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Original Article

# Evaluation of the role of the pharmacists in the rational use of inhaler devices in the treatment of asthma and COPD

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**ABSTRACT**

**Background and Aims:** Inhaled drug-delivery is the cornerstone for the treatment of asthma and chronic obstructive pulmonary disease (COPD). However, these diseases cannot be adequately controlled in most patients due to the misuse of inhaler devices and poor patient compliance. Patient education is a critical component of treatment and requires the cooperative effort of physicians and pharmacists. This study aimed to evaluate a pharmacists' ability to use inhaler devices and their practical knowledge, and to assess the extent to which pharmacists have consulted on this issue for the rational drug use of asthma or COPD patients.

**Methods:** A questionnaire containing demographic information, steps for the correct use of inhaler devices, information source for inhaler use, and patient counseling was applied to fifty community pharmacists in Istanbul and the data was evaluated.

**Results:** The number of pharmacists who have adequate knowledge about the use of a Metered-Dose Inhaler was 59%. It was 50% for Turbuhaler®, 54% for Diskus®, and 56% for a Capsule Inhaler. Pharmacists operating in community pharmacies for up to 20 years were more knowledgeable about the correct use of inhaler devices, but there was no statistically significant difference according to the pharmacists years in practice ($p<0.05$ for each device).

**Conclusion:** About half of the pharmacists did not have enough knowledge for the correct use of each inhaler device. This suggests that there is a clear need for special and continuing educational programs for pharmacists to increase their knowledge of inhaler use and attitudes towards inhaled therapy to provide better patient counseling and training in the management of asthma and COPD.

**Keywords:** Asthma, Chronic Obstructive Pulmonary Disease, Inhaler Devices, Community Pharmacist, Inhaler Technique

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## INTRODUCTION

Chronic respiratory diseases are the third leading cause of mortality worldwide, behind cardiovascular diseases and neoplasms. Of all chronic respiratory diseases, asthma and chronic obstructive pulmonary disease (COPD) are the most common. This prevalence has been increasing over the years in the world due to higher smoking and increased air pollution (GINA, 2020; GOLD, 2020). In most patients, COPD and asthma are associated with significant comorbidities such as impaired mobility, insomnia, depression, sinusitis, migraine, high blood pressure, stomach ulcers and cancer (Van Manen et al., 2001). The economic impact of asthma and COPD on a patient's spending is substantial, including both direct healthcare costs such as medication, routine and emergency care, and also indirect healthcare costs, including reduced quality of life and productivity, missed school and workdays (GINA, 2020; GOLD, 2020).

Inhaled drug delivery is the cornerstone for the treatment of pharmaceutical management of asthma and COPD, since it allows drugs to reach the target site at effective concentrations with the advantages of faster onset of action, low systemic bioavailability, and consequently less side effects compared to systemic delivery routes (Broeders, Sanchis, Levy, Crompton, & Dekhuijzen, 2009; Al-Jahdali et al., 2013; Mortensen & Hickey, 2014). In both diseases an adequate treatment with inhaled drugs can reduce symptoms and the number of exacerbations, provide clinical control, and improve patients' quality of life. A wide variety of inhaler devices are currently available on the drug market. However, this wide range also represents a disadvantage as each requires different inhalation techniques and the correct completion of multiple steps to ensure optimal and effective drug delivery to the lungs (Basheti, Bosnic-Anticevich, Armour, & Reddel, 2014; Mortensen & Hickey, 2014; Chrystyn et al., 2017). Although effective corticosteroid and bronchodilator treatments are available with inhaled devices, the benefits of inhalation therapy may be limited by inadequate inhalation maneuvers and inhaler use (Broeders et al., 2009; Sanchis, Corrigan, Levy, & Viejo, 2013; Molimard et al., 2017). Many published studies have shown that the majority of patients do not use inhaler devices correctly, and they need to be educated and trained about inhaler techniques (Melani et al., 2011; Chrystyn et al., 2017; Ruud, Rønningen, Faksvåg, Ariansen, & Hovland, 2018). Misuse of inhaler devices and poor compliance of patients are the most common causes of treatment failure. Errors in the use of inhaler devices have been associated with uncontrolled asthma and increased rates of severe COPD exacerbations in patients due to reduced drug delivery and decreased efficacy of the inhaled drugs (Maricoto et al., 2015; Molimard et al., 2017; Price et al., 2017).

In the successful management of asthma and COPD, patient education is a critical component of treatment and requires the cooperative effort of physicians and pharmacists. Since community pharmacists are the healthcare providers that patients often encounter just before taking obtaining their medication, they play an important role in educating and counselling patients on the correct use of different inhaled medicines and devices and also, they have a great responsibility to ensure that patients are using their prescribed drugs correctly. Training and follow-up of the patients by community pharmacists is considered as an important step in the management of asthma and COPD (Ballantyne, 2007; Benavides, Rodriguez, & Maniscalco-Feichtl, 2009; Hesso, Gebara, & Kayyali, 2016). Therefore, pharmacists must be confident and competent in the correct use of different inhaler devices. Several studies have attempted to evaluate the knowledge and ability of pharmacists to properly educate patients for the correct use of inhaler devices, and the impact on the management of chronic respiratory diseases such as asthma and COPD. It was evident in these studies that pharmacists lack the knowledge of the use of inhaler devices and inhaled therapy (Cain, Cable, & Oppenheimer, 2001; Dizdar, Civelek, & Sekerel, 2007; Benavides et al., 2009; Plaza, Giner, Rodrigo, Dolovich, & Sanchis, 2018). A literature search showed that there was only one published survey study done in Turkey in 2014 that evaluated pharmacists' knowledge of using inhaler devices (Gemicioglu, Borekci, & Can, 2014). Therefore, in order to currently address this important issue, this study aimed to evaluate the skills of inhaler device use and practical knowledge of community pharmacists, and to assess the extent to which pharmacists have consulted on this issue for rational drug use of asthma and COPD patients.

## MATERIAL AND METHODS

### Design and study population

This is a survey study, the objective of which is to assess the level of inhaler device usage skills, practical knowledge, and attitudes of community pharmacists. After the coordination and legal permissions were obtained, pharmacies were randomly visited and a specifically designed questionnaire was distributed to community pharmacists in Istanbul city between 1st of February 2019 and 1st of May 2019. After the research goals were announced and the satisfaction of the community pharmacists, questionnaires were distributed and then collected when the survey was completed the same day. Informed consent was obtained before starting data collection.

### Questionnaire

A questionnaire was created based on those used in the relevant survey studies previously published, and piloted for use as a tool in this study (Basheti et al., 2014; Gemicioglu et al., 2014; Giner et al., 2016). Seventy-five community pharmacists in Istanbul city were asked to fill out the questionnaire. However, only fifty of them voluntarily agreed to participate in the study. Data was evaluated within the framework of the principles of rational drug use. The questionnaire included questions about demographics, the most frequently prescribed inhaler devices for patients, the source of information on inhaler use among community pharmacists, steps for the correct use of Metered Dose Inhaler (MDI) and Dry Powder Inhalers (DPIs) including Diskus®, Turbuhaler® and Capsule Inhaler (Aerolizer®, HandiHaler®), and patient counseling. The questionnaire also included questions about the pharmacists' knowledge on storage and cleaning of inhaler devices. A checklist of steps for using each inhaler device was used to assess pharmacists' knowledge on inhalation techniques (Table 1). These checklists were designed according to the pharmaceutical company

| **Table 1: Checklist Items of Demonstrating the Use of Inhaler Devices** |
|---|
| **Steps for the Use of Metered Dose Inhaler (MDI)** |
| **1.** Remove the cap of the inhaler. |
| **2.** Hold inhaler upright. |
| **3.** Shake the inhaler vigorously. |
| **4.** Tilt your head back slightly and breathe out gently. |
| **5.** Put your lips around the mouthpiece. |
| **6.** Start breathing slowly and then operate the inhaler once during inspiration. |
| **7.** Keep inhaling through mouth while pressing the canister down. |
| **8.** Hold your breath for 10 seconds, then exhale slowly through the nose. |
| **9.** If a second dose is needed, wait half a minute before repeating. |
| **10.** Replace the cap. |
| **Steps for the Use of Turbuhaler®** |
| **1.** Unscrew the cover and lift it up. |
| **2.** Hold the Turbuhaler® upright. |
| **3.** Turn the colored base in one direction as possible. |
| **4.** To load the drug, turn it in the opposite direction until it clicks. |
| **5.** Tilt your head back slightly. |
| **6.** Breathe out gently away from the Turbuhaler®. |
| **7.** Put your lips around the mouthpiece. |
| **8.** Breathe in strongly and deeply through your mouth. |
| **9.** Hold your breath for 10 seconds. |
| **10.** Remove the Turbuhaler® from your mouth and exhale slowly through the nose. |
| **11.** Replace the cap and screw it shut. |
| **12.** After using the Turbuhaler®, rinse your mouth with water. |
| **Steps for the Use of Diskus®** |
| **1.** Put your thumb on the thumb handle, push your thumb away from you. |
| **2.** Slide the tab away from you until you hear a click sound. |
| **3.** Tilt your head back slightly. |
| **4.** Breathe out gently away from the device. |
| **5.** Put your lips around the mouthpiece. |
| **6.** Breathe in strongly and deeply through your mouth. |
| **7.** Hold your breath for 10 seconds. |
| **8.** Remove the Diskus from your mouth and breathe out through the nose. |
| **9.** Replace the cap and screw it shut. |
| **10.** Rinse your mouth and gargle with water, then spit it out. |
| **Steps for the Use of Capsule Inhaler** |
| **1.** Open the cap and lift the mouthpiece. |
| **2.** Remove capsule from foil, place in the internal chamber. |
| **3.** Close the mouthpiece firmly until you hear a click sound. |
| **4.** Hold the inhaler upright and press the button firmly only once to pierce the capsule. |
| **5.** Tilt your head back slightly. |
| **6.** Breathe out gently away from the inhaler. |
| **7.** Put your lips around the mouthpiece. |

**Table 1: Continue**

| Steps for the Use of Capsule Inhaler |
|---|
| **8.** Inhale slowly and deeply at a rate sufficient to hear whirring sound or feel the capsule vibrate. |
| **9.** Hold your breath for 10 seconds. |
| **10.** Breathe out normally through nose away from the inhaler. |
| **11.** Open the mouthpiece, tip out the used capsule and discard. |
| **12.** Close the mouthpiece and cap. |

instructions for each inhaled medication device, standardized, and validated according to the relevant survey studies (Basheti et al., 2014; Gemicioglu et al., 2014; Giner et al., 2016).

**Inhalation technique assessment**

Participants were individually classified according to the correct response rates they marked in the checklist for the correct use of each inhaler device. When a respondent marked 30% or less of the correct steps, it was considered as "Poor or No Knowledge Level", if between 30-70%, it was considered as " Inadequate Knowledge Level", and if 70% or more than, this was considered as "Adequate Knowledge Level."

**Statistical analysis**

GraphPad Prism 8.00 for Windows (GraphPad Software, San Diego, California, USA) was used to conduct the statistical analyses. Data was expressed as percentage (%). Scores were converted into the percentage of correct steps for each pharmacist. The relationship between years of working as a community pharmacist and their practical knowledge of the correct use of inhaler devices was examined by using the chi-squared test. The value of $p<0.05$ was considered statistically significant.

## RESULTS

Seventy-five community pharmacists in Istanbul were asked to fill out the questionnaire but only 50 voluntarily agreed to participate in the study (response rate= 66.6%). As demographic data, the gender rates, and the years of practicing as a community pharmacist are given in **Table 2.** There was no statistically significant difference in knowledge scores of pharmacists regarding the adequate use of inhaler devices in terms of gender. The most common inhaler devices prescribed for asthma and COPD patients were the MDI/spacer, followed by Inhaler Capsule (Handihaler® and Aerolizer®), Turbuhaler®, and Diskus® **(Figure 1).** The rates of the knowledge levels of community pharmacists on the correct use of each inhaler device are given in **Figure 2.**

Regarding the critical steps in using MDI, 44% of the pharmacists did not know that MDI should be held upright with the mouthpiece at the bottom. Thirty-four percent were unaware that MDIs had to be shaken before use. Only 62% had the knowledge to start inhalation at the same time as pressing down the canister as the most critical step in MDI use. Seventy-eight percent knew that they had to hold their breath for 10 seconds after inhalation. Only 48% marked the correct statement exhaling through the nose after inhalation. As the most critical step in the use of Turbuhaler®, only 42% of pharmacists had the knowledge that the colored base must be twisted on both sides to load the drug and make it ready for use. When we ask if the Turbuhaler® was accidentally loaded multiple times before use, only 44% of them marked the correct statement that the dose counter drops off by the loaded dose, but still only single dose is inhaled **(Table 2).** Seventy-three percent of the pharmacists knew that to turn on the Diskus®, the thumb had to be placed on the thumb handle and pushed until hearing a click sound, but the rest (29%) did not know this. Only 67% of them knew that to make the drug ready, the thumb had to be placed on the tab and slid away until it clicked in place. The rest (33%) did not know how to load the drug into the device before using it. With regard to capsule inhaler use, 70% had the knowledge that after inserting the capsule into the capsule-chamber, the spike buttons had to be pressed only once to make the drug ready for inhalation, which was a critical step. Only 53% of them knew that while breathing rapidly and deeply, a whirring sound had to be heard, otherwise, the capsule could get stuck. Eighty-five percent of the pharmacists knew how to empty the used capsule and discard after use.

The response rates of pharmacists to general questions regarding inhaler use and patient counseling, storage, and cleaning of devices are given in **Table 2.** The relationship between years practicing as a community pharmacist and knowledge of the adequate use of each inhaler device is shown in **Figure 3.** There were no statistically significant differences between community pharmacists by years of practice (n=50, p=0.12 for MDI, p=0.66 for Diskus®, p=0.88 for Turbuhaler®, and p=0.64 for Capsule Inhaler). The source of the knowledge on the use of inhaler devices among community pharmacists is given in **Figure 4.**

Within the scope of pharmaceutical care, pharmacists were asked what recommendations they made to ensure the rational use of inhaler drugs in the treatment of asthma and COPD and to increase the effectiveness of the treatment. Fifty-seven percent stated that special training and education programs should be organized so that they can educate their patients about the correct use of inhaler devices. Fifteen percent suggested that patient follow-up should be done to properly keep asthma and COPD under control. Seven percent recommended that brochures should be prepared for patients on the correct use technique of inhaler devices. Seven percent recommended that patients should have their pulmonary function tests done regularly. Seven percent stated that only

**Table 2: Questions about inhaler use and patient counseling, and response rates of pharmacists**

| **Gender** | **Pharmacist (%) (n=50)** |
|---|---|
| Male | 44 |
| Female | 56 |
| **Years practicing as a community pharmacist** | **Pharmacist (%)** |
| >30 years | 14 |
| 21-30 years | 56 |
| 10-20 years | 20 |
| >10 years | 10 |
| **After inhalation, if the inhaler device contains a corticosteroid drug, should the mouth be rinsed with water?** | **Pharmacist (%)** |
| Yes | 68 |
| No | 19 |
| I don't know | 13 |
| **What should be considered if no taste is sensed during inhalation with the inhaler device?** | **Pharmacist (%)** |
| I don't know | 32 |
| It is normal, the drug in the inhaler has no taste | 58 |
| The drug is not inhaled | 10 |
| **What happens if Turbuhaler® is accidentally loaded several times before using it?** | **Pharmacist (%)** |
| The dose counter drops off as much as the loaded dose but still only one dose is inhaled | 44 |
| All loaded dose is inhaled | 20 |
| I don't know | 36 |
| **How should inhaler devices be stored?** | **Pharmacist (%)** |
| At room temperature, in a dry place | 75 |
| In refrigerator, at +4°C | 9 |
| I don't know | 16 |
| **How should inhaler devices be cleaned?** | **Pharmacist (%)** |
| By using dry clothes | 64 |
| By using detergents and water | 9 |
| I don't know | 27 |
| **Do you think that you are providing adequate healthcare services in your pharmacy to ensure the rational use of drugs in the treatment of asthma and COPD?** | **Pharmacist (%)** |
| Yes, I think I am providing an adequate service | 48 |
| No, I do not think I am providing an adequate service | 52 |
| **In your pharmacy, do you teach the patients the inhalation technique of the prescribed devices?** | **Pharmacist (%)** |
| Always | 23 |
| Usually | 32 |
| Sometimes | 25 |
| Rarely | 12 |
| Never | 8 |
| **Which suggestions do you make to ensure the rational use of inhaler drugs and to increase the effectiveness of therapy in the treatment of asthma and COPD?** | **Pharmacist (%)** |

pharmacists should inform patients about inhaler drugs and devices, not pharmacy technicians, and 7% declared that it is the responsibility of physicians to inform patients about inhaler devices.

## DISCUSSION

The correct use of inhaler devices and adherence to prescribed therapy are critical components in the management of asthma and COPD. However, most patients do not use their inhaler de-

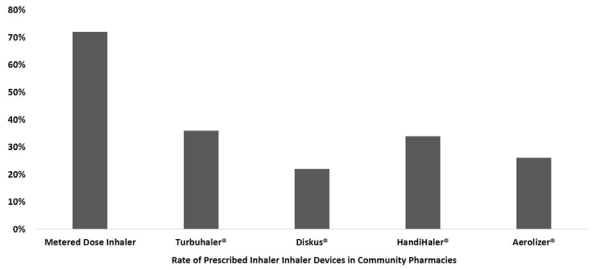


**Figure 1.** Most common inhaler devices prescribed for asthma and COPD patients.

The total percentage is higher than 100%, since respondents were able to select more than one device.

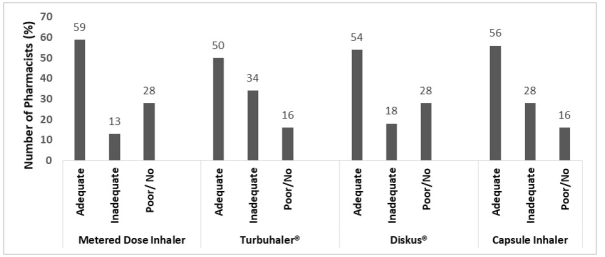


**Figure 2.** Rates of the knowledge levels of community pharmacists on the correct use of inhaler devices.

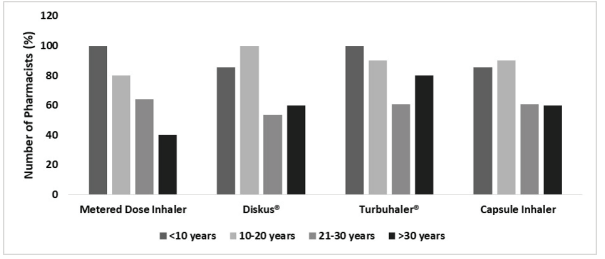


**Figure 3.** Relationship between years practicing as a community pharmacist and their knowledge on adequate use of inhaler devices.

There were no statistically significant differences between community pharmacists according to the practicing years (n=50). p=0.12 for Metered Dose Inhaler, p=0.66 for Diskus®, p=0.88 for Turbuhaler®, and p=0.64 for Capsule Inhaler.

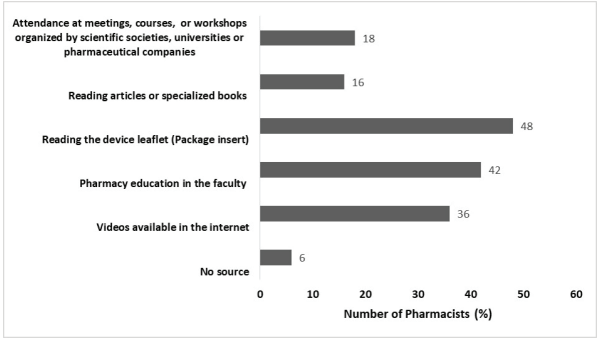


**Figure 4.** Source of knowledge on the inhaler device use among community pharmacists.

The total percentage is higher than 100%, because respondents were able to select more than one device.

vices correctly, and should be trained in terms of inhalation techniques (Melani et al., 2011; Chrystyn et al., 2017; Ruud et al., 2018). Community pharmacists, as being healthcare providers, are responsible for the correct use of medications, as is the prescribing physicians, to ensure that patients use inhaled drugs correctly. Pharmacists have important roles in education, training, and follow-up of the patients in terms of correct inhaler techniques, rational use of medications and in the management of asthma and COPD (Ballantyne, 2007; Benavides et al., 2009; Usmani et al., 2018). Therefore, this survey study aimed to examine inhaler device usage skills and practical knowledge of community pharmacists in Istanbul city and to assess the extent to which pharmacists have consulted this issue in terms of the rational drug use of in asthma and COPD patients.

In this study, more than half of the pharmacists who participated were aware of the most important steps in the correct inhalation techniques with MDI and DPIs and had adequate knowledge about the use of commonly used inhaler devices. However, about half of the respondents were lack of complete knowledge on their proper use. Overall, pharmacists demonstrated the same level of knowledge with all inhaler devices. Regarding the proper inhaler techniques among pharmacists, the MDI technique was slightly better than other inhaler devices. This may be because MDIs have been on the drug market for a long time. Pharmacists operating in community pharmacies for up to 20 years were more knowledgeable on the correct use of inhaler devices, however there was no significant difference according to the years in practice.

Numerous studies have been conducted around the world to elucidate the factors associated with inhaler technique errors and why mistakes are made by patients (Sanchis, Gich, & Pedersen, 2016; Chrystyn et al., 2017; Ruud et al., 2018; Makhinova, Walker, Gukert, Kalvi, & Guirguis, 2020). A high proportion of pharmacists from different countries also made mistakes in the usage steps of inhaler devices (Cain, et al., 2001; Basheti et al., 2011; Gemicioglu et al., 2014; Plaza et al., 2018). Common mistakes and problems in inhaler devices include the deficiencies in preparing the devices for use, lack of knowledge on how to turn on the device, how to load the dose and how to keep the device, inability to coordinate operation, not breathing out before inhalation, not breathing deeply and strongly, not holding the breath long enough when a second dose is required, not waiting for a half minute before repeating the dose, not breathing out through the nose after inhalation, not rinsing the mouth with water after inhaling a corticosteroid drug (Cain et al., 2001; Basheti et al., 2011; Gemicioglu et al., 2014; Plaza et al., 2018; Usmani et al., 2018; Makhinova et al., 2020).

This study's findings also revealed an alarming lack of knowledge among community pharmacists regarding the steps in the correct use of inhaler devices, as nearly half of them had inadequate, poor, or no knowledge on the correct use of inhaler devices. This study addressed some critical errors made by pharmacists in the use of various type of inhalers. The most critical and common lack of knowledge in pharmacists when using MDI were not shaking the device before use (34%) and not starting inhalation at the same time when pressing the canister to get the proper dose (38%), which are the most critical steps for adequate use of the device. More than half of the

pharmacists (58%) did not know how to load the drug into the Turbuhaler® and prepare it for inhalation. The most common and critical lack of knowledge in using the Turbuhaler® was not turning the colored base in two directions to load the dose into the device. Ten percent of the pharmacists thought that the drug was not inhaled when no taste was sensed during inhalation with the device, which may lead to the risk of overdose if the patient is misinformed. Twenty percent thought that if the Turbuhaler® was accidentally loaded multiple times before it was used, that the loaded dose was completely inhaled, and 36% had no knowledge, which may lead to noncompliance with treatment if the patient is misinformed. The most critical lack of knowledge among pharmacists in the use of Diskus® included not knowing how to turn on the device (27%) and load the drug dose for inhalation (33%). The most common mistakes with Capsule Inhaler use were not pressing the button to pierce the capsule (30%), not breathing deeply enough to hear the whirring sound or feel the vibration of the capsule (47%) and forgetting to open the mouthpiece to tip out the used capsule and discard (22%). Makhinova et al. showed that patients swallowed the capsules, did not know to load the capsule into the device, did not puncture the capsule, and did not release the puncture needle prior to inspiration while using the Capsule Inhaler (Makhinova et al., 2020). The pharmacists in our study also did not have the adequate knowledge of cleaning (24%) and storage (36%) of the devices. The study questionnaire focused on identifying the most problematic steps and common mistakes in the use of inhaler devices among community pharmacists. Gemicioglu et al. (2014) showed that in general the most common patient errors with inhaler devices were forgetting to hold their breath for 10 seconds after breathing in and not waiting 30-60 seconds before the second use of the device. In this study we found that the pharmacists lack of knowledge in how to load a drug dose and remind patients to breathe deeply and strongly.

In this study, the most common source of knowledge for inhaler device use among community pharmacists were to read the patient information leaflet (PIL) in the product package insert (48%), followed by faculty pharmacy education (42%), and videos for inhaler use available on the internet (36%). Only a few acknowledged attendance at meetings, courses, or workshops organized by scientific societies, universities, or pharmaceutical companies (18%), and reading articles or specialized books (16%). Our study shows that the instructions given by the pharmaceutical companies are not sufficient. It is highly recommended that attendance to appropriate and continuing education programs will enhance pharmacists' ability and knowledge on the correct use of different inhaler devices and improve the quality of counselling that patients receive.

Only half of the pharmacists thought that they provided adequate healthcare services to their patients in their pharmacies to ensure rational use of drugs in the treatment of asthma and COPD. About half of them did not find the service they provided sufficient. They believed that they could not educate patients adequately in the correct use of inhaler devices, and were not confident with their knowledge. While most of the participating pharmacists considered it their responsibility to teach patients how to use inhaled devices correctly, while a minority believed that it was the physicians' role. The time a physician spends with a patient counseling is very limited, resulting in fewer opportunities to educate patients in the correct use of their medication and inhaler devices. As community pharmacists are the most accessible healthcare providers, they have the opportunity to evaluate, train, and counsel patients on their medications and inhaler techniques. There are many studies in the literature showing the pivotal role of community pharmacists in the management of asthma and COPD, especially in inhaler technique training and adherence to medication. In these studies community pharmacists' educational interventions improved the adherence to the proper use and technique of inhalers, reduced the number of patients who made errors in the use of inhaler devices, decreased the need for medication and drug waste, and significantly reduced the frequency of exacerbations and hospitalizations (Hämmerlein, Müller, & Schulz, 2011; Hesso et al., 2016; Takemura et al., 2013; Ottenbros et al., 2014; Tommelein et al., 2014) According to this study's findings, only half of the pharmacists demonstrated the inhalation technique of the prescribed device to their patients at the pharmacy. For this reason, we suggest pharmacists should take a more active role in patient care and counseling as well as paying more attention to evaluating and educating their patients on the correct use of inhaler devices.

In conclusion, community pharmacists who participated in this survey may have limited knowledge regarding the use of inhaler devices and are not sufficiently qualified in the inhalation technique to effectively educate their patients about the correct use of different devices. In order to increase patient participation in pharmaceutical care for the management of asthma and COPD, community pharmacists' knowledge of inhaler uses and their attitudes towards inhaled therapy needs to be improved by further education, so that they can provide better patient counseling and training. This will help to minimize poor disease control and frequent emergency department visits, and thereby, alleviating the economic burden of the disease. Besides, the findings of consistent problems with certain steps among both patients and pharmacists may encourage the manufacturers to perform field testing early in the development of new inhaler devices, thus, making future inhalers easier to use. On the other hand, this study was performed in only one city with a small sample size; therefore, the results cannot be generalized. Studies in other locations with larger sample sizes are necessary. However, the results of the study can give pharmacists and other healthcare professionals an insight into ideal strategies for managing persistent asthma and COPD.

**Peer-review:** Externally peer-reviewed.

**Informed Consent:** Written consent was obtained from the participants.

**Author Contributions:** Conception/Design of Study- N.O., Z.P.K., B.S.U.D.; Data Acquisition- E.S.E.; Data Analysis/Interpretation- N.O., E.S.E., Z.K.P., B.S.U.D.; Drafting Manuscript- N.O., Z.P.K.; Critical Revision of Manuscript- N.O., Z.K.P., B.S.U.D..; Final Approval and Accountability- N.O., E.S.E., Z.K.P., B.S.U.D.

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