Galaxy Publication

Patient's Opinions and Expectations on the Role of Pharmacists in Asthma Management in North Macedonia

Sarah Adams[1], Thomas Miller[1]*, Emily Carter[1]

[1]Department of Pharmaceutics, College of Pharmacy, University of Illinois Chicago, Chicago, USA.

*E-mail ✉ thomas.miller@protonmail.com

ABSTRACT

This research investigated how asthma patients in North Macedonia perceive pharmacist involvement and education on inhaler use. Between July and September 2024, a cross-sectional survey was conducted at the University Clinic for Pulmonology and Allergology in Skopje, enrolling 187 adult patients with asthma. Although 69% reported following their prescribed treatment, 13.9% had never received guidance on inhaler use, and only 27.3% had received instructions from a pharmacist. Nearly all participants (96.3%) were interested in medication counseling from pharmacists, yet fewer than half (48.7%) were willing to engage in pharmacist-led inhaler training. Patient adherence was significantly linked to both gender (p = 0.040) and prior inhaler education. The findings highlight a gap in patient recognition of pharmacists' clinical contributions, suggesting that expanding pharmacist-driven training in community settings and strengthening collaboration with physicians could enhance asthma care and improve healthcare efficiency.

Keywords: Community pharmacy, Pharmacist, Education, Asthma, Patient opinion

Introduction

Over the past decades, the role of pharmacists has shifted dramatically from merely dispensing medications to becoming active contributors in patient care [1–4]. Many patients, faced with long waiting times for physician appointments, increasingly rely on pharmacists for timely advice and guidance, making pharmacists often the first point of contact in healthcare [5]. Their accessibility, combined with professional knowledge, positions pharmacists to play a pivotal role in managing chronic illnesses. According to the World Health Organization, community pharmacists can enhance patients' understanding of medications, improve quality of life, and support self-management strategies [6], while the International Pharmaceutical Federation emphasizes pharmaceutical care as a means to empower pharmacists in aiding patients with long-term conditions [7].

In North Macedonia, however, pharmacists' potential in chronic disease management remains underrecognized. Current legislation focuses predominantly on the dispensing of drugs rather than patient-centered care [8, 9], highlighting a need for reforms that align local pharmacy practices with European Union standards. Such reforms could enhance accessibility, efficiency, and overall population health outcomes [9]. Standardized pharmaceutical service programs are essential to ensure equitable access to health guidance, particularly in low- and middle-income countries where pharmacists often provide essential medicines and support management of chronic conditions such as cardiovascular diseases, diabetes, asthma, COPD, and mental health disorders [10]. Establishing these programs can improve patient outcomes and reduce national healthcare expenditures [11].

Asthma is a chronic respiratory condition that imposes significant physical, social, and economic burdens [12]. Symptoms like wheezing, shortness of breath, and exacerbations can limit daily activity and sometimes necessitate urgent medical care. Successful asthma management depends heavily on correct inhaler use, medication adherence, and environmental control. Improper inhaler technique is a common cause of inadequate disease

control and therapy failure [13, 14]. Despite its critical importance, proper inhaler education is often lacking in clinical practice [15]. Evidence suggests that pharmacist-led interventions in community pharmacies can improve asthma outcomes [16], highlighting the value of incorporating such approaches into routine care in North Macedonia and other developing countries. Understanding patient perspectives, knowledge, and expectations is crucial to implementing effective pharmacist-led interventions. This study, therefore, investigates adult asthma patients' experiences and perceptions regarding inhaler education and pharmaceutical care, examining therapy adherence, prior sources of instruction, and willingness to engage in pharmacist-led training, to identify gaps in asthma management and inform strategies to enhance patient care in North Macedonia.

Materials and Methods

Study setting and participants

A cross-sectional study was conducted at the Public Health Institution (PHI) University Clinic for Pulmonology and Allergology in Skopje, North Macedonia, from July to September 2024. The study targeted adult patients with chronic asthma who regularly used inhalers and attended pulmonology consultations. Inclusion criteria were: age ≥18 years, confirmed diagnosis of chronic asthma by a pulmonologist based on clinical assessment and medical records, and voluntary consent to participate. Patients who declined participation, withdrew during the study, or had conditions limiting effective communication were excluded. Out of 200 distributed questionnaires, 187 were returned completed, yielding a 93.5% response rate.

Ethical approval was obtained from the Ethical Committee at the Faculty of Medical Sciences, Goce Delcev University – Stip, North Macedonia (Doc. No. 2005-137/4). Participants signed informed consent forms prior to completing the survey and were assured of anonymity and confidentiality. Questionnaires were completed in private spaces to ensure comfort and privacy.

Questionnaire design

The survey included 12 questions, combining closed-ended and semi-open formats. The first section collected demographic and clinical information, including age, gender, education, employment status, and asthma duration. The second section explored therapy details, adherence, and inhaler technique, including whether participants had received instruction and its source (pharmacist or physician). The final section assessed participants' opinions on pharmacist-led care, interest in inhaler training by pharmacists, and awareness of the 'New Drug' service.

Data analysis

Data were entered into Microsoft Excel® (Microsoft Corp., Redmond, WA, USA), cleaned, and analyzed using Jamovi software (version 2.6, https://www.jamovi.org) [17–19].

Results and Discussion

Participant demographics and clinical characteristics

A total of 187 patients participated, ranging in age from 19 to 82 years (mean ± SD: 50.16 ± 13.49 years). **Table 1** summarizes participants' demographic profiles, clinical characteristics, and therapy-related details, illustrating the diversity of the study population.

Table 1. Demographic, Clinical, and Therapy-Related Characteristics of Study Participants

Variable	Category	Percentage (%)	95% Confidence Interval (%)
Gender	Male	62.6	55.7–69.5
	Female	37.4	30.5–44.3
Education Level	Primary school	17.6	12.1–23.1
	High school	46.5	39.4–53.6
	College	2.7	0.4–5.0
	University	33.2	26.5–39.9
Smoking Status	Smoker	50.8	43.6–58.0
	Non-smoker	49.2	42.0–56.4

Duration of Asthma	<1 year	18.2	12.7–23.7
	1–5 years	69.5	62.9–76.1
	≥5–20 years	12.3	7.6–17.0
Current Treatment	ICS + LABA	78.0	72.1–83.9
	LAMA	6.4	2.9–9.9
	ICS + LAMA + LABA	9.1	5.0–13.2
	ICS alone	6.4	2.9–9.9
Inhaler Training Received	Physician	58.8	51.7–65.9
	Pharmacist	27.3	20.9–33.7
	None	13.9	8.9–18.9
Training using demo inhaler	Physician	49.7	42.5–56.9
	Pharmacist	5.9	2.5–9.3
	None	44.4	37.3–51.5
Adherence to Prescribed Therapy	Yes	69.0	62.4–75.6
	No	16.6	11.3–21.9
	Sometimes	14.4	9.4–19.4

*ICS+LABA= Inhaled Corticosteroid + Long-Acting Beta-2 Agonist; LAMA = Long-Acting Muscarinic Antagonist; ICS + LAMA + LABA = Inhaled Corticosteroid + Long-Acting Muscarinic Antagonist + Long-Acting Beta-2 Agonist; ICS = Inhaled Corticosteroid, CI – confidence interval.

Analysis of the data in **Table 1** shows that the study population was predominantly male (62.6%), with females representing 37.4% of participants. Concerning educational attainment, nearly half had completed high school (46.5 percent), followed by university graduates (33.2%), while smaller proportions had only primary education (17.6 percent) or college-level education (2.7%). The participants were almost equally divided by smoking status, with 50.8% reporting as smokers and 49.2 % as non-smokers, which could influence disease progression and response to therapy. Most individuals had lived with asthma for one to five years (69.5 percent), whereas 18.2% had been diagnosed within the past year, and 12.3% had the condition for more than 5 years. Regarding treatment, the pressurized metered-dose inhaler (pMDI) was the most frequently used device (56.1%). Inhaler instruction was predominantly provided by physicians (58.8 percent), with pharmacists contributing to 27.3 percent of training sessions; 13.9% of patients reported receiving no instruction at all. When considering hands-on demonstration with a practice inhaler, 44.4% of participants had not received any practical training, while 49.7% were trained by physicians and only 5.9% by pharmacists **(Figure 1)**.
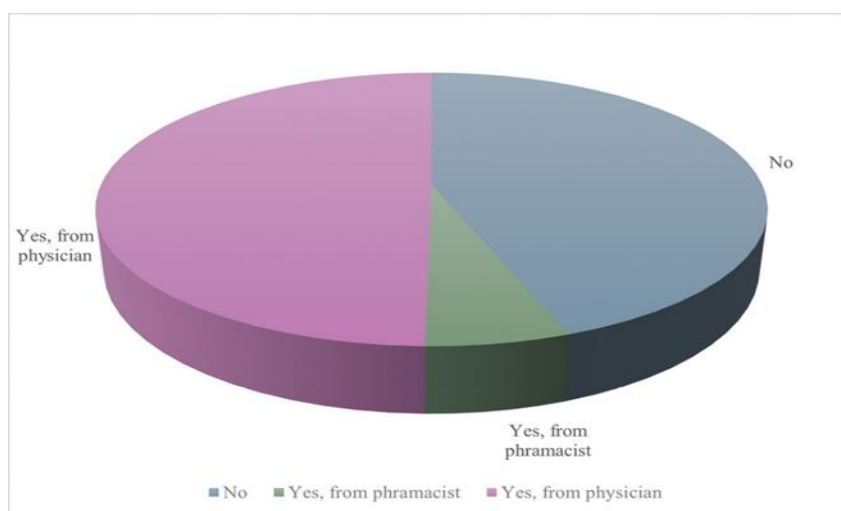

Figure 1. Demo education for the use of inhalers.

The study revealed that most participants adhered well to their prescribed asthma therapy, with 69% reporting consistent compliance. Meanwhile, 14.4% followed their regimen sporadically, and 16.6% admitted to not adhering at all.

Patients' views on pharmacist services

When asked about receiving information regarding newly prescribed medications, nearly all respondents (96.3%) expressed a positive interest in pharmacist counseling, highlighting strong patient demand for professional guidance. Only a small fraction (3.7%) were not interested. Opinions were more divided regarding inhaler technique training delivered by pharmacists in community pharmacies: 48.7% were willing to participate, whereas 51.3% preferred not to engage in such training.

Further analysis using crosstabulation identified significant relationships between several variables **(Table 2)**. Adherence to therapy showed a notable association with both gender and prior inhaler training. Additionally, patients who were interested in pharmacist-led medication counseling were also more likely to be open to receiving inhaler training from pharmacists.

A closer look at adherence by gender revealed that among 70 female participants, 44 reported full adherence, 16 partial adherence, and 10 no adherence. Among 117 males, 85 were fully adherent, 11 partially adherent, and 21 non-adherent **(Figure 2)**. Statistical testing confirmed a significant association between gender and therapy adherence ($\chi^2 = 6.46$, df = 2, p = 0.040), supported by the likelihood ratio (p = 0.044) and Fisher's exact test (p = 0.047). Cramer's V (0.186) indicated a small effect size, suggesting that gender influences adherence to a modest degree. Although females showed slightly higher full adherence rates, the overall pattern was similar across genders, with most participants maintaining regular therapy, implying that additional factors beyond gender contribute to adherence **(Table 2)**.

Table 2. Statistical results for contingency tables.

| Statistics	Therapy adherence vs Gender	Therapy adherence vs inhaler training	Pharmacist inhalation training vs new medication info
Sample size (N)	187	187	187
Degrees of freedom (df)	2	4	1
Chi-squared value	6.46	20	7.67
Chi-squared p-value	0.04	< 0.001	0.006
Likelihood ratio value	6.24	16.4	10.4
Likelihood ratio p-value	0.044	0.003	0.001
Fisher's exact test p-value	0.047	0.002	0.006
Phi-coefficient value	/	/	0.203
Cramer's V value	0.186	0.231	0.203
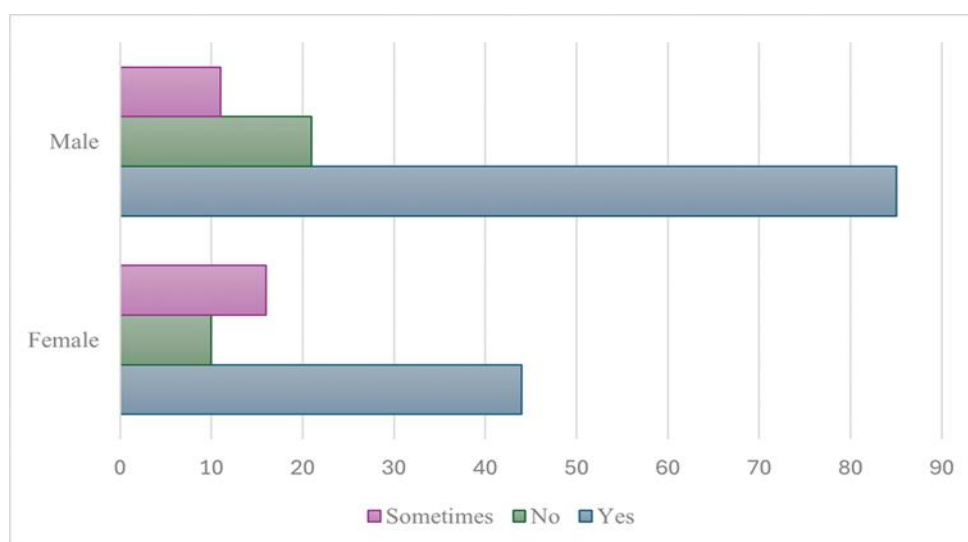
Figure 2. Relationship between Gender and Adherence to Prescribed Therapy

Analysis of therapy adherence in relation to inhaler training provides further insight **(Table 2)**. Among the fifty-one participants who had received training from a pharmacist, thirty-five reported full adherence, eight reported partial adherence, and eight were non-adherent. For the 110 participants trained by a physician, 82 adhered fully to their therapy, 17 showed partial adherence, and 11 did not adhere. Among the twenty-six participants who had not received any inhaler training, 12 were fully adherent, 2 partially adherent, and 12 non-adherent **(Figure 3)**.

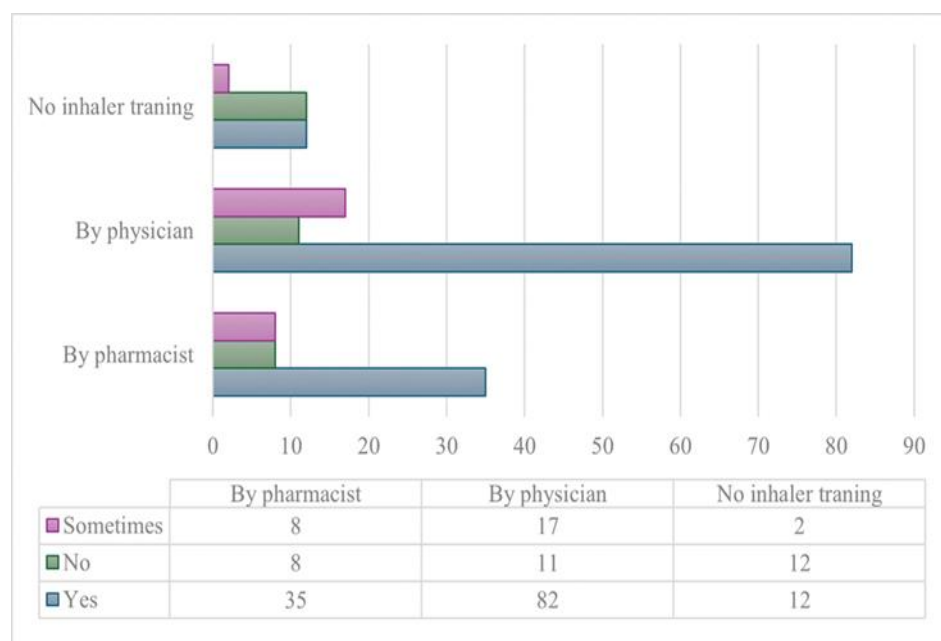|	By pharmacist	By physician	No inhaler traning
■ Sometimes	8	17	2
■ No	8	11	12
■ Yes	35	82	12

Figure 3. Relationship between inhaler training and adherence to prescribed therapy.

The analysis demonstrated a clear connection between inhaler training and patients' adherence to their treatment plans. Chi-squared testing showed a significant relationship ($\chi^2 = 20.0$, df = 4, $p < 0.001$), which was confirmed by both the likelihood ratio test ($p = 0.003$) and Fisher's exact test ($p = 0.002$), indicating that the differences in adherence across training groups are unlikely to occur by chance. Cramer's V of 0.231 suggests a moderate, meaningful effect, implying that training contributes substantially, though not exclusively, to adherence behavior. Patients who received guidance from healthcare professionals demonstrated notably higher adherence than those without any instruction. Among participants trained by physicians, 82 of 110 (74.6%) followed their therapy fully, while 35 of 51 (68.6%) who received pharmacist-led training were fully adherent. In contrast, only 12 of 26 patients (46.2%) who had not received any training achieved full adherence. These findings highlight that structured inhaler instruction, whether provided by a physician or a pharmacist, is instrumental in supporting patients to follow their prescribed treatment correctly. While adherence is influenced by other factors, the results emphasize the critical role of targeted patient education.

When examining the relationship between participants' interest in receiving medication counseling and their willingness to undergo pharmacist-led inhaler training in community pharmacies, the data revealed a notable trend. Of the 91 participants willing to receive inhaler training, 84 also wanted guidance on newly prescribed medications, while seven did not. Interestingly, all 96 participants who declined inhaler training still expressed interest in receiving pharmacist counseling about their medications **(Figure 4)**.

Figure 4. Patient openness to receiving pharmacist guidance on newly prescribed medications and interest in pharmacist-led inhaler instruction.

Analysis using the Chi-squared test (χ^2) revealed a significant correlation between patients' willingness to receive medication information from pharmacists and their interest in inhaler training (χ^2 = 7.67, df = 1, p = 0.006). This indicates that patients receptive to one form of pharmacist support are generally inclined to accept additional support as well. The association was further reinforced by the likelihood ratio test (p = 0.001) and confirmed by Fisher's exact test (p = 0.006), suggesting the relationship is unlikely to be due to chance. With a Phi coefficient and Cramer's V of 0.203, the effect size can be considered moderate, implying a meaningful connection without being overly strong. These findings point to the potential benefits of delivering combined educational services in community pharmacies, where patients engaging with one type of intervention—such as medication counseling— are also more likely to participate in other services like inhaler technique training **(Table 2)**. Nevertheless, the moderate effect size suggests additional factors may influence patient engagement.

Proper inhaler usage and adherence to prescribed treatments are critical components of asthma management, as emphasized by the Global Initiative for Asthma (GINA) and the World Health Organization (WHO) [20, 21]. The present results underscore the need to provide consistent education to patients and ensure the correct use of inhaler devices. Pharmacists play a central role in this process, offering expertise on medication use and inhaler techniques [22]. However, survey responses indicate that physicians currently perform much of this educational role. Limited pharmacist involvement may result from time pressures during dispensing, suggesting a need to redesign workflows to align with pharmacists' competencies. Other contributing factors include insufficient training for delivering patient education and unclear legal frameworks defining pharmacists' responsibilities. This is concerning because evidence consistently demonstrates that pharmacist-led interventions can significantly enhance inhaler technique and treatment adherence. For instance, Giraud and Allaert (2011) observed that pharmacist guidance increased correct inhaler use from 24% to 79%, accompanied by improved asthma control and adherence [23]. Similarly, Axtell *et al.* (2017) found that even brief, two-minute pharmacist sessions outperformed written and video-based instructions in achieving proper inhaler technique [24]. These studies highlight the important role pharmacists can play in patient education and the need to expand their participation in both community and clinical settings. Strengthening patient education and inhaler training in community pharmacies could substantially improve adherence and clinical outcomes.

The survey also revealed that a vast majority of participants (96.3%) were willing to receive pharmacist-provided medication information, demonstrating strong patient support for pharmacist involvement. Acceptance of inhaler training in community pharmacies was lower, possibly due to a preference for physician-led instruction, limited awareness of pharmacists' expertise, or concerns about training quality or accessibility. These findings highlight the need to increase awareness of the pharmacist's role in inhaler education and build patient confidence in such services.

Gender also appeared to influence adherence, with a statistically significant association observed. This indicates that additional personal or contextual factors contribute to adherence behaviors and merit further exploration. Literature presents mixed findings: Boucquemont *et al.* (2019) reported age-dependent gender differences, with no disparities among younger adolescents but higher adherence among young women compared to men [25]. In contrast, Chen *et al.* (2014) found that male patients with hypertension adhered more consistently than females, demonstrating that gender effects are context-specific and complex [26].

Finally, the association between willingness to receive medication information and inhaler training suggests that patients open to one type of pharmacist intervention are more likely to accept others. Technological innovations can complement these efforts, including electronic monitoring devices, mobile apps, web platforms, and sensor-equipped smart inhalers providing real-time adherence feedback [27].

Research from around the world demonstrates that education led by pharmacists can substantially improve patients' understanding of their treatments and support medication adherence, as pharmacists are among the most accessible healthcare professionals [28–30]. In Italy, the Italian Medicines Use Review (I-MUR), the nation's first cognitive pharmaceutical service, was shown through a randomized controlled trial to be both effective and cost-efficient for asthma management. The program's success prompted the Italian Ministry of Health to officially integrate I-MUR into community pharmacy practice as a nationally funded service, emphasizing the increasingly recognized role of pharmacists in patient education and adherence promotion [31]. Such experiences could provide a blueprint for North Macedonia to strengthen asthma care and enhance clinical outcomes.

Community pharmacies are well-positioned to deliver holistic asthma care by combining medication counseling with inhaler technique training. Addressing these components simultaneously can improve both patient adherence and therapeutic outcomes. Building on this concept, North Macedonia launched a nationwide education initiative in 2023 with support from the International Primary Care Respiratory Group (IPCRG) and the Center for Family Medicine at Ss. Cyril and Methodius University in Skopje. The program employed a "train the trainers" model targeting family physicians, nurses, and community pharmacists. By early 2023, 16 pharmacists and five physicians were trained to lead workshops, which subsequently expanded to 20 regional sessions reaching 400 community pharmacists, integrating them into the national asthma care strategy [32]. Although still in its initial stages, this program offers a promising foundation for improving asthma management and adherence to therapy across the country.

Conclusion

This study highlights the impact healthcare providers—particularly pharmacists and physicians—can have on supporting medication adherence in asthma patients. Therapy adherence was significantly associated with gender and the type of inhaler training received. While patients were generally open to receiving information from pharmacists, fewer were willing to participate in inhaler technique training, indicating limited awareness of pharmacists' clinical expertise. Establishing specialized educational programs within community pharmacies could expand pharmacists' role in enhancing patient outcomes and optimizing healthcare resource use. Strengthening collaboration between pharmacists and physicians and increasing public recognition of pharmacists' competencies will be essential for advancing patient-centered approaches to asthma care.

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