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RESEARCH ARTICLE

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Perceptions, practices, and experiences of asthma patients and community pharmacists on short-acting beta-2 agonists inhaler use: A qualitative study

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ABSTRACT

Background: Short-acting beta-2 agonists (SABA) are bronchodilators that offer rapid relief for asthma patients experiencing acute symptoms. The availability of SABA inhalers without a prescription may exacerbate the overuse of SABA. This study aimed to explore the perceptions, practices, and experiences of asthma patients and community pharmacists toward using SABA inhalers in Malaysia.

Methods: A qualitative study was conducted among eleven asthma patients and twelve community pharmacists using semi-structured individual interviews. All interviews were audio-recorded and transcribed verbatim and then analyzed by thematic analysis. The findings were reported using the COREQ checklist.

Results: Thematic analysis yielded eight major themes, (1) perceptions and understanding of good asthma control; (2) perceptions and experience towards asthma follow-up review; (3) perceptions of SABA's reliance; (4) practices towards the proper use of inhalers; (5) over-the-counter availability of SABA inhalers; (6) provision of pharmacists in SABA use assessment; (7) patients-healthcare professionals communication; and (8) recommendations for policymakers.

Conclusion: Most asthma patients and community pharmacists agreed that good asthma control was associated with reduced SABA usage and minimum asthma symptoms. The majority of patients claimed that visiting physicians

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for asthma follow-up reviews was unnecessary. Moreover, community pharmacists have raised concerns regarding patients' reliance on SABA inhalers due to the immediate relief effects, however, the majority of interviewed patients claimed that they did not rely on SABA inhalers. Additionally, community pharmacists were generally concerned about the frequency, dosage, and techniques using SABA inhalers. These concerns need to be addressed to improve the safe use of SABA inhalers. Language barriers, health literacy, long waiting times, and public education were the most important believed determinants of the safe use of SABA inhalers.

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KEYWORDS Beta-2 agonists; pharmacy; community pharmacist; asthma; inhalers; over-the-counter

Background

Asthma is a chronic respiratory condition, estimated to impact 262 million people worldwide (Global Initiative for Asthma [GINA], 2023; Li et al., 2020). Pathophysiology of asthma is established to be a process of airway inflammation, with bronchoconstriction as one of the remarkable symptoms in addition to cough and wheezing (GINA, 2024). Short-acting beta-2 agonists (SABA) are bronchodilators that can provide prompt relief to patients experiencing acute symptoms and are commonly recommended as symptom relievers to be used only when required (GINA, 2023).

For many years, asthma management guidelines suggested that as-needed SABA use was sufficient in cases of mild asthma with infrequent symptoms (GINA, 2024). SABAs are also often used in first aid for people who experience an acute exacerbation. This has led to a high degree of reliance on SABAs by asthma patients (Nwaru et al., 2020; Wang et al., 2021). Data further highlighted that patients who were treated with SABA monotherapy (i.e. without accompanying anti-inflammatory medicines) have a higher chance of experiencing asthma exacerbations requiring systematic corticosteroid treatment (Kaplan et al., 2020).

Although GINA suggested that SABA use should be as-needed only with anti-inflammatory treatment, however, use of SABA inhalers by the patients remains high (the use of three or more SABA canisters per year) (Ban et al., 2024; Loh et al., 2023a, 2023b). While there is a need to address these issues comprehensively at all levels of health care, community pharmacists play a crucial role in asthma management (Alyas et al., 2024; Seston et al., 2022). Given the accessibility, clinical expertise, and no consultation fee charges for the advice provided, community pharmacists play an indispensable role within Malaysia's primary healthcare system (Alabid et al., 2021; Seston et al., 2022). Asthma is an important non-communicable disease requiring pharmacist focus in Malaysia. The prevalence of asthma in Malaysia

is between 8.9% and 13.0% in children and up to 6.3% in adults, implying frequent presentations of people with asthma (Ahad & Ming Khoo, 2017; Chan et al., 2015; Pearce et al., 2007). Further, pharmacists in Malaysia and many other countries such as Australia, Russia, and Italy dispense SABA inhalers over-the-counter (OTC) (Avdeev et al., 2022; Bateman et al., 2022; Loh et al., 2023b). This availability of SABA inhalers without a prescription in community pharmacies adds a layer of complexity to the safe and effective use of SABA inhalers by patients (Ban et al., 2023; Price et al., 2024; Reddel et al., 2017). According to an Australian study, 73.9% of asthma patients who purchased SABA inhalers OTC were SABA overusers (Azzi et al., 2019, 2022). Additionally, most SABA overusers considered that SABA was safe to use (Loh et al., 2023a; Visser et al., 2024).

However, little to no information is known about the community pharmacists' perspectives toward the purchase of SABA inhalers. An unexplored area exists concerning the perceptions, practices, and experiences related to SABA usage among asthma patients and community pharmacists in Malaysia. This study aimed to explore the perceptions, practices, and experiences of both asthma patients and community pharmacists toward the use of SABA inhalers in Malaysia.

Methods

This study is reported by using the Consolidated Criteria for Reporting Qualitative Studies (COREQ) (Appendix A) (Tong et al., 2007).

Study design

This was an exploratory qualitative study of a descriptive nature. Qualitative interviews were used to explore the experiences of participants regarding the use of non-prescription SABA inhalers at community pharmacy setting. The qualitative approach was selected due to its adaptability in exploring the experiences, and intentions of respondents as well as its ability to help develop comprehensive perspectives on the topic in question (Cleland, 2017; Howard Lune B.L.B., 2017). It's also an ideal choice for poorly covered study fields to fill in the gaps that survey-based research methodologies fail to (Mullen & Reynolds, 1978). Using a phenomenological approach, this study explored the participants' comments to figure out their experiences from their point of view.

Selection and recruitment of participants

The sample size for the qualitative study was estimated until reaching the point of data saturation, wherein no further significant insights emerged from the

data that was predetermined by the researchers (Fusch & Ness, 2015). The targeted participants were both community pharmacists and asthma patients. The inclusion criteria for community pharmacists were full-time registered community pharmacists with the Pharmacy Board of Malaysia, and proficient in English. Pharmacy technicians, trainees, and non-registered pharmacists were excluded from the study. Consenting community pharmacists were subsequently involved in selecting the participants at the point of SABA inhaler purchase in their pharmacies by inviting these consenting asthma patients if they met the study criteria. For asthma patients, the inclusion criteria were being ≥18 years old, having purchased SABA inhalers, being proficient in English, and being able to self-report doctor-diagnosed asthma. On the other hand, vulnerable individuals. i.e. pregnant women and those coping with other severe health conditions were excluded. The process of selecting participants for the qualitative study was employed through purposive and snowball sampling techniques (Smith, 2010). Most participants were from the Malaysian states of Perak and Penang. All participants gave their informed consent, and their participation was completely voluntary. Moreover, no incentives were offered. Figure 1 shows the detailed process of selection and recruitment of participants.

Data collection

Two separate semi-structured interview guides were developed for asthma patients (Appendix B) and community pharmacists (Appendix C) based on a thorough literature review (Azzi et al., 2019, 2022; Blakeston et al., 2021; Loh et al., 2023a, 2023b; Muneswarao et al., 2019) and considering expert opinions from an asthma and a subject specialist. A panel of academics further reviewed both interview guides, and each guide was then pilot-tested with two asthma patients and two community pharmacists (who were later excluded from the final results). The interview guide for asthma patients focused on asthma control and management, communication about the safe use of SABA inhalers, and future perspectives. On the other hand, the interview guide of community pharmacists highlighted asthma control and management, risk perceptions towards the use of SABA inhalers, communication with asthma patients, and future perspectives. The data collection form of demographics for asthma patients is presented in Appendix D and for community pharmacists in Appendix E.

Semi-structured interviews were conducted individually by a researcher (ZCL) who had prior training in conducting qualitative interviews. The researcher (ZCL) introduced herself to the participants as a postgraduate student, and no prior acquaintance existed between the interviewer and the participants before the interviews. Face-to-face interviews were prioritised at the preferred time and suggested location by the participants, or else these were facilitated by the Zoom® application version 5.14.11 (17466).

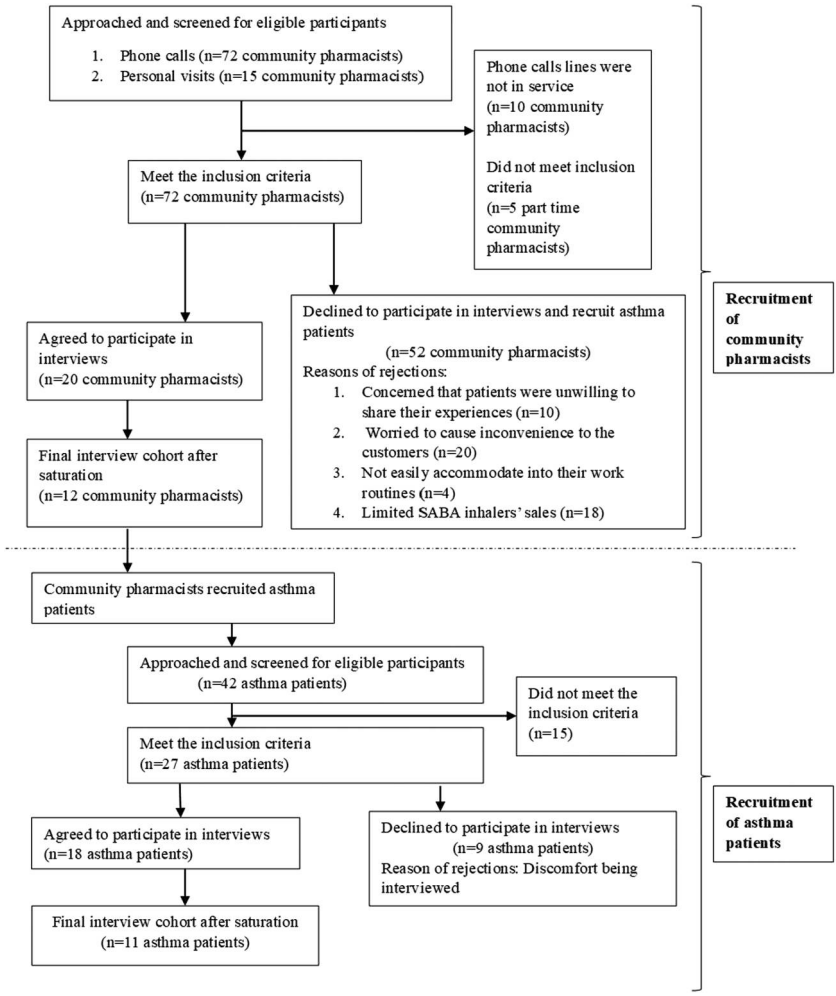

Figure 1. Participants' selection process.

A sample of 11 asthma patients (three face-to-face interviews) and 12 community pharmacists (eight face-to-face interviews) were interviewed. Whilst data saturation was achieved after nine patients' and 10 pharmacists' interviews, a further two interviews were carried out in both sets of participants to verify saturability. The interviews for both community pharmacists and asthma patients were conducted between December 2022 and April 2023. The researcher took additional field notes during the interviews to record the contextual information. Each interview lasted about 40 minutes for asthma patients and about 30 minutes for community pharmacists.

Validity and reliability

Digital recordings of the data were accessible to the study team, and they had been transcribed professionally to ensure accuracy. A qualified and experienced qualitative researcher (ZCL) served as the primary researcher and was responsible for all interviews to ensure consistency in how the questions were asked. There was no collaboration between the researchers and the subjects in this study. The study team had access to digital recordings of the data that had been transcribed professionally to guarantee correctness. Coding was compared and discussed among researchers until reaching consensus. To increase the confirmability of this study, the whole study was overseen by two additional researchers (JM & OSC) well-versed in qualitative research techniques. To enhance credibility, another two researchers (AUR & BA), with expertise in qualitative research methodologies, confirmed the themes and performed a thematic analysis. In this study, there were no collaborations between the subjects and researchers. Some participants' interview transcripts were returned to them via WhatsApp for review to ensure the researchers' reflexivity, they were satisfied by the transcribed words.

Data analysis

An inductive approach was employed for data analysis, and the primary data analysis for this study followed the techniques outlined by Braun and Clarke (2006) (Braun & Clarke, 2006), as given in Table 1. A researcher (ZCL) completed verbatim transcriptions using Microsoft Word® for all the interviews in the English language. The coding method involved a constant-comparative method between two researchers (ZCL and RH). Line-by-line coding on all the transcripts was conducted by using NVivo® software. Meaningful segments (words, phrases, or sentences) in the transcribed data were identified and assigned with appropriate codes, which serve as labels or tags representing specific concepts or themes (Naeem et al., 2023). For each interview, the two coders compared their codes,

Table 1. Braun and Clarke' six-phase thematic analysis framework.

Analysis phase	Tasks completed
Familiarization with the data	Transcription, reading, and re-reading of the interview transcripts
Generation of initial codes	Initial, open coding of the entire data set
Categorization of initial codes	Categorizing generated codes into groups
Searching for themes and merging categories	Merging generated categories into potential themes
Reviewing of themes	Confirming themes – ensuring the internal homogeneity and external heterogeneity of themes
Defining and naming themes	Further refinement of themes
Report finalisation	Production of the manuscript, selection of illustrative quotes

and any disagreement between the two coders was resolved by mutual discussion. The codes were continuously refined and reviewed as the analysis progressed. Another two team members (SCO & BA) were tasked with spot-checking the coding process to ensure the quality of data analysis. Emerging themes from the complete data set were developed by clustering coded data representing similar issues/ideas.

Reflexivity statement

We understand the importance of comprehending the significance of this qualitative study exploring the practices and experiences of SABA inhaler use among patients and pharmacists, as researchers with backgrounds in both clinical pharmacy and pharmacy practice. It also needs caution to prevent biases from being introduced into the research. So, during this study, the researchers committed to be transparent and truthful about their positionality and presumptions. We used a reflective technique for data collection and thematic analysis to ensure that the safe use of SABA inhalers in Malaysia was evaluated objectively and thoroughly.

Ethical considerations

This study was approved by the Human Research Ethics Committee of the Universiti Sains Malaysia, namely Jawatankuasa Etika Penyelidikan Manusia (JEPeM) under the reference number USM/JEPeM/22090575. All participants provided informed consent to participate in this study. No one's identity or participation in the research was revealed to maintain the participants' privacy. Each person had a special identifier (the codes of participants). Before the interviews, participants were briefed about the interviewer's background, objectives, methodology, and voluntary nature of this study. All interviews were audio recorded and stored safely on the principal researcher's computer. The recordings were erased as soon as the data processing was complete.

Results

Participants' demographics

Most asthma patients aged 18–28 years ($n = 8$), were females ($n = 8$), of Chinese ethnicity ($n = 6$), and had a Bachelor's degree ($n = 9$). For community pharmacists, the majority were aged 29–38 years ($n = 7$), females ($n = 9$), Chinese ($n = 9$), and had a Bachelor's degree ($n = 11$). Socio-demographic data for participants is indicated below in Table 2.

Table 2. Demographics of participants.

Characteristics	*n*	
	Asthma patients *N* = 11	Community pharmacists *N* = 12
Age (years)		
18–28	8	2
29–38	2	7
39–48	1	1
49 years old and above	-	2
Gender		
Male	3	3
Female	8	9
Nationality		
Malaysian	11	12
Area		
Penang	6	2
Perak	5	10
Ethnicity		
Malay	4	1
Chinese	6	9
Indian	1	2
Education level		
Secondary education	2	0
Bachelor's degree	9	11
Master's degree	0	1
Working status		
Full time	7	12
Student	4	0
Working experience		
Less than 5 years	NA	3
5–10 years	NA	4
10 years and above	NA	5

N = Sample size, n = frequency, NA = not available.

Thematic analysis results

The final data analysis resulted in eight major themes and six subthemes. The themes included: (1) perceptions and understanding of good asthma control; (2) perceptions and experience towards asthma follow-up review; (3) perceptions of SABA's reliance; (4) practices towards the proper use of inhalers; (5) over-the-counter availability of SABA inhalers; (6) provision of pharmacists in SABA use assessment; (7) patients – healthcare professionals communication; and (8) recommendations for policymakers. The themes, subthemes, and verbatim quotes are presented in Table 3. Additionally, the description of themes based on participants' demographics is presented in Table 4.

Theme one: perceptions and understanding of good asthma control

The participants were asked about their understanding of good asthma control. Most asthma patients ($n = 7$) and all community pharmacists were aware of good asthma control, as they agreed that good asthma control is related to reduced SABA usage and having minimum asthma symptoms.

Table 3. Description of themes, subthemes, and verbatim quotes.

Themes	Subthemes	Verbatim quotes	
		Asthma patients	Community pharmacists
1. Perceptions and understandings of good asthma control		'*Good asthma control means not having to take SABA inhalers anymore.*' (Female, Patient-01)	'*Patients with good asthma control are those who have asthma attacks (symptoms) less than three times a week.*' (Female, Pharmacist-02)
		'*I considered my asthma to be well controlled because I haven't experienced any asthma symptoms lately, even though it is the rainy season*' (Female, Patient-02)	'*I consider a patient to have good asthma control if they have fewer asthma attacks (symptoms), perhaps less than five in a month. In that case, their asthma can be considered well-controlled.*' (Female, Pharmacist-08)
2. Perceptions and experiences towards asthma reviews	Perceptions towards asthma reviews	'*My asthma is very good now, so I don't think I need to see the doctors. I use my medicines very less often also.*' (Female, Patient-05)	'*Maybe patients' asthma status was not diagnosed accurately. Their asthma condition might worsen, and they need some add-on therapy, but the patients themselves did not realise this and nobody told them about this, so they just keep using the SABA inhalers. We have to ask them to go back to their doctors and follow their doctor's prescriptions.*' (Female, Pharmacist-08)
		'*I think it is not necessary to visit doctors to just get a pump (SABA inhaler).*' (Female, Patient-10)	'*Their symptoms are not really assessed, so they might overuse it, but then they are not sure when to go and see a doctor. And then some of the patients are like, they refused to see a doctor no matter what their conditions are.*' (Male, Pharmacist-12)
	Experiences with physicians and pharmacists	'*Excellent. Because each time when I go to see them (physicians) and tell them I have asthma, they will use their stethoscope to check my lungs.*' (Male, Patient-07)	'*If we observe individuals excessively using SABA inhalers, we usually attempt to intervene, even though it may not be entirely allowed. In Malaysia, pharmacists are not authorised to initiate steroid inhaler prescriptions. However, in cases where it appears necessary, we still strive to provide interventions.*' (Female, Pharmacist-02)
		'*Excellent. They (physicians) will check my conditions in very detail and give professional advice to me.*' (Female, Patient-09)	'*If I notice any concerns, I suggest they schedule a follow-up review with their doctors, without alarming them.*' (Female, Pharmacist-10)

(*Continued*)

Table 3. Continued.

Themes	Subthemes	Verbatim quotes	
		Asthma patients	Community pharmacists
		'*Excellent. All their (pharmacists) suggestions are very useful. They will demonstrate to me how to use the pumps and all.*' (Female, Patient-03)	'*We advise them that the use of steroid-based inhalers offers a more effective long-term treatment.*' (Male, Pharmacist-07)
		'*There is an additional check-up when I go to the pharmacy. She (pharmacists) will give advice on the dosage, each and how much should be used.*' (Female, Patient-06)	'*I encourage them to undergo a comprehensive asthma review with physicians, as there may be underlying issues with their asthma.*' (Female, Pharmacist-08)
		'*They are good, but they (pharmacists) cannot check my condition in detail, such as listening to my lungs' sounds all that.*' (Male, Patient-07)	'*I recommend that they visit the clinic for better care. They may also need to consider nebulizer treatments or update their regimen to include ICS.*' (Female, Pharmacist-06)
		'*Good, but they (pharmacists) cannot check my body or lungs. I will look for pharmacists if I just need to buy the medicines.*' (Female, Patient-09)	'*I would suggest they see their doctors for a thorough reassessment of their condition, so that they can be prescribed an appropriate steroid inhaler. This is because rescue inhalers alone do not provide a long-term solution.*' (Female, Pharmacist-03)
3. Perceptions about reliance on SABA inhalers		'*I don't think I rely on it. Unless I feel sick when I have fever or flu, I will use it more frequently.*' (Female, Patient-03)	'*SABA inhalers can provide immediate relief for their symptoms, unlike budesonide beclomethasone, which doesn't offer immediate effects. They don't notice the impact. Therefore, we need to continue counseling them and encourage reduced reliance on SABA inhalers.*' (Female, Pharmacist-05)
		'*I've been using it for over 3 years now. And now, it seems to have become somewhat of a reliance. It's become habitual.*' (Female, Patient-04)	'*From what I observe in the community, patients are unaware that SABA is solely for short-term relief. Once they experience the comforting sensation upon inhalation, they become attached to what brings them comfort.*' (Male, Pharmacist-07)
		'*Typically, I would not use the pump (SABA inhaler) until I have an attack (asthma symptoms).*' (Female, Patient-05)	'*I believe most asthma patients are unaware that SABA is a reliever, which lacks anti-inflammatory effects. They depend on it because it effectively alleviates their symptoms. They are unaware that frequent use of SABA inhalers can lead to an increase in asthma exacerbations.*' (Female, Pharmacist-09)

4. Practices towards proper use of inhaler	'*They (Pharmacists and physicians) demonstrated how to use the inhaler to me and then they asked me to demonstrate it in front of them.*' (Female, Patient-02)	'*The frequency of their usage is what I care about the most. The second concern is dosage, and techniques come last. In terms of techniques, patients have made significant improvements. They all know how to use it now.*' (Female, Pharmacist-04)
	'*The doctors and pharmacists have told me how to use the inhalers. They said I have to use the chocolate pump (inhaled corticosteroids) at night, and the blue one (SABA inhaler) for all the other conditions.*' (Female, Patient-09)	'*My main concerns are the frequency and dosage of SABA inhaler use because excessive usage can lead to poor asthma control.*' (Female, Pharmacist-09)
	'*Pharmacists taught me how to use this (SABA) inhaler.*' (Female, Patient-10)	
5. Over-the-counter availability of SABA inhalers	'*When I need the inhalers, I will just go over-the-counter.*' (Female, Patient-01)	'*They don't really follow up with their doctors; they simply come and purchase the medication. They use it quite frequently.*' (Female, Pharmacist-03)
	'*I think it is easier to buy this from pharmacy.*' (Female, Patient-03)	'*Patients can purchase SABA inhalers over-the-counter from nearby pharmacies at any time, contributing to their ease of access.*' (Female, Pharmacist-09)
	'*I could not go back to the hospital Taiping to get a new one, so I just buy it from the pharmacy.*' (Male, Patient-07)	'*Within hospital or Klinik Kesihatan (government health clinic) settings, patients are closely monitored for their SABA usage. The government provides a one-to-one exchange system for inhalers, where patients must return their empty canister to receive a new one. Pharmacists keep records on appointment cards, and if they notice frequent visits, they take action. However, in the community setting, there is limited monitoring due to the ease of obtaining SABA inhalers from retail pharmacies for around RM 20 (USD 4)*' (Female, Pharmacist-10)
	'*If I buy this from pharmacy, it will be more affordable and convenient for me.*' (Female, Patient-09)	'*Maybe they are recommended by their friends. They did not go through their doctors first, to see whether they need it or not, they straight away listen to what their friends said to buy SABA inhalers from pharmacies.*' (Male, Pharmacist-11)
6. *Provision of pharmacists regarding SABA use assessment*	'*Pharmacist also has asked me to show them the ways on how I use this pump.*' (Female, Patient-04)	'*I will keep a record of how frequently the SABAs are being used by those who rely on them.*' (Female, Pharmacist-05)

(*Continued*)

Table 3. Continued.

Themes	Subthemes	Verbatim quotes	
		Asthma patients	Community pharmacists
		'*Community pharmacists have concerned about the frequency I used SABA inhalers. When I purchase this inhaler, they will ask whether I have used this or not, and how frequent I use it.*' (Female, Patient-05)	'*I've noticed that most patients are using their inhalers incorrectly. When they don't use the correct techniques, it's useless for them to use SABA inhalers because they can't effectively control their asthma.*' (Female, Pharmacist-06) '*Initially, we will inquire about the frequency of inhaler use. Additionally, I will help them recognize potential triggers such as air pollution, allergens from pets' fur, and so on.*' (Male, Pharmacist-07) '*If I suspect patients are excessively using SABA inhalers, I will refrain from dispensing them and instead reassess the situation to identify any potential issues.*' (Female, Pharmacist-10)
7. Communication between patients and healthcare professionals	*Language barrier*	'*I think the language barrier could be happened while communicating with a pharmacist from different races. I prefer to visit Chinese pharmacy because I can communicate easily.*' (Female, Patient-09)	'*At times, they face challenges communicating with their doctors, especially those in government hospitals where there may be language differences, particularly for Chinese or Indian patients who are less familiar with the Malay language.*' (Female, Pharmacist-05)
		'*I think the doctors should take care of the patients who have low literacy level. When I go to Klinik Kesihatan, I can see many people having difficulty communicating with doctors. For example, a Chinese old lady unable to speak to an Indian doctor due to language barrier.*' (Female, Patient-10)	'*I believe it comes from communication errors, where misunderstandings can occur when Malay patients interact with Chinese healthcare professionals, or vice versa. Both parties may struggle to fully understand each other due to dialect and language differences during counselling sessions. Patients may simply say 'yes' to what the healthcare provider says without fully understanding the message. This 'yes' response might lead the healthcare provider to assume complete comprehension.*' (Male, Pharmacist-07)
	Health literacy	'*I think the doctors should have a more detailed consultation with us. Sometimes, when I tell them my problem, they just be like, 'Yes, yes, yes' you know, then asked me go to get my medicines.*' (Female, Patient-03)	'*I believe that individual counselling could enhance communication between patients and pharmacists. Written instructions alone are not effective, as patients may struggle to understand the intended message.*' (Female, Pharmacist-02)

		'*I think the doctors should take care of the patients who have low literacy level.*' (Female, Patient-10)	'*Another thing is about the elderly and children. In this case, we will ask the caretakers to come along and counsel them together. So that at least there is someone to take care of this and beware of this, to avoid misuses. Then we to use simple language to explain to them, avoid those medical words.*' (Female, Pharmacist-10)
8. Recommendations for policymakers	*Long waiting time*	'*If I go to the hospital, I have to wait for a long time to get my medicines.*' (Female, Patient-03)	'*Considering everyone's busy schedules, most patients simply come to obtain their prescriptions and have limited time for extended interactions.*' (Female, Pharmacist-09)
		'*When I go to the government hospital, I need to queue up for a long time.*' (Female, Patient-04)	'*If there are no customers, perhaps we can allocate more time for counselling. However, we often find ourselves busy, resulting in shortened counselling sessions.*' (Female, Pharmacist-11)
			'*I think the Ministry of Health should increase the working staff at government hospital so that the waiting time could be reduced. Some patients have to wait quite a long time even though in the emergency department.*' (Male, Patient-07)
	Foster public education	'*I think Ministry of Health could implement an asthma education program, by setting up a team to go into each primary or secondary school to teach the students about this.*' (Female, Patient-10)	'*I think the Ministry of Health could do several things. To ensure that pharmacists have the skills necessary to work well in the counselling section, the training should first be made compulsories for all pharmacists, and they have to at the very least pass the exams.*'(Male, Pharmacist-07)
		'*I believe the Ministry of Health should increase public awareness about asthma by promoting educational materials on the internet or through television. This will help to increase the public's understanding of asthma and reduce the chances of individuals misusing asthma medications.*' (Male, Patient-11)	'*I think government hospitals should provide detailed and extended counselling sessions for asthma patients.*' (Female, Pharmacist-08)
			'*Government must periodically offer training courses and invite community pharmacists to participate. They may learn how to communicate with asthma patients more effectively at one of these training sections. The pharmacists should be trained to improve their listening skills, as well as introduction to strategies like 'teach-back' or 'show-back' method.*' (Female, Pharmacist-09)

Table 4. Description of themes based on participants' demographics.

Theme	Patient	*N*	Ages	Gender	Ethnic	Education	Working status
1	1,2,4,5,8,9,10	7	5 (18–28 years old) 1 (29–38 years old) 1 (39–48 years old)	1 Male 6 Female	3 Malay 3 Chinese 1 Indian	2 Secondary 7 Bachelor degree	2 Students 5 Full–time
2 subtheme1	1,2,3,4,5,6,7,8,9,10,11	11	8 (18–28 years old) 2 (29–38 years old) 1 (39–48 years old)	3 Male 8 Female	4 Malay 6 Chinese 1Indian	2 Secondary 9 Bachelor degree	4 Students 7 full–time
Subtheme2	Satisfy with physicians-1,2,4,6,7,8,9,10,11	9	8 (18–28 years old) 1 (29–38 years old)	3 Male 6 Female	4 Malay 5 Chinese	1 Secondary 8 Bachelor degree	4 Students 5 Full–time
	Satisfy with pharmacist-1,2,3,6,7,8,9,10,11	9	7 (18–28 years old) 2 (29–38 years old)	3 Male 6 Female	4 Malay 5 Chinese	1 Secondary 8 Bachelor degree	4 Students 5 Full–time
	Limitation of pharmacist-2,4,7,8,9,10,11	7	6 (18–28 years old) 1 (29–38 years old)	3 Male 4 Female	3Malay 4 Chinese	1 Secondary 6 Bachelor degree	3 Students 4 Full–time
3	Rely-1,9,10	3	3 (18–28 years old)	3 Female	2 Malay 1 Chinese	3 Bachelor degree	2 Students 1 Full–time
	Not-rely-2,3,4,5,6,8	6	3 (18–28 years old) 2 (29–38 years old) 1 (39–48 years old)	1 Male 5 Female	1 Malay 1 Indian 4 Chinese	2 Secondary 4 Bachelor degree	1 Students 5 Full–time
4	1, 2,3, 4, 5,8,9,10	8	5 (18–28 years old) 2 (29–38 years old) 1 (39–48 years old)	1 Male 7 Female	4 Malay 1 Indian 3 Chinese	2 Secondary 6 Bachelor degree	2 Students 6 Full–time
5	1,3,4,5,6,7,8,9,10	9	7 (18–28 years old) 1 (29–38 years old) 1 (39–48 years old)	2 Male 7 Female	4 Malay 1 Indian 4 Chinese	2 Secondary 7 Bachelor degree	3 Students 6 Full–time

6	1,4,5,9	4	3 (18–28 years old) 1 (39–48 years old)	4 Female	2 Malay 1Indian 1 Chinese	1 Secondary 3 Bachelor degree	1 Student 3 Full–time
7 subtheme1	9,10	2	2 (18–28 years old)	2 Female	1 Malay 1 Chinese	2 Bachelor degree	2 Students
subtheme2	1,3,4,8,10	5	4 (18–28 years old) 1 (29–38 years old)	1 Male 4 Female	2 Malay 3 Chinese	1 Secondary 4 Bachelor degree	1 Student 4 Full–time
8 subtheme 1	3,4,7	3	2 (18–28 years old) 1 (29–38 years old)	1 Male 2 Female	3 Chinese	3 Bachelor degree	3 Full–time
Subtheme2	6,9,10,11	4	4 (18–28 years old)	1 Male 3 Female	1 Malay 3 Chinese	4 Bachelor degree	4 Students

Theme	Pharmacist	*N*	Ages	Gender	Ethnic	Education	Working experience
1	1,2,3,4,5,6,7,8,9,10,11,12	12	2 (18–28 years old) 7 (29 –38 years old) 1 (39–48 years old) 2 (>49 years old)	3 Male 9 Female	1 Malay 9 Chinese 2 Indian	1 Master degree 11 Bachelor degree	3 (<5 years) 4 (5–10 years) 5 (>10 years)
2 subtheme 1	2,3,8,11,12	5	1 (18–28 years old) 3 (29 –38 years old) 1 (39–48 years old)	2 Male 3 Female	4 Chinese 1 Indian	5 Bachelor degree	2 (<5 years) 2 (5–10 years) 1 (>10 years)
Subtheme 2	1,2,3,4,5,6,7,8,9,10,11,12	12	2 (18–28 years old) 7 (29 –38 years old) 1 (39–48 years old) 2 (>49 years old)	3 Male 9 Female	1 Malay 9 Chinese 2 Indian	1 Master degree 11 Bachelor degree	3 (<5 years) 4 (5–10 years) 5 (>10 years)
3	3,5,6,7,9,10,11	7	2 (18–28 years old) 4 (29 –38 years old) 1 (>49 years old)	2 Male 5 Female	6 Chinese 1 Indian	1 Master degree 6 Bachelor degree	2 (<5 years) 3 (5–10 years) 2 (>10 years)
4	1,2,3,4,5,6,7,8,9,10,11,12	12	2 (18–28 years old) 7 (29 –38 years old) 1 (39–48 years old) 2 (>49 years old)	3 Male 9 Female	1 Malay 9 Chinese 2 Indian	1 Master degree 11 Bachelor degree	3 (<5 years) 4 (5–10 years) 5 (>10 years)
5	3,6,7,9,10,11	6	2 (18–28 years old) 3 (29 –38 years old) 1 (>49 years old)	2 Male 4 Female	5 Chinese 1 Indian	6 Bachelor degree	2 (<5 years) 3 (5–10 years) 1 (>10 years)
6	4,5,6,7,8,10,11	7	2 (18–28 years old) 4 (29 –38 years old) 1 (>49 years old)	2 Male 5 Female	5 Chinese 2 Indian	1 Master degree 6 Bachelor degree	2 (<5 years) 2 (5–10 years) 3 (>10 years)
7 subtheme 1	5,6,7	3	2 (29 –38 years old) 1 (>49 years old)	1 Male 2 Female	2 Chinese 1 Indian	1 Master degree 2 Bachelor degree	1 (5–10 years) 2 (>10 years)
Subtheme 2	2,6,9, 10,12	5	1 (18–28 years old) 2 (29 –38 years old) 1 (39–48 years old) 1 (>49 years old)	1 Male 4 Female	5 Chinese	5 Bachelor degree	2 (<5 years) 1 (5–10 years) 2 (>10 years)
8 subtheme 1	9,11	2	1 (18–28 years old) 1 (29 –38 years old)	1 Male 1 Female	2 Chinese	2 Bachelor degree	1 (<5 years) 1 (5–10 years)
subtheme 2	4,6,7,8,10,12	6	1 (18–28 years old) 4 (29 –38 years old) 1 (>49 years old)	2 Male 4 Female	4 Chinese 2 Indian	6 Bachelor degree	2 (<5 years) 2 (5–10 years) 2 (>10 years)

N = sample size.

One asthma patient mentioned that he had not experienced any symptoms even if the weather had changed. Community pharmacists also revealed that patients with good asthma control referred to those who have asthma symptoms less than three to five times a week.

Theme two: perceptions and practices towards asthma reviews

Subtheme one: perceptions towards asthma follow-up reviews

All asthma patients perceived follow-up visits as unnecessary since they considered their asthma status well-controlled. They thought it unnecessary to visit physicians to receive a new SABA inhaler. In concordance with the asthma patients' views, most community pharmacists ($n = 5$) identified that frequent SABA users needed to be more aware of the necessity of asthma follow-ups to monitor their current asthma status, and they may need to receive additional treatments such as inhaled corticosteroids. Therefore, community pharmacists recognised their essential roles in reminding and advising patients to have regular asthma reassessment.

Subtheme two: experiences with physicians and pharmacists

The majority of patients ($n = 9$) indicated their satisfaction with the high-quality care provided by physicians, specifically using stethoscopes for lung examinations. Besides, they were confident with pharmacists' consultations for their medication advice. Although the interaction between patients and pharmacists was excellent, seven patients claimed that the checkups provided by pharmacists were less detailed than those provided by physicians. Community pharmacists aligned with patients' statements by urging patients to get a comprehensive asthma review with their physicians. After a thorough checkup, physicians may prescribe inhaled corticosteroids as a long-term treatment option.

Theme three: perceptions about reliance on SABA inhalers

About half of patients ($n = 6$) stated that they did not develop an attachment to SABA inhalers, as they only used them when necessary. However, few patients admitted they had relied on SABA inhalers, as they had used them for a very long time. On the other hand, more than half of the community pharmacists ($n = 7$) raised concerns regarding asthma patients who tend to depend on the use of SABA inhalers for immediate relief effects. According to them, community pharmacists must monitor and counsel asthma patients properly, as overuse of SABA inhalers will increase asthma exacerbations.

Theme four: practices towards the proper use of SABA inhalers

The majority of patients ($n = 8$) highlighted the crucial role of healthcare professionals, particularly pharmacists, in guiding the appropriate use of SABA inhalers. These professionals provided instructions on both the frequency of SABA and inhaled corticosteroid (ICS) uses and proper inhalation techniques. This finding was corroborated by responses from all community pharmacists, who expressed particular concern regarding the correct dosage, frequency, and technique employed by asthma patients when using SABA inhalers.

Theme five: over-the-counter availability of SABA inhalers

Participants reported uniform responses regarding the availability of SABA inhalers as over-the-counter medications. Most asthma patients ($n = 9$), mentioned that when they needed SABA inhalers, they would purchase them from community pharmacists due to the ease of access and affordable prices. These findings aligned with community pharmacists' perceptions that patients prefer to purchase SABA inhalers at community pharmacies. Additionally, community pharmacists perceived that the most frequent SABA users who purchased OTC inhalers were less likely to follow up with physicians. One of the pharmacist participants mentioned that there was a lack of a monitoring system to trace SABA uses in community pharmacy settings. However, patients were monitored in the government setting because patients must return their empty canisters to receive a new one in Malaysia.

Theme six: provision of pharmacists in SABA use assessment

Asthma patients shared their experiences about the role of community pharmacists in their SABA use assessment. Around a third of asthma patients ($n = 4$) mentioned that the community pharmacists were concerned about the frequency and techniques of using the SABA inhalers, and some community pharmacists particularly asked them to demonstrate how to use SABA inhalers. On the other hand, most community pharmacists ($n = 7$) whether their experience was less than 5 years or more than 10 years, mentioned that they always inquire about their patients' frequency of SABA use. One of the pharmacist participants highlighted that she always keeps a record of patients who purchased inhalers from her pharmacy. Some of them also investigated the potential reason for SABA overuse.

Theme seven: communication between patients and healthcare professionals

Subtheme one: language barrier

Two patients who were students reported facing language barriers when communicating with healthcare professionals of different ethnicities.

Similarly, three community pharmacists noted that language barriers in healthcare settings can hinder effective communication and message delivery.

Subtheme two: health literacy

Some patients ($n = 5$) requested detailed consultation with healthcare professionals and highlighted that physicians should be more attentive to patients with low literacy levels. This was in accordance with the declared practices of some community pharmacists especially females ($n = 5$), who were involved in the counseling sessions and used simple language to explain to the patients.

Theme eight: recommendations for policymakers

Subtheme one: reduced waiting time

Patients complained that when they visited government hospitals, they would need to wait for a long time. Therefore, three patients who were Chinese highly recommended that the government should increase the number of working staff in the hospitals, as there would be more staff to cater to the patients, especially during emergencies. On the other hand, only two Chinese community pharmacists claimed that in their place of work, the job routine was very busy and they seldom had time for detailed counseling of asthma patients.

Subtheme two: foster public education

The asthma patients and community pharmacists, especially females suggested that the government should implement asthma education programs to increase awareness of asthma patients. A third of asthma patients ($n = 4$) suggested promoting educational materials through online social media would be beneficial. Similarly, half of the community pharmacists suggested establishing training programs for community pharmacists regularly. It would improve their communication skills to introduce techniques such as the 'teach back' or 'show back' method.

Discussion

Statement of key findings

The present study has explored asthma patients' and community pharmacists' perceptions and practices regarding the safe use of SABA inhalers. The study found that the majority of asthma patients and community pharmacists agreed that good asthma control was related to reduced SABA usage and minimum asthma symptoms. Most interviewed patients claimed

visiting physicians for asthma reviews was unnecessary since their asthma conditions were well-controlled. Community pharmacists have raised concerns regarding patients' reliance on SABA inhalers due to the immediate relief effects, but this was not aligned with most patients' statements claiming not to rely on SABA inhalers. Additionally, community pharmacists were concerned about the frequency, dosage, and techniques of SABA users. This was in line with the majority of interviewed patients' statements, where they indicated that healthcare professionals usually demonstrate how to use SABA inhalers. Since most interviewed patients preferred to purchase SABA inhalers OTC, interviewed community pharmacists were concerned that patients who always purchased SABA inhalers OTC rarely followed up with physicians and were seldom monitored for their SABA uses. Both patients and community pharmacists believed that language barriers, health literacy, long waiting times, and public education were important determinants of the safe use of SABA inhalers.

Interpretation

Asthma patients and community pharmacists in this study agreed that good asthma control is related to minimum asthma symptoms and reduced SABA usage. This was in concordance with the GINA report, which stated that patients with well-controlled asthma should use SABA reliever relievers less than twice per week and have daytime and nighttime symptoms less than twice per week (GINA, 2024).

Most participants (patients) in this study stated that they reduced follow-up visits as they believed visiting physicians was unnecessary when they had good asthma control. Individuals with irregular check-ups often have a lack of timely information about their condition and lower adherence to ICS (Park et al., 2018; Reddel et al., 2017). It was ideal for healthcare providers to review asthma symptoms control, asthma exacerbations, adverse events arising from the use of medicines, and patients' techniques to use their inhalers from each follow-up visit (GINA, 2024). Participants' failure to follow up on their condition may stem from a lack of recognition that asthma is a chronic disease (Alyas et al., 2024; Alzayer, 2023). It was worth noting that general practitioners observed that only uncontrolled asthma patients attended three-month scheduled follow-up visits (Bouloukaki et al., 2024). Community pharmacists could play a crucial role in this context by providing patient education and encouraging regular asthma reviews (Cork & White, 2022; Melani et al., 2011).

The findings in this study showed that while most community pharmacists were concerned that patients may develop a reliance on SABA inhalers, only one-third of patients admitted they relied on the use of SABA inhalers. Previously, patients with mild asthma were prescribed SABA inhalers only for

symptomatic relief as step 1 or 2 treatment (GINA, 2024). In these steps, SABA inhalers are used for an as-needed basis without any controller therapy, reflecting a management approach that prioritizes immediate symptom relief (Reddel et al., 2019). Recent guidelines have suggested mild asthma patients should use ICS-containing treatment/ a controller alongside as-needed SABA inhalers (GINA, 2024). However, patients tend to overuse SABA and underuse ICS for immediate symptomatic relief (Cho & Oh, 2019). Therefore, the GINA report recommended the use of low-dose ICS-formoterol as the preferred reliever option for both steps 1 and 2 (GINA, 2024). Besides, researchers suggested that only 'persistent controller users' (patients at risk of asthma exacerbations and/ or patients who failed to discontinue a controller) should use a controller for a lifetime (Cho & Oh, 2019).

Community pharmacists in this study were concerned about the dose, frequency, and techniques of SABA inhaler use, which aligned with patients' claims that healthcare professionals inquired about usage frequency and demonstrated proper techniques. Additionally, community pharmacists reported their usual assessment of patients' SABA usage frequency and techniques regardless of their duration of experience. It was documented in the literature that community pharmacy-delivered intervention was feasible and showed a positive effect in promoting the safe use of SABA inhalers (Foot et al., 2024). For example, community pharmacies in Denmark provided an Inhaler Technique Assessment Service to both new and experienced patients utilising inhalation devices. This service, conducted by either a pharmacist or a pharmacy technician, was designed to enhance patient outcomes by evaluating the patient's inhalation technique through demonstration and teach-back sessions (Hansen et al., 2021). Correct inhaler technique maximised the absorption of the medication into the lungs so that patients were less likely to require additional doses of SABA to achieve the desired therapeutic effect (Jahedi et al., 2017). Additionally, asthma education provided by community pharmacists led to improvements in asthma control, quality of life, asthma inhaler administration, and medication adherence (AL-awaisheh et al., 2023; Mahdavi & Esmaily, 2021).

The majority of interviewed patients stated that they mainly get their SABA inhalers from pharmacies as OTC. Moreover, community pharmacists identified that asthma patients who frequently purchased SABA inhalers OTC were less likely to follow up with healthcare professionals. In Malaysia, SABA is classified as a 'drug C' that could be easily purchased as OTC from community pharmacies (without a prescription) (Ministry of Health Malaysia, 2023). Community pharmacists were responsible for dispensing SABA medications, and it was mandatory to keep records of all SABA drugs dispensed through OTC purchases (Ministry of Health Malaysia, 2023). Data from 24 countries, including Malaysia, showed that 18% of SABA purchases were made without a prescription (Bateman et al., 2022). The easy accessibility

of SABA inhalers as OTC and the absence of prescription monitoring may lead to under-treatment of asthma, as patients may use it without proper supervision (Bouloukaki et al., 2024; Loh et al., 2023a). Therefore, community pharmacists need to communicate about the safe use of SABA inhalers (Loh et al., 2023a, 2023b). Also, community pharmacists should be trained to assess whether an OTC medication is secure based on patients' health conditions (Gilson et al., 2019).

Participants in this study acknowledged language barriers and health literacy as determinants of the safe use of SABA inhalers. Involving caregivers in the counseling process for translation and reinforcing healthcare providers' instructions could reduce the impact of language barriers and limited health literacy (Divecha et al., 2020). Healthcare organisations should hire medical interpreters who are trained professionals to participate in the counseling process of patients who face difficulty in communicating with healthcare professionals (Squires, 2018). Effective asthma medication counseling involves varied educational resources and integrating visual aids in asthma action plans (Abrams, 2020). Additionally, healthcare providers should adhere to health literacy precautions such as slowing down during counseling, being specific about subjective terms, using illustrations to demonstrate important concepts, and using the 'teach-back' method (Hussain et al., 2023).

Many factors were addressed by the participants to enhance the safe use of SABA inhalers. Firstly, some participants urged the reduction of the long waiting times in healthcare settings. In Malaysia, long waiting times in healthcare settings resulted from the need for more human resources, insufficient equipment, a slow registration process, and a high patient volume (Sharif et al., 2016). This problem could be addressed by a smart management waiting system to schedule appointments (Sharif et al., 2016). Patients could obtain their registration numbers via mobile applications and stay in their preferred locations, with reminders ten minutes before their appointments to prevent missed ones (Nasrudin et al., 2023). Another suggested factor by the participants was public education. It was evident that a lack of education and awareness about asthma increased the burden of this chronic disease on the population (Pitrez, 2023). Social media is a platform that could be used to disseminate information about asthma and patients could improve asthma self-management and control (Poowuttikul & Seth, 2020). Furthermore, inadequate professional skills regarding inhaler use among community pharmacists from Turkey, Sudan, Nigeria, and India were primarily due to their limited knowledge of inhaler techniques (Gemicioglu et al., 2014; Nduka et al., 2016). Consequently, the implementation of a well-structured training program has become crucial for enhancing the knowledge and practices of community pharmacists in asthma management (Basheti et al., 2019). Beyond individual patient care, trained community pharmacists would also play a role in advocating for asthma awareness and public

health initiatives by engaging in community outreach programs (Kritikos et al., 2005).

Study strengths and limitations

This study evaluated both asthma patients' and community pharmacists' perceptions and practices on the safe use of SABA inhalers. Moreover, this study used thematic analysis that generated a rich and descriptive account of participants' experiences, opinions, and beliefs. However, recall bias, or social desirability bias, needs to be acknowledged. To address these issues, the interviewer employed probes and prompts to facilitate more precise event recall and underscored the anonymity and confidentiality of this study.

Limited sample size and generalisation beyond research participants remain issues, as they appear in qualitative research. Moreover, the study deliberately focused on English-speaking participants to ensure effective communication, precise data collection, and streamlined data analysis. Some confounding variables may have affected this study, such as the participants' varied demographics, gender, and ethnicity. The participants' experiences and attitudes were probably influenced by these circumstances, which resulted in a range of responses from them that would have compromised the consistency of the findings. For example, female community pharmacists were more willing to track the proper use of SABA inhalers. This could result in wildly disparate methods for monitoring patients' proper SABA inhaler use. It is vital to recognise these confounders, and future studies need to find ways to control these confounders to ensure a clearer picture of how SABA inhalers are practiced regardless of the context. Last but not least, the included interviewees in this study were from two regions of Malaysia: Penang and Perak. Perak is the fourth largest in the nation, while Penang is the second largest. The current study's conclusions cannot be generalised to the entire country. Therefore, results from this study are unlikely to differ much from those from other regions of the country; nonetheless, more research is needed to validate this nationwide, particularly in rural areas.

Further research

Future studies should focus on developing effective practices to monitor and optimise SABA use in low-resource settings. In particular, effective approaches to identify and counsel patients at risk, for example, people with low health literacy, from deprived backgrounds, and those less likely to engage with asthma review, can optimise use and minimise adverse outcomes.

Conclusion

The study found that most asthma patients and community pharmacists agreed that good asthma control was associated with reduced SABA usage and minimum asthma symptoms. Most patients claimed visiting physicians for asthma reviews was unnecessary. Community pharmacists raised concerns regarding patients' reliance on SABA inhalers due to the immediate relief effects, but the majority of patients claimed that they did not rely on SABA inhalers. Additionally, community pharmacists were generally concerned about the frequency, dosage, and techniques of SABA inhaler use. Since most patients preferred to purchase SABA inhalers OTC, community pharmacists were concerned that patients who always purchased SABA inhalers OTC rarely followed up with physicians and were seldom monitored for their SABA use. Language barriers, health literacy, long waiting times, and public education were the most important believed determinants of the safe use of SABA inhalers.

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Data availability statement

All data generated or analysed during this study were included in this published article [and its supplementary information files].

Authors' contributions

Conceptualization: RH & ZCL; Data curation: RH, BA, ZCL & JM; Formal analysis: RH, ZCL & BA; Investigation: RH, ZCL, BA & JM; Methodology: RH, ZCL & JM; Project administration: RH & ZCL; Resources: RH, SCO & JM; Supervision: RH, SCO & JM; Writing – original draft preparation: RH, ZCL & BA; Writing – review and editing: RH, BA, SCO, BS, JM, AUR & VP.

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Appendix

Appendix A: COREQ checklist

Item	Guidelines	Reported in the section of
1	Which author/s conducted the interview or focus group?	Data collection
2	What were the researcher's credentials? E.g. PhD, MD	–
3	What was their occupation at the time of the study?	Data collection
4	Was the researcher male or female?	Data collection
5	What experience or training did the researcher have?	Data collection
6	Was a relationship established prior to study commencement?	Data collection
7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	Data collection
8	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	Reflexivity statement
9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	Study design
10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	Selection and recruitment of participants
11	How were participants approached? e.g. face-to-face, telephone, mail, email	Data collection
12	How many participants were in the study?	Results

(*Continued*)

Continued.

Item	Guidelines	Reported in the section of
13	How many people refused to participate or dropped out? Reasons?	Figure 1
14	Where was the data collected? e.g. home, clinic, workplace	Data collection
15	Was anyone else present besides the participants and researchers?	Data collection
16	What are the important characteristics of the sample? e.g. demographic data, date	Results/Table 2
17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	Data collection
18	Were repeat interviews carried out? If yes, how many?	–
19	Did the research use audio or visual recording to collect the data?	Data collection
20	Were field notes made during and/or after the interview or focus group?	Data collection
21	What was the duration of the interviews or focus group?	Data collection
22	Was data saturation discussed?	Data collection
23	Were transcripts returned to participants for comment and/or correction?	Validity and reliability
24	How many data coders coded the data?	Data analysis
25	Did authors provide a description of the coding tree?	Results/Table 3
26	Were themes identified in advance or derived from the data?	Results
27	What software, if applicable, was used to manage the data?	Data analysis
28	Did participants provide feedback on the findings?	Validity and reliability
29	Were participant quotations presented to illustrate the themes / findings? Was each quotation identified? e.g. participant number	Results
30	Was there consistency between the data presented and the findings?	Results
31	Were major themes clearly presented in the findings?	Results
32	Is there a description of diverse cases or discussion of minor themes?	Results

Appendix B

Asthma patients' interview guide

Part I

Focus: General information from asthma patients

1. How many medications/inhalers do you normally use a day for your asthma control?
2. What types of medications are there in your inhalers?
3. Do you have multiple of same types of inhalers at the same time?
4. How does asthma affect your daily life?
5. Why do you prefer to obtain this reliever inhaler over the counter?

Part II

Focus: Asthma control and management

1. Tell me what you understand by the words 'asthma control'?
2. How do you describe good asthma control?
3. How do you describe your asthma control in the past one month?
4. How does your usual asthma management change if you really feel very unwell with your asthma on a particular day?
5. How regularly do you consult your doctor about your asthma problems?

Part III
Focus: Risk perceptions

1. In general, how many puffs per day of the blue reliever inhaler do you believe are suitable for you?
2. If someone uses 2 or more puffs per day, how would you describe his/her asthma control?
3. How interested would you move to another inhaler completely which contained both a preventer and a reliever?

Part IV
Focus: Communication about safe use of SABA inhalers

1. Who would be your preferred healthcare professional as a point of contact, when you wish to look for asthma medications?
2. How often do you talk to your health professional and lead on to reasons if they are not very often?
3. How satisfied are you with your asthma consults/follow ups with your doctors?
4. How satisfied are you with your asthma consults/follow ups with your pharmacists?
5. Have you experienced a healthcare professional such as doctor, pharmacist, or nurse express concern about your blue asthma inhaler use?

Part IV
Focus: Future perspectives

1. What would be the possible suggestions to reduce the frequency of usage of blue reliever inhalers, which are bought from community pharmacies, to no more than twice per week?
2. What would be the possible suggestions to improve communication between you and your healthcare professionals?
   Conclusion/suggestion:
3. Would you like to provide any additional suggestions / comments about the safe use of asthma medicines in Malaysia?

Appendix C

Community pharmacists' interview guide

Part I
Focus: Asthma control and management

1. How do you describe patients with good asthma control?
2. Would you dispense the reliever inhalers to asthma patients if you noticed they might overuse it? Could you please provide the reasons?

Part II
Focus: Risk perceptions towards the use of SABA inhalers

1. Are you concerned about safe use of SABA inhalers by asthma patients?
2. In your opinion, what could be the reasons for patients overusing SABA inhalers which are purchased from community pharmacies?

Part III
Focus: Communication with asthma patients

1. If you would like to convince a patient who used SABA more than twice per week to cut down on the use, how would you convey this message?
2. How likely do you think that asthma patients will talk about their asthma conditions with community pharmacists?

Part IV
Focus: Future perspectives

1. What could be the possible suggestions to improve the safe use of asthma reliever inhalers which are requested from community pharmacies.
2. What could be the possible suggestions to improve the communications between patients and community pharmacists?

Conclusion/suggestion:

1. Would you like to provide any additional suggestions about what the policy makers or Ministry of Health could do to improve the safe use of asthma medicines in Malaysia?

Appendix D

Data collection form for asthma patients

Perceptions, practices, and experiences of asthma patients towards using the short-acting beta-2 agonists inhalers: A qualitative study

Age	☐ 18–28 years old ☐ 29–38 years old ☐ 39–48 years old ☐ 49 years old and above
Gender	☐ Male ☐ Female
Nationality	☐ Malaysian ☐ Non-Malaysian
Ethnicity	☐ Malay ☐ Chinese ☐ Indian ☐ Others. Please specify:
Education level	☐ Primary ☐ Secondary ☐ College/University ☐ Others. Please specify:
Working status	☐ Full time ☐ Part time ☐ Unemployed ☐ Student ☐ Retired

For Researcher Use Only
Pharmacist's ID:
Date received:

Appendix E

Data collection form for community pharmacists

Perceptions, practices, and experiences of community pharmacists towards using the short-acting beta-2 agonists inhalers: A qualitative study (Data collection form for qualitative interview**)**

Age	☐ 18-28 years old
	☐ 29-38 years old
	☐ 39-48 years old
	☐ 49 years old and above
Gender	☐ Male
	☐ Female
Ethnicity	☐ Malay
	☐ Chinese
	☐ Indian
	☐ Others
Qualification	☐ Diploma
	☐ Bachelor's degree
	☐ Master's degree
	☐ Doctor of philosophy
Working experience	☐ Less than 5 years
	☐ 5 to 10 years
	☐ 10 years and above

Are you registered with Pharmacy Board of Malaysia? (Yes / No)
Do you work as full-time permanent position at community pharmacy? (Yes/ No)

For Researcher Use Only

Pharmacist's ID:
Date received: