm* 2020;77:1625–1630. <https://doi.org/10.1093/ajhp/zxaa216>.
25. Sriram KB, Percival M. Suboptimal inhaler medication adherence and incorrect technique are common among chronic obstructive pulmonary disease patients. *Int J Clin Pharmacol* 2016;13:13–22. <https://doi.org/10.1177/1479972315606313>.
26. Bhattarai B, Walpola R, Mey A, Anoopkumar-Dukie S, Khan S. Barriers and strategies for improving medication adherence among people living with COPD: a systematic review. *Respir Care* 2020;65:1738–1750. <https://doi.org/10.4187/respcare.07355>.
27. Duarte-de-Araújo A, Teixeira P, Hespagnol V, Correia-de-Sousa J. COPD: understanding patients' adherence to inhaled medications. *Int J Chron Obstruct Pulmon Dis* 2018;13:2767–2773. <https://doi.org/10.2147/COPD.S160982>.
28. Mäkelä MJ, Backer V, Hedegaard M, Larsson K. Adherence to inhaled therapies, health outcomes and costs in patients with asthma and COPD. *Respir Med* 2013;107:1481–1490. <https://doi.org/10.1016/j.rmed.2013.04.005>.
29. Fathima M, Saini B, Foster JM, Armour CL. A mixed methods analysis of community pharmacists' perspectives on delivering COPD screening service to guide future implementation. *Res Social Adm Pharm* 2019;15:662–672. <https://doi.org/10.1016/j.sapharm.2018.08.007>.
30. Lehnbon EC, Jo-anne EB. Challenges in chronic illness management: a qualitative study of Australian pharmacists' perspectives. *Pharm World Sci* 2010;32:631–636. <https://doi.org/10.1007/s11096-010-9414-9>.
31. Ogunbayo OJ, Russell S, Newham JJ, et al. Understanding the factors affecting self-management of COPD from the perspectives of healthcare practitioners: a qualitative study. *npj Prim Care Respir Med* 2017;27. <https://doi.org/10.1038/s41533-017-0054-6>.
32. Lavrakas PJ. *Encyclopedia of survey research methods*. California: Thousand Oaks. 2008.
33. Bryman Alan. *Social research methods*. 4th ed. Oxford university press. 2012.
34. QSR International Pty Ltd. *NVivo (Released in March 2020)*. 2020.
35. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol* 2006;3:77–101. <https://doi.org/10.1191/1478088706app0630a>.
36. Thomas DR. A general inductive approach for analyzing qualitative evaluation data. *Am J Eval* 2006;27:237–246. <https://doi.org/10.1177/1098214005283748>.
37. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International J Qual Health Care* 2007;19:349–357. <https://doi.org/10.1093/intqhc/mzm042>.
38. Hanlon P, Nicholl BI, Jani BD, et al. Examining patterns of multimorbidity, polypharmacy and risk of adverse drug reactions in chronic obstructive pulmonary disease: a cross-sectional UK biobank study. *BMJ Open* 2018;8, e018404. <https://doi.org/10.1136/bmjopen-2017-018404>.
39. Restrepo RD, Alvarez MT, Wittnebel LD, et al. Medication adherence issues in patients treated for COPD. *Int J Chron Obstruct Pulmon Dis* 2008;3:371–384. <https://doi.org/10.2147/copd.s3036>.
40. Morgan SG, Lee A. Cost-related non-adherence to prescribed medicines among older adults: a cross-sectional analysis of a survey in 11 developed countries. *BMJ Open* 2017;7, e014287. <https://doi.org/10.1136/bmjopen-2016-014287>.
41. Dalton K, Byrne S. Role of the pharmacist in reducing healthcare costs: current insights. *Integr Pharm Res Pract* 2017;6:37–46. <https://doi.org/10.2147/IPRP.S108047>.
42. Bluml BM. White paper on expanding the role of pharmacists in chronic obstructive pulmonary disease: American Pharmacists Association Foundation. *J Am Pharm Assoc* 2011;51:203–211. <https://doi.org/10.1331/JAPhA.2011.11513>.
43. George M, Keddem S, Barg FK, Green S, Glanz K. Urban adults' perceptions of factors influencing asthma control. *J Asthma* 2015;52:98–104. <https://doi.org/10.3109/02770903.2014.947651>.
44. Lareau SC, Hodder R. Teaching inhaler use in chronic obstructive pulmonary disease patients. *J Am Acad Nurse Pract* 2012;24:113–120. <https://doi.org/10.1111/j.1745-7599.2011.00681.x>.
45. Hesso I, Kayyali R, Nabhani-Gebara S. Supporting respiratory patients in primary care: a qualitative insight from independent community pharmacists in London. *BMC Health Serv Res* 2019;19:5. <https://doi.org/10.1186/s12913-018-3814-2>.
46. Hanania NA, Braman S, Adams SG, et al. The role of inhalation delivery devices in COPD: perspectives of patients and health care providers. *Chronic Obstr Pulm Dis* 2018;5:111–123. <https://doi.org/10.15326/jcopdf.5.2.2017.0168>.
47. Klijn SL, Hilgismann M, Evers SM, Román-Rodríguez M, van der Molen T, van Boven JF. Effectiveness and success factors of educational inhaler technique interventions in asthma & COPD patients: a systematic review. *npj Prim Care Respir Med* 2017;27. <https://doi.org/10.1038/s41533-017-0022-1>.
48. Hämmerlein A, Müller U, Schulz M. Pharmacist-led intervention study to improve inhalation technique in asthma and COPD patients. *J Eval Clin Pract* 2011;17:61–70. <https://doi.org/10.1111/j.1365-2753.2010.01369.x>.
49. Sanchis J, Gich I, Pedersen S. Systematic review of errors in inhaler use: has patient technique improved over time? *Chest* 2016;150:394–406. <https://doi.org/10.1016/j.chest.2016.03.041>.
50. O'Sullivan TA, Sy E, Bacci JL. Essential attributes for the community pharmacist as care provider. *Am J Pharm Educ* 2020;84. <https://doi.org/10.5688/ajpe7125>.
51. National Asthma Council (Australia). Living with asthma. Available from: <https://www.nationalasthma.org.au/living-with-asthma> 2020. (accessed 5 January 2021).
52. Morton K, Pattison H, Langley C, Powell R. A qualitative study of English community pharmacists' experiences of providing lifestyle advice to patients with cardiovascular disease. *Res Social Adm Pharm* 2015;11:e17–e29. <https://doi.org/10.1016/j.sapharm.2014.04.006>.
53. Eades CE, Ferguson JS, O'Carroll RE. Public health in community pharmacy: a systematic review of pharmacist and consumer views. *BMC Public Health* 2011;11:582. <https://doi.org/10.1186/1471-2458-11-582>.
54. Pringle J, Melczak M, Aldridge A, Snyder R, Smith R. Medication adherence and its relationship to the therapeutic alliance: results from an innovative pilot study within a community pharmacy MTM practice. *Innov Pharm* 2011;2:33.
55. Rogliani P, Ora J, Puxeddu E, Matera MG, Cazzola M. Adherence to COPD treatment: myth and reality. *Respir Med* 2017;129:117–123. <https://doi.org/10.1016/j.rmed.2017.06.007>.
56. Hermansyah A, Sainsbury E, Krass I. Investigating influences on current community pharmacy practice at micro, meso, and macro levels. *Res Social Adm Pharm* 2017;13:727–737. <https://doi.org/10.1016/j.sapharm.2016.06.007>.
57. Costa FA, Scullin C, Al-Taani G, et al. Provision of pharmaceutical care by community pharmacists across Europe: is it developing and spreading? *J Eval Clin Pract* 2017;23:1336–1347. <https://doi.org/10.1111/jep.12783>.
58. Roberts AS, Benrimoj SI, Chen TF, Williams KA, Aslani P. Practice change in community pharmacy: quantification of facilitators. *Ann Pharmacother* 2008;42:861–868. <https://doi.org/10.1345/aph.1K617>.
59. Katoue MG, Awad AI, Schwinghammer TL, Kombian SB. Pharmaceutical care in Kuwait: hospital pharmacists' perspectives. *Int J Clin Pharmacol* 2014;36:1170–1178. <https://doi.org/10.1007/s11096-014-0013-z>.
60. Ngho LN. Health literacy: a barrier to pharmacist-patient communication and medication adherence. *J Am Pharm Assoc* 2009;49:e132–e149. <https://doi.org/10.1331/JAPhA.2009.07075>.
61. Kritikos VS, Reddel HK, Bosnic-Anticevich SZ. Pharmacists' perceptions of their role in asthma management and barriers to the provision of asthma services. *Int J Pharm Pract* 2010;18:209–216. <https://doi.org/10.1211/ijpp.18.04.0005.x>.
62. Odenina F, Segal R, Helper C. Providing pharmaceutical care in community practice: differences between providers and non-providers of pharmaceutical care. *J Soc Adm Pharm* 1995;12:170–180.
63. Harris W, Rivers P, Goldstein R. The potential role of community pharmacists in care management. *Health Soc Care Community* 1998;6:196–203. <https://doi.org/10.1046/j.1365-2524.1998.00121.x>.
64. Mattingly AN, Mattingly II TJ. Advancing the role of the pharmacy technician: a systematic review. *J Am Pharm Assoc* 2018;58:94–108. <https://doi.org/10.1016/j.japh.2017.10.015>.
65. Gregório J, Cavaco AM, Lapão LV. How to best manage time interaction with patients? Community pharmacist workload and service provision analysis. *Res Social Adm Pharm* 2017;13:133–147. <https://doi.org/10.1016/j.sapharm.2016.02.008>.
66. Berbatis CG, Sunderland VB, Joyce A, Bulsara M, Mills C. Enhanced pharmacy services, barriers and facilitators in Australia's community pharmacies: Australia's National Pharmacy Database Project. *Int J Pharm Pract* 2007;15:185–191. <https://doi.org/10.1211/ijpp.15.3.0005>.
67. Kelly DV, Bishop L, Young S, Hawboldt J, Phillips L, Keough TM. Pharmacist and physician views on collaborative practice: findings from the community pharmaceutical care project. *Can Pharm J* 2013;146:218–226. <https://doi.org/10.1177/1715163513492642>.
68. Rathbone AP, Mansoor SM, Krass I, Hamrosi K, Aslani P. Qualitative study to conceptualise a model of interprofessional collaboration between pharmacists and general practitioners to support patients' adherence to medication. *BMJ Open* 2016;6. <https://doi.org/10.1136/bmjopen-2015-010488>.
69. Albassam A, Almohammed H, Alhujaili M, Koshy S, Awad A. Perspectives of primary care physicians and pharmacists on interprofessional collaboration in Kuwait: a quantitative study. *PLoS One* 2020;15, e0236114. <https://doi.org/10.1371/journal.pone.0236114>.
70. Chen TF, de Almeida Neto AC. Exploring elements of interprofessional collaboration between pharmacists and physicians in medication review. *Pharm World Sci* 2007;29:574–576. <https://doi.org/10.1007/s11096-007-9130-2>.
71. Hussein R, Whaley CR, Lin EC, Grindrod K. Identifying barriers, facilitators and behaviour change techniques to the adoption of the full scope of pharmacy practice among pharmacy professionals: using the theoretical domains framework. *Res Social Adm Pharm* 2021;17:1396–1406. <https://doi.org/10.1016/j.sapharm.2020.10.003>.
72. Guest G, Bunce A, Johnson L. How many interviews are enough? An experiment with data saturation and variability. *Field Methods* 2006;18:59–82. <https://doi.org/10.1177/1525822X05279903>.
73. Francis JJ, Johnston M, Robertson C, et al. What is an adequate sample size? Operationalising data saturation for theory-based interview studies. *Psychol Health* 2010;25:1229–1245. <https://doi.org/10.1080/08870440903194015>.