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Importance of inhaler device use status in the control of asthma in adults: ASIT (Asthma Inhaler Treatment) Study

Prof. Fusun Yildiz, M.D.[1], on behalf of the ASIT Study Group*

[1]Department of Pulmonary Diseases, Kocaeli University School of Medicine, Kocaeli, Turkey

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Address for correspondence:

Prof.Dr. Füsun Yıldız

Kocaeli Universitesi Tıp Fakültesi

Göğüs Hastalıkları Anabilim Dalı,

Umuttepe Merkez Yerleşkesi, 41380, Kocaeli, Turkey

Phone: +90 262 303 7007

Fax: +90 262 303 7003

E-mail: fusun.yildiz@gmail.com

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Abstract

Background: Proper education and training in correct inhalation technique has been reported to have a substantial role in the achievement of optimal therapeutic benefit and asthma control. The present study was designed to evaluate inhaler technique and the role of education in relation to asthma control among patients with persistent asthma in Turkey.

Methods: A total of 572 patients with persistent asthma (mean(SD) age:42.7(12.2) years, 76% were females) were included in this non-interventional observational registry study conducted across Turkey. Data on the effective and correct use of inhaler devices were collected via Ease of Use for the Inhaler Device Questionnaire to patients and physicians.

Results: Asthma control (overall 61.5% at baseline and increased to 87.3% during follow up) was better with significant improvement in technique and the decrease in basic errors to range of 0-1, regardless of the inhaler type. Overall, the most common basic error associated with inhalation maneuvers was failure to exhale before inhaling through the device (18.9%). There was concordance between patients and physician questionnaires in terms of ratio of correct inhaler technique only for spray type of inhalers.

Conclusion: Close follow up with repeated checking of patients' inhaler techniques with correction of the errors in each time by physicians seem to be associated with a significant decrease in percent of patients with basic errors in inhalation maneuvers and device-independent errors and the better control of persistent asthma.

Keywords: *Persistent asthma; inhaler treatment; inhaler technique; asthma control; questionnaire; Turkey*

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Introduction

Given the low level of disease control in many countries including Turkey confirmed by the epidemiological data, [1-3] finding the best way to assess asthma control and defining management strategies are the ongoing challenge in asthma management to ensure that asthma control is achieved and maintained.[4]

In line with the newly introduced asthma management approach which emphasizes the monitoring of disease control to facilitate acceptance and use of asthma guidelines in clinical practice,[5] use of combined therapies in which inhaled corticosteroids (ICS) are given mainly in combination with long-acting beta-2 -adrenoceptor agonists (LABA)[5-7] has been recommended. However, correct inhalation technique plays a vital role in effective asthma therapy alongside appropriate drug usage[8] which otherwise may lead to diminished therapeutic effect, poor control of symptoms and thereby insufficient disease management.[9]

Due to limited number of currently available validated questionnaires on inhaler techniques, there is a growing need for standardized questionnaires on identification and measurement of patient preferences for inhaler devices by means of development of such questionnaires and conduction of related studies may increase the asthma control rates.

Given the substantial role of proper education and training in correct inhalation technique on the achievement of optimal therapeutic benefit[9] and the improvement documented in the measures of asthma control by interventions to correct inhaler technique in patients with asthma,[10] the present real-life prospective ASIT (Asthma Inhaler Treatment) study was designed to evaluate patient inhaler technique and the role of education in relation to asthma control among patients with persistent asthma in Turkey based on "The Ease of Use for the Inhaler Device Questionnaire" completed by each investigator and patient to enable subjective (patients' judgment of their inhaler technique) and objective (physicians' check) evaluation on inhaler technique.

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Methods

Study population

Patients with persistent asthma were included in this national, multi-center, non-interventional, single arm prospective observational study conducted at 31 pneumology outpatient clinics across Turkey based on 4 consecutive visits performed at study enrolment (visit 1, month 0; n=572) and in the first (visit 2; n=477), third (visit 3; n=368) and sixth (visit 4; n=308) months of follow up to determine asthma control status in relation to inhaler therapy and inhaler technique. Female or male outpatients ≥18 years of age, diagnosed with persistent asthma at least for the last six months according to the GINA criteria,[5] received at least one dose of ICS and LABA either in separate or fixed combinations irrespective of pharmacological agent(s), followed-up for at least 6 months prior to the study were included. Presence of confirmed or suspected pregnancy, breastfeeding, co-morbid COPD, allergy/sensitivity or intolerance to any kind of asthma treatment, anti-Ig E treatment within the last 4 months, treatment with leukotriene receptor antagonists, hospitalization due to symptomatic respiratory infection of asthma within the last eight weeks, chronic diseases that likely to affect the prognosis negatively (e.g. carcinoma), chronic alcohol consumption and substance abuse were the exclusion criteria.

Written informed consent was obtained from each subject following a detailed explanation of the objectives and protocol of the study which was conducted in accordance with the ethical principles stated in the "Declaration of Helsinki" and approved by the institutional ethics committee.

Data collection

Following the patients' eligibility check in terms of inclusion/exclusion criteria, data on socio-demographic characteristics (age, gender, educational status, occupation), vital signs, physical examination findings, medical history, co-morbid disorders, concomitant treatments,

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characteristics and clinical course of asthma disease, asthma control and asthma treatment via inhaler device were collected at the initial enrollment visit. At baseline and consecutive three follow up visits, the Ease of Use for the Inhaler Device Questionnaire developed in house specifically for each inhaler device was applied to patients and physicians considering the effective use of inhaler devices. The Ease of Use for the Inhaler Device Questionnaire included items on the inhaler device type, appropriateness of the using techniques and patient compliance and completed by each investigator and patient to enable subjective (patients' judgment of their inhaler technique) and objective (physicians' check) evaluation on inhaler technique (Appendix 1).

Asthma control was determined by Asthma Control Test (ACT™) is one of the standard tests that have been developed for reflecting the patient's perspective for his/her disease and enables to determine asthma control levels, to predict exacerbations and to optimize the therapies of the patients.[11] ACT™ has been translated into Turkish and cultural adaptation has been completed.[12] In the present study, ACT™ filled in by patients was used to assess the level of asthma control in the 4 weeks preceding the enrollment considering an overall score of ≥20 controlled asthma, and a score <20 uncontrolled asthma.

Statistical analysis

Sample size was calculated to be 529 subjects in order that it could demonstrate the hypothesis that rate of controlled asthma is 25% within 95% confidence interval and with ±3.5% accuracy. A total of 635subjects were included in the study assuming that the rate of drop-out would be 20%.

Stata Data Analysis and Statistical Software (Version 10, StataCorp LP, 4905 Lakeway Drive, College Station, Texas 77845, USA) were used for statistical analysis. Data were expressed as "mean (standard deviation; SD)", and percent (%) where appropriate. Significance level

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during categorical comparison of the groups was evaluated by Chi-square test using cross table statistics. All tests were two-sided and $p<0.05$ was considered statistically significant.

Results

Patient demographics

The mean (SD) age of the patients included in the study was 42.7(12.2) years and 76% (n=435) were females. The majority of the patients (n=440; 76.9%) were primary-high school graduates and 61.9% were unemployed (55.8 % housewives) (Table 1). Mean (SD) duration of asthma from diagnosis was 8.0(8.3) years; 53.3% of the patients were diagnosed ≤5 years ago (Table 1). Active smokers presented 18.2% (n=104) of the patients (Table 1).

Inhaler device preferences in relation to age and educational level

The percentage of patients compliant to their inhaler device without need of treatment switch for discus, turbuhaler, solution spray and aerolizer type of inhalers was found to be 30.0, 29.9, 21.0 and 17.3% at baseline and 28.0, 31.3, 20.8 and 19.9% of patients at the final visit, respectively; with no significant difference between visit 1 and 4. Spray was the most preferred device as it was used by 52.7% of all patients and also among all age and education subgroups at baseline (Table 2). Indeed, inhaler use was evenly distributed to age subgroups regardless of the type of the inhaler; but there was significant relationship between educational status and discus and turbuhaler use ($p=0.002$ and 0.014, respectively); discus was preferred among illiterates, and vice versa was true for turbuhaler (Table 2).

Asthma control status from baseline to last visit in terms inhaler treatment

Overall, asthma was determined to be controlled in 61.5% of the patients at baseline and increased to 87.3% during follow-up. When compared to baseline, the rate of uncontrolled asthma was determined to be significantly decreased at visit 4 in patients under treatment with fixed-dose combinations including “fluticasone / salmeterol discus” (38.2% vs. 11.4%, $p<0.001$), “beclomethasone / formoterol solution spray” (32.7% vs. 10.0%, $p<0.001$),

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"budesonide / formoterol turbuhaler"(41.7% vs. 14.9%, p<0.001) while there was no difference in uncontrolled asthma rates with the use of "budesonide + formoterol aerolizer (separate inhaler devices)" (42.9% vs. 23.5%, p=0.131) (Table 3).

Basic errors in inhaler technique throughout the study according to inhaler types

Overall; at baseline, failure to exhale before inhaling through device was the most common (18.5%) error in inhalation maneuvers mostly in aerolizer (28.9%) and discus (20.6%) type of inhalers. Exhalation during inhalation was common with turbuhaler (14.1%) followed by discus (11.4%). Failure to rinse mouth after inhaling the drug was the leading (16.8%) device-independent error (Table 4).

Among the most common inhaler device-specific errors in inhalation maneuvers ; failure to exhale before inhaling through the device was highly common at aerolizer (28.9%.) and discus (20.6%); exhalation during inhalation was higher at turbuhaler (14.1%) and discus (11.4%) and failure to hold breath was a common error among all devices dominated at aerolizer by 18.7% (Table 3).

After physician training, there was a significant decrease in basic errors in inhalation technique identified by patients including failure to exhale before inhaling through the device (18.5% at visit 1 vs. 6.5% at visit 4, p<0.001), failure to hold breath for 5-10 seconds after the inhalation (13.6% at visit 1 vs. 3.7% at visit 4, p<0.001), and failure to rinse mouth with water after inhaling the drug (16.8% at visit 1 vs. 5.6% at visit 4, p<0.001) (Table 4).

Asthma control status in relation to number of basic errors in inhalation technique

Based on data from physician and patient questionnaires, it was determined that when the number of basic errors decreased to 0-1, the control of asthma increased for each specific type of inhaler device (Table 5). Patient and physician questionnaires were compatible in terms of

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percent of controlled and uncontrolled asthma patients with 0-1 error at visit 1 and visit 4 (Table 5).

Past training on inhaler technique and arbitrary dose-adjustment by patients

Although majority of patients identified that they have learned the inhaler technique from a specialist physician for each type of inhalers and with percentages increased from visit 1 to 4, pharmacists, nurses/physiotherapists/technicians, family physicians and a relatives/friends composed the other trainers with percentages decreased from visit 1 to 4 (Table 6). Practice-based learning was more common than theory-based learning in each type of inhaler with a gradual increase in favor of practice-based learning throughout the study. While decreased from visit 1 to 4, more than one-third of patients identified that their inhaler technique was not checked in terms of appropriate application by an observant trainer (Table 6).

Discussion

The principal findings of this real-life prospective ASIT study revealed higher efficacy in asthma control and better patient compliance with fixed dose combinations in patients with persistent asthma in Turkey, while the basic errors in inhalation technique consisted of failure to exhale before inhaling through the device (18.5%), exhalation during inhalation (10.5%), failure to hold breath after the inhalation (13.9%). There was significant improvement in correct application of the technique from visit 1 to 4 for turbuhaler and aerolizer type of inhalers and better control of asthma with decrease in the number of basic errors to range of 0-1, for each specific type of inhaler device.

International guidelines for the management of COPD do not differentiate between various inhaler devices[13] indicating that device selection should be based on the availability, cost of the device, patient and physician preference, and clinical setting.[10] Accordingly, fixed-dose

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combination inhaler types were equally effective on asthma control in our study population with decrease in uncontrolled asthma rates from baseline to 6th month in asthma patients.

The good compliance to asthma inhaler device treatment during follow-up and satisfaction with the relief provided by the inhaler therapy in majority of our patients indicate the role of close follow-up in achievement of better asthma control rates and emphasize the bi-directional positive relation between asthma control and treatment satisfaction.

Given that our patients were suffering from asthma for an average of 8 years, the finding that basic errors in inhaler technique ranged from 10.5 to 18.5% at baseline is worth noting. Likewise, failure to rinse mouth with water after inhaling the drug was the most commonly identified device-independent error and no significant improvement was obtained in terms of specific inhaler types.

Increase in asthma control rates by appropriate use of inhalers by higher percent of patients in our study population is critical given that albeit technical features of inhaler devices have improved constantly with time, the effectiveness in delivering drugs to the lungs has been considered to depend on correctly performed inhalation maneuvers[9] with negative outcomes of incorrect use of inhalers most pronounced among patients with poor inspiration maneuvers.[14,15] Hence, errors in inhalation maneuvers in our study population emphasize the consequent substantial reduction in the delivery and effectiveness of the medication.[16]

However, despite the risk of insufficient drug delivery that may lead to poor drug efficacy and inadequate control of asthma, incorrect use of inhalers has been indicated to be seriously underestimated by healthcare professionals.[9]

Each clinician and service provider has been recommended to have knowledge and to take responsibility to either teach directly or refer the patient to an available resource in the community who has proven skills in patient instruction.[16]

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Given the fact that proper education is the norm rather than the exception, it should be emphasized that while the primary responsibility for patient education rests with the prescribing clinician and the dispensing pharmacist, the entire health-care team has a role and responsibility to assure that the patient is capable of effective self-management.[16]

Published studies from around the world suggest that lack of patient education on inhaler use in 25% of patients with asthma, while often rushed and poor quality education in others without reinforcement with almost always of less than 10 min duration with no follow-up assessment and education in most cases.[9] Notably, although majority of our patients identified that they have learned the inhaler technique from a specialist physician for each type of inhalers, albeit decreased from visit 1 to visit 4, more than one-third of them identified that their inhaler technique was not checked in terms of appropriate application by an observant trainer.

Our finding strongly correlates with the consistently reported fact that patients' inhaler technique can be improved by education from a health professional or other person trained in correct technique and the amount of instruction on inhaler technique given by health care professionals influences patients' likelihood of correct technique.[10,17] Besides, training was indicated to result in a more efficient use of inhaler therapy only if the training sessions are repeated, and the results checked at regular intervals.[9]

Notably, a high proportion (31–85%) of health professionals was reported to show incorrect technique when tested objectively with similar results obtained between doctors, nurses and community pharmacists.[18] Hence, health professionals, especially prescribing clinicians and the dispensing pharmacists who have the primary responsibility for patient education should also make sure their own knowledge of correct technique is up to date before assuming their own technique is correct.[18]

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Given the increase in asthma control rates in case of decrease in basic errors to the range of 0-1 in our study population in each inhaler device, patient training on inhaler technique seems to be essential in achievement of better asthma control rates. Moreover, the likelihood of basic errors in most of asthma patients emphasizes the importance of evaluation considering inhaler technique of each type of inhaler device regardless of the asthma age.

Therefore, inhalation devices with feedback mechanisms which guide patients through the correct inhalation maneuver would be ideal for an improved inhalation technique and, thereby, more appropriate asthma management.[9]

Besides, compatibility of scores obtained in patient and physician questionnaires in terms of the role of correct inhaler technique on asthma control in our study seem to indicate that the Ease of Use for the Inhaler Device Questionnaire are worth to validate in the future.

Conclusion

In conclusion, the real-life prospective ASIT study revealed that the asthma control rate increased during follow up in adult outpatients with persistent asthma, moving from 61.5% to 87.0% after 6 months, regardless of patient demographics, smoking, educational, or employment status.[19] The findings we present here, indicate higher efficacy of fixed dose combinations in achievement of asthma control and patient compliance to asthma inhaler device treatment, while the basic errors in inhalation technique consisted mainly of inhalation maneuvers and decrease in the number of basic errors to range of 0-1 was associated with better control of asthma, regardless of the inhaler type. There was a concordance between the results of patients and physician questionnaires in terms of correct inhaler technique only for spray type of inhalers. In this regard, providing data on the positive role of regular monitoring in better clinical efficacy and disease control via achievement of good compliance to inhaler treatment and proper handling of inhalers in asthma patients, our findings emphasize the crucial role of regular assessment and reinforcement of correct inhalation technique by entire

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health-care team particularly the prescribing clinician and the dispensing pharmacist who have primary responsibility for patient education and should themselves retain the skills to operate the various devices.

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***ASIT Study Group** (by the physician's name in descending order of number of patients enrolled):

Yıldız F, Study Coordinator (Department of Pulmonary Diseases, Kocaeli University School of Medicine, Kocaeli)

Erbagci A (Zonguldak Uzun Mehmet Chest Diseases Hospital, Zonguldak

Demirel YS (Department of Chest Diseases, Ankara University, School of Medicine, Ankara)

Akcalı SD (Chest Diseases Clinic, Ankara Dıskapı Yıldırım Beyazıt Hospital, Ankara)

Ekici A (Department of Chest Diseases, Kirikkale University, School of Medicine, Kirikkale)

Dursunoglu N (Department of Chest Diseases,Pamukkale University School of Medicine,Denizli)

Ediger D (Department of Chest Diseases, Uludag Uni¬versity, School of Medicine, Bursa)

Erdinc M (Department of Chest Diseases, Ege University, School of Medicine, Izmir)

Cemri SC (Chest Diseases Clinic, Mersin State Hospital, Mersin)

Kalyoncu AF (Department of Chest Diseases, Hacettepe University, School of Medicine, Ankara)

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Guclu SZ (Dr. Suat Seren Chest Diseases Hospital, Izmir)

Aktogu S (Dr. Suat Seren Chest Diseases Hospital, Izmir)

Bayramgurler B (Chest Diseases Clinic, Derince Research and Training Hospital, Kocaeli)

Bayram M (Chest Diseases Clinic, Sivas Numune Research and Training Hospital, Sivas)

Akgun M (Department of Chest Diseases, Erzurum Atatürk University, School of Medicine, Erzurum)

Mirici A (Department of Chest Diseases, Canakkale 18 March University, School of Medicine, Canakkale)

Akyildiz L (Chest Diseases Clinic, Private Park Hospital, Mardin)

Celik P (Department of Chest Diseases, Celal Bayar University, School of Medicine, Manisa)

Guven AO (Nihat Kitapci Chest Diseases Hospital, Erzurum)

Camsari G (Yedikule Chest Diseases Hospital, Istanbul)

Ozseker F (Sureyyapasa Chest Diseases Hospital, Istanbul)

Cimen F (Atatürk Chest Diseases Hospital, Ankara)

Kurutepe M (Sureyyapasa Chest Diseases Hospital, Istanbul)

Senyigit A (Department of Chest Diseases, Dicle University, School of Medicine, Diyarbakir)

Bektas Y (Trabzon Chest Diseases Hospital, Trabzon)

Ozbudak O (Department of Chest Diseases, Akdeniz University, School of Medicine, Antalya)

Saylan B, Baslilar S (Chest Diseases Clinic, Umraniye Research and Training Hospital, Istanbul)

Polatli M (Department of Chest Diseases, Adnan Menderes University, School of Medicine, Aydin)

Cagatay T (Department of Chest Diseases, Istanbul University, Istanbul School of Medicine, Istanbul)

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Kalkan S (Chest Diseases Clinic, Private Batman Hospital, Batman)

Ozer A (Chest Disease Clinic, Cukurova State Hospital, Adana)

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TABLES (1-6)

Table 1. Socio-demographic characteristics of patients (n=572)

Age (years)	**Mean(SD)**	42.7(12.2)
Age categories (years)		
18-40		252(44.1)
41-60	**n(%)**	272(47.6)
>60		48(8.4)
Gender	**n(%)**	
Male		137(24.0)
Female		435(76.0)
Time from asthma onset (years)	**Mean(SD)**	8.0(8.3)
Age categories (year)		
≤5		305 (53.3)
>5 to ≤10	**n(%)**	118 (20.6)
>10 to ≤15		59 (10.3)
>15		90 (15.7)
Active smoking	**n(%)**	104 (18.2)
Educational status		
Illiterate		28(4.9)
Primary-high school	**n(%)**	440(76.9)
University		104(18.2)
Employment status		
Unemployed		354(61.9)
Employed	**n(%)**	210(36.7)
Missing		8 (1.4)

SD: Standard deviation

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Table 2. Inhaler device preferences in relation to age and educational level

	Type of inhaler device											
	Spray[a]			Discus			Turbuhaler			Aerolizer		
Age groups	**n**	**%[b]**	P value[c]	**n**	**%[b]**	P value[c]	**n**	**%[b]**	P value[c]	**n**	**%[b]**	P value[c]
18-39 years (n=236)	128	54.2		64	27.1		73	30.9		37	15.7	
40-59 years (n=285)	151	53.0	0.493	90	31.6	0.378	84	29.5	0.865	52	18.2	0.670
>60 years (n=51)	23	45.1		18	35.3		14	27.5		10	19.5	
TOTAL	302			172			171			99		
Educational status	**n**	**%**		**n**	**%**		**n**	**%**		**n**	**%**	
Illiterate (n=28)	16	57.1		17	60.7		2	7.1		6	21.4	
Primary-high school (n=440)	231	52.5	0.851	134	30.5	**0.002**	132	30.0	**0.014**	76	17.3	0.819
University (n=104)	55	52.8		28	20.2		37	35.6		17	16.3	
TOTAL	302			179			171			99		

[a] controller + rescue
[b] % of all patients in the age / educational status subgroup
[c] Chi-square test

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Table 3. Asthma control status in relation to inhaler types assessed by physicians

	Visit 1(month 0)			Visit 4 (month 6)			
	Total (n=572)	Asthma control status		**Total (n=308)**	Asthma control status		p value*
		Controlled (ACT≥20, n=352)	Uncontrolled (ACT<20, n=220)		Controlled (ACT≥20, n=269)	Uncontrolled (ACT<20, n=39)	
According to inhaler types used							
Fixed-dose combinations				n(%)			
FP/S Discus	152(26.6)	94(61.8)	58(38.2)	79(25.6)	70(88.6)	9(11 .4)	<0.001
BDP/F Solution spray	107(18.7)	72(67.3)	35(32.7)	60(19.5)	54(90)	6(10.0)	<0.001
B/F Turbuhaler	156(27.3)	91(58.3)	65(41.7)	87(28.2)	74(85.1)	13(14.9)	<0.001
Separate inhalers				n(%)			
B+ F Aerolizer	84(14.7)	48(57.1)	36(42.9)	51(16.6)	39(76.5)	12(23.5)	0.131
B+ F Easyhaler	21(3.8)	14(66.7)	7(33.3)	8(2.6)	8(100.0)	0(0.0)	**

ACT: asthma control test; B: budesonide; BDP: beclometasone dipropionate; F: formoterol; FP: fluticasone propionate; S: salmeterol.
*rate of uncontrolled asthma visit 1 vs. visit 4; Chi square test
**no statistical analysis was done because of small number of patients.

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Table 4**.** Basic errors in inhaler technique according to inhaler types

	Basic errors in inhaler technique											
	Failure to exhale before inhaling through the device			Exhalation during inhalation			Failure to hold breath for 5-10 seconds after the inhalation			Failure to rinse mouth with water after inhaling the drug		
	n/N	%	P value*	n/N	%	P value*	n/N	%	P value*	n%N		P value*
Solution spray												
Visit 1	**9/88**	10.2	0.118	4/88	4.5	-	11/90	12.2	0.184	13/89	14.6	0.417
Visit 4	1/42	2.4		0/41	0.0		2/42	4.8		4/42	9.5	
Discus												
Visit 1	27/131	20.6	0.072	15/132	11.4	0.159	18/132	13.6	0.164	27/132	20.5	0.139
Visit 4	**6/60**	10.0		3/60	5.0		4/60	6.7		7/60	11.7	
Turbuhaler												
Visit 1	23/144	16.0	**0.015**	20/142	14.1	**0.013**	17/145	11.7	-	25/145	17.2	-
Visit 4	3/69	4.3		2/69	2.9		0/69	0.0		0/69	0.0	
Aerolizer												
Visit 1	22/76	28.9	**0.010**	7/76	9.2	0.330	14/75	18.7	**0.026**	9/75	12	0.060
Visit 4	4/45	8.9		2/45	4.4		2/45	4.4		1/45	2.2	
TOTAL												
Visit 1	81/439	18.5	<0.001	46/438	10.5	0.1488	60/442	13.6	<0.001	74/441	16.8	<0.001
Visit 4	14/216	6.5		7/215	3.3		8/216	3.7		12/216	5.6	

*Chi-square test

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Table 5. Asthma control status in relation to number of basic errors in inhalation technique

		Visit 1		Visit 4		
		0-1 error	>1 error	0-1 error	>1 error	
Physician questionnaires*		n(%)				p value**
Aerolizer						
	ACT ≥20	42(59.2)	11(68.8)	41(82.0)	1(100.0)	0.008
	ACT<20	29(40.8)	5(31.2)	9(18.0)	0(0.0)	
Discus						
	ACT ≥20	72(66.1)	22(51.2)	55(88.7)	3(60.0)	0.001
	ACT<20	37(33.9)	21(48.8)	7(11.3)	2(40.0)	
Solution spray						
	ACT ≥20	13(61.9)	49(62.8)	17(100.0)	20(90.9)	<0.001
	ACT<20	8(38.1)	29(37.2)	0(0.0)	2(9.1)	
Turbuhaler						
	ACT ≥20	82(58.6)	19(61.3)	70(85.4)	1(100.0)	<0.001
	ACT<20	58(41.4)	12(38.7)	12(14.6)	0(0.0)	
Patient questionnaires*						
Aerolizer						
	ACT ≥20	37(61.7)	17(58.6)	33(80.5)	9(90.0)	0.044
	ACT<20	23(38.3)	12(41.4)	8(19.5)	1(10.0)	
Discus						
	ACT ≥20	62(63.3)	32(59.3)	50(86.2)	7(87.5)	0.002
	ACT<20	36(36.7)	22(40.7)	8(13.8)	1(12.5)	
Solution spray						
	ACT ≥20	8(88.9)	65(57)	8(100.0)	36(92.3)	-
	ACT<20	1(11.1)	49(43)	0(0.0)	3(7.7)	
Turbuhaler						
	ACT ≥20	42(64.6)	60(56.1)	57(87.7)	14(82.4)	0.002
	ACT<20	23(35.4)	47(43.9)	8(12.3)	3(17.6)	

ACT: asthma control test; B: budesonide; BDP: beclometasone dipropionate; F: formoterol; FP: fluticasone propionate; S: salmeterol.

*Physician vs patient evaluation:
Visit 1: aerolizer p=0.771; discus p=0.674; turbuhaler p=0.414
Visit 4: aerolizer p=0.086; discus p=0.669; turbuhaler p=0.686
Chi-square test
No comparison for solution spray was done because of small numbers of patients in some of the cells

**Visit 1 vs Visit 4 for 0-1 error; Chi-square test

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Table 6. Past training on inhaler technique and arbitrary dose-adjustment by patients

	Spray		Discus		Turbuhaler		Aerolizer	
	Visit 1	Visit 4	Visit 1	Visit 4	Visit 1	Visit 4	Visit 1	Visit 4
Learned inhaler technique from				**n(%)**				
Family physician	9(4.5)	3(3.3)	6(3.4)	2(2.9)	3(1.6)	0(0.0)	3(3.0)	0(0.0)
Specialist physician	133(66.8)	79(87.8)	125(71.4)	61(88.4)	139(74.7)	79(87.8)	70(69.3)	51(96.2)
Nurse, physiotherapist or technician	12(6.0)	0(0.0)	7(4.0)	1(1.4)	11(5.9)	4(4.4)	7(6.9)	0(0.0)
Nobody	3(1.5)	0(0.0)	1(0.6)	0(0.0)	1(0.5)	1(1.1)	1(1.0)	0(0.0)
Pharmacist	27(13.6)	8(8.9)	23(13.1)	4(5.8)	20(10.8)	3(3.3)	10(9.9)	1(1.9)
Relative/friend	7(3.5)	0(0.0)	7(4.0)	1(1.4)	2(1.1)	0(0.0)	5(5.0)	0(0.0)
Information brochure	8(4.0)	0(0.0)	6(3.4)	0(0.0)	10(5.4)	3(3.3)	5(5.0)	1(1.9)
Learned inhaler technique via								
Practical application	140(82.4)	77(93.9)	120(81.6)	63(95.5)	123(74.1)	80(97.6)	66(77.6)	48(94.1)
Theoretical explanation	30(17.6)	5(6.1)	27(18.4)	3(4.5)	43(25.9)	2(2.4)	19(22.4)	3(5.9)
Trainer checked the correctness of technique								
Yes, a few times	78(45.9)	65(79.3)	0(0.0)	0(0.0)	46(27.7)	68(82.9)	29(33.3)	41(80.4)
Yes, only once	36(21.2)	13(15.9)	105(70.0)	61(93.8)	48(28.9)	12(14.6)	26(29.9)	8(15.7)
No	56(32.9)	4(4.9)	45(30.0)	4(6.2)	72(43.4)	2(2.4)	32(36.8)	2(3.9)
Satisfied with the relief provided by the inhaler	92(95.8)	43(100.0)	138(93.2)	66(100.0)	156(92.3)	80(96.4)	81(94.2)	47(92.2)