

Patient Preference in the Choice of Dry Powder Inhalers

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OBJECTIVE: To investigate a group of patients' preferences among 3 dry powder inhalers—Accuhaler[®], Easyhaler[®], and Turbuhaler[®]—and to analyze the features that were most important for motivating choices.

MATERIAL AND METHOD: The study enrolled 30 patients with stable asthma with a mean (SD) age of 40 (13) and who habitually used inhaled corticosteroids. The patients were shown in detail how to use each of the devices and were randomized to begin using them in different orders. After using each inhaler for a week, the patients assessed 9 different features on a scale of 0 to 10 with an independent observer. The patients were asked to put the inhalers in order of preference, and finally to demonstrate they could use them correctly.

RESULTS: All patients correctly performed the inhalation maneuver at the beginning and the end of the study. The mean final scores out of 90 of the 9 features evaluated were 75 (13) for the Easyhaler, 67 (12) for the Accuhaler, and 65 (14) for the Turbuhaler. Differences were statistically significant between the first and the second device ($P=0.02$) and the first and the third ($P=0.001$) but not between the Accuhaler and the Turbuhaler ($P=0.376$). Mean rating scores were 8.6 (1.4) for the Easyhaler, 7.3 (1.9) for the Turbuhaler, and 7.1 (1.6) for the Accuhaler. The Easyhaler was the first choice for 53% of patients, the Turbuhaler for 27%, and the Accuhaler for 20%.

CONCLUSIONS: The Easyhaler was rated the highest by the patients in the study. The scores were a long way from the maximum score, so research into developing an ideal inhaler must continue.

Key words: Asthma. Dry powder inhalers. Preferences.

Preferencias de los pacientes en la elección de dispositivos de inhalación en polvo

OBJETIVO: Conocer las preferencias de un grupo de pacientes acerca de 3 dispositivos de inhalación en polvo—Accuhaler[®], Easyhaler[®] y Turbuhaler[®]—y analizar los aspectos más importantes que motivan su elección.

MATERIAL Y MÉTODO: Se estudió a 30 pacientes de 40 ± 13 años, asmáticos y estables, que se administraban habitualmente corticoides inhalados. Se les explicó detalladamente la técnica de utilización de cada uno de los dispositivos y, de forma aleatoria, se asignó el orden en que debían utilizarlos. Tras una semana de usar cada uno de los dispositivos, un observador independiente evaluó 9 aspectos distintos de los dispositivos, valorados de 0 a 10 puntos. Se pidió a los pacientes que determinaran el orden de preferencia y finalmente se evaluó la técnica de utilización.

RESULTADOS: Todos los pacientes realizaron correctamente la técnica de inhalación, al principio y al final del estudio. Las puntuaciones totales de los 9 aspectos evaluados, sobre 90 puntos, fueron de 75 ± 13 puntos para Easyhaler, de 67 ± 12 para Accuhaler y de 65 ± 14 para Turbuhaler. Las diferencias fueron estadísticamente significativas entre el primero y el segundo ($p = 0,02$) y entre el primero y el tercero ($p = 0,001$), pero no para Accuhaler y Turbuhaler ($p = 0,376$). Las medias de los valores fueron de $8,6 \pm 1,4$ para Easyhaler, de $7,3 \pm 1,9$ para Turbuhaler y de $7,1 \pm 1,6$ para Accuhaler. El 53% de los pacientes escogió el dispositivo Easyhaler, el 27% el Turbuhaler y el 20% el Accuhaler.

CONCLUSIONES: El dispositivo Easyhaler fue el mejor valorado por los pacientes evaluados. Las puntuaciones obtenidas para cada dispositivo distan de la puntuación máxima, por lo que deberá continuar investigándose para obtener el inhalador ideal.

Palabras clave: Asma. Inhaladores en polvo. Preferencias.

Introduction

Patients with chronic diseases under prolonged treatment tend to have poor adherence to medication.¹⁻³ Asthma is a chronic respiratory disease in which we can

see this tendency, partly explained by differences in the types of medication used. Bronchodilators, on the one hand, have an almost immediate effect, and are used assiduously; the effect of antiinflammatory treatment, however, is delayed and adherence is poor.⁴

Several approaches, invariably involving more time spent to inform and educate the patient about the disease and its treatment, have been suggested with the aim of improving acceptance of therapy and adherence.⁵ Results, however, have been mixed and depend on the objectives and the programs used. Among the many

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possible ways of increasing acceptance of therapy and adherence, according to some authors one might be allowing the patient to choose the inhalation device. The Global Initiative for Asthma (GINA) guidelines⁶ recommend that the patient be shown several devices and participate in the decision over which one is better for him. This study was designed to examine the therapeutic preferences of a group of asthmatic patients among 3 dry powder inhalers and, at the same time, to examine which features were considered the most important when making the selection.

Material and Methods

Study Design

A prospective, descriptive study was designed to examine the preferences of a group of patients among 3 dry powder inhalers: Accuhaler[®] (GSK, United Kingdom), Easyhaler[®] (Orion Pharma, Finland) and Turbuhaler[®] (Astra-Zeneca, Sweden).

Patients

A total of 30 asthmatics were enrolled—20 women (67%) and 10 men (33%)—all of whom had come consecutively to our clinic. All were stable asthmatics who habitually used inhaled corticosteroids with devices bought at the pharmacy and had done so for at least 6 months prior to enrolling in the study. Mean (SD) age was 40 (13) years (range, 20-71 years). Twenty-five patients (83%) had prior experience with 1 of the study devices. Seven patients (23%) were using the Accuhaler, 4 (13%) the Easyhaler, and 14 (47%) the Turbuhaler. The 5 remaining patients were using pressurized metered-dose canisters with holding chambers. None of the patients regularly used two or more of the devices studied.

Procedure

Patients were informed of the nature of the study and gave their written consent to participate. Patients under 18 years of age and those with impaired coordination which could interfere with the use of inhalation devices were excluded from the study. One of the authors, appropriately trained, gave a detailed and individual explanation of the technique for using each device.⁷ The inhalation technique was demonstrated to the patients using devices with placebo and, finally, the patients were asked to try out the devices and any errors in technique were corrected. Published recommendations⁸ were followed, and, in the case of the Easyhaler, the manufacturer's recommendations. As a result, all patients used the devices correctly at the beginning of the study.

Each patient was randomly assigned the order in which they were to use the devices, each of which was used for 1 week with the corresponding dose adjustment. After 3 weeks, the patients were interviewed at the clinic to determine the device they preferred. The interview was conducted by a different researcher from the one who had instructed them in technique.

Features Assessed

Patients were presented the devices one by one in random order and asked to rate each on a scale from 0 to 10, with

TABLE
Features, Rated From 0 to 10, for Each
of the Devices Studied

Perception of inhalation
Use of the device
Ease of holding
Size
Weight
Discreetness
Comfortable mouthpiece
Dose counter
Ease of cleaning

respect to 9 features (Table). The order of presentation was independent of the order in which the devices had been used. Patients were then asked to give an overall rating, again from 0 to 10, of each device and put them in order of preference. Finally they were asked to give a practical demonstration of each device with placebo to confirm their use of the correct technique.

Statistical Analysis

Values are expressed as means (SD). Analysis of variance was used to compare the 3 devices, and each 2 devices were compared using paired Student *t* tests. The Spearman rank correlation coefficient was used to analyze the relations between variables. In all cases, differences were considered significant when *P* was less than .05. The Windows program SPSS version 10.0 was used for statistical analysis.

Results

All patients used the 3 devices correctly at the beginning and end of the study. Mean (SD) overall scores for the inhalers (out of a possible 90 points for all features) were 75 (13) for the Easyhaler, 67 (12) for the Accuhaler, and 65 (14) for the Turbuhaler. Significant differences were found between the scores of the first and the second device (*P*=.02), and between the first and the third (*P*=.001) but not between the Accuhaler and the Turbuhaler (*P*=.376).

The mean overall assessment on the scale of 0 to 10 for each device was 7.1 (1.6) for the Accuhaler, 8.6 (1.4) for the Easyhaler, and 7.3 (1.9) for the Turbuhaler. Differences were not statistically significant between the Accuhaler and the Turbuhaler (*P*=.751) but were significant between the Easyhaler and the Accuhaler (*P*=.003) and the Easyhaler and the Turbuhaler (*P*=.015).

When the patients were asked to put the devices in order of preference, the Easyhaler was first choice for 16 (53%), the Turbuhaler for 8 (27%), and the Accuhaler for 6 (20%).

The Figure shows the scores of the 9 features analyzed for each of the devices. No significant differences were found for use of the device, ease of holding, and ease of cleaning; there were significant differences between the Accuhaler and Easyhaler with respect to the Turbuhaler for perception of inhalation (*P*<.0001 in both cases). Regarding size, there were no differences between the Easyhaler and the Turbuhaler (*P*=.108) but there were

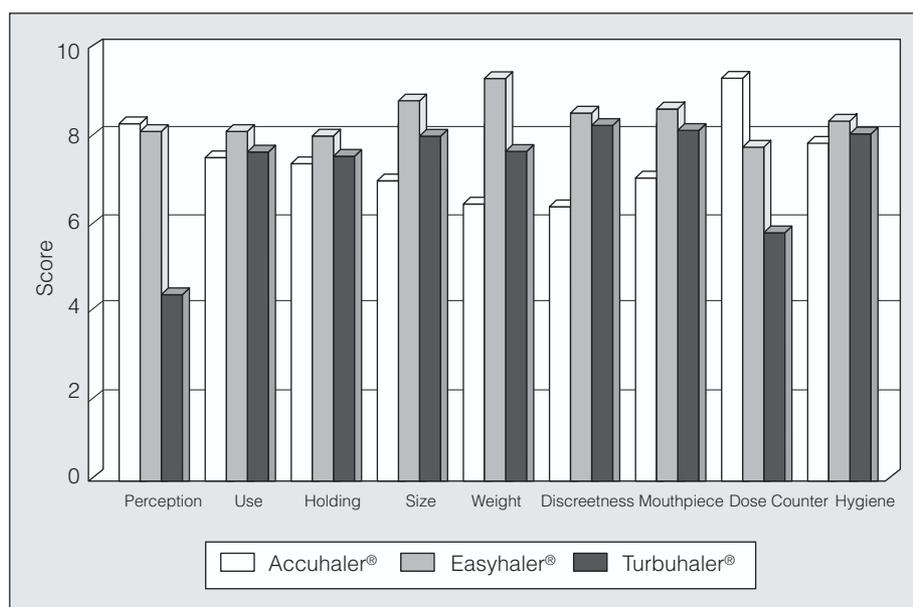


Figure. Scores of the features assessed for each of the devices studied.

differences between the Easyhaler and the Accuhaler ($P<.0001$) and between the Turbuhaler and the Accuhaler ($P=.038$). Regarding discreetness, there were no differences between the Easyhaler and the Turbuhaler ($P=.326$) but there were differences between the Easyhaler and the Accuhaler ($P<.0001$) and the Turbuhaler and the Accuhaler ($P=.004$). The Easyhaler's mouthpiece was found to be more comfortable than the Accuhaler's ($P<.0001$) but there were no significant differences between the Easyhaler and the Turbuhaler ($P=.141$) or the Accuhaler and the Turbuhaler ($P=.072$). The Accuhaler dose counter was the highest rated and was considered significantly better than either the Easyhaler or the Turbuhaler ($P<.0001$ in both cases); the Easyhaler was significantly better than the Turbuhaler ($P<.0001$).

Discussion

The asthmatic patients in our study judged the Easyhaler to be the most satisfactory device on all the scales used. The other inhalers (Turbuhaler and Accuhaler) received acceptable ratings from the patients and, in general, there were minimal differences between them.

The stated choice of preferred inhaler corresponded exactly to the mean scores obtained for all the features analyzed.

Several authors have compared patient preferences among various drug inhalers, though none have compared the same three as this study. Brown et al⁹ compared the Accuhaler and the Turbuhaler for ease of use and portability with a group of 36 asthmatic patients, finding no differences between them. Vilsvik et al¹⁰ found a general preference for the Turbuhaler over the

Accuhaler in a study of 159 patients. Gioulekas et al¹¹ compared patient preferences for the Turbuhaler in comparison with the Accuhaler with 32 asthmatic patients and found that 44% preferred the Turbuhaler whereas 16% preferred the Accuhaler, although the difference was not significant. Wettengel et al,¹² compared the Accuhaler with the Easyhaler in a group of 185 asthmatic patients, using an eleven-point questionnaire. Patients rated the Easyhaler higher on 8 questions. Jager et al¹³ studied the acceptance of and preference for the Turbuhaler in comparison with the Easyhaler in a group of 79 powder-naïve asthmatic patients. They found that 59% preferred the Easyhaler, 33% chose the Turbuhaler, and 7% rated them the same. Zetterstrom et al,¹⁴ studying a group of 32 patients with asthma and/or bronchial hyper-reactivity, observed that 65% found the Easyhaler very easy to use and 35% found it easy. Out of 16 patients who had previously used the Turbuhaler, 16% rated the Easyhaler much better, 44% rated it better, and 38% rated it as high as the Turbuhaler. Tukiainen et al¹⁵ compared acceptance of devices, together with other factors, among a group of asthmatic patients (103 used the Easyhaler and 58 the Turbuhaler). The Easyhaler was found to be better accepted than the Turbuhaler in that study. Serra-Batlles et al¹⁶ found that their powder-naïve patients preferred the Accuhaler over the Turbuhaler and, in particular, valued the dose counter, ease of use, design, and the attached cover. Features appreciated about the Turbuhaler included its small size, discreetness, and ease of holding, and those features were rated highly in our study too. Schweisfurth et al¹⁷ studied the acceptance of 2 inhalers in a group of asthmatic patients (159 used the Easyhaler and 167 the Turbuhaler) and also found the former better accepted than the latter.

Based on the opinions expressed by the patients in our study, the features of the inhalers can be described as follows:

– Accuhaler: marked perception of drug inhalation, accessible dose counter, easy to use, slightly large and heavy, not very discreet, big mouthpiece, and generally easy to clean.

– Easyhaler: good perception of drug inhalation, easy to use, small and light—and therefore discreet, comfortable mouthpiece, acceptable dose counter, and easy to clean.

– Turbuhaler: poor perception of drug inhalation, easy to use, acceptable size and weight—making it discreet, comfortable mouthpiece, a dose counter that needs improvements, and easy to clean. It must be pointed out that the 2 worst rated features of the Turbuhaler—patient perception of drug inhaled and dose counter—have been corrected and improved in the new inhaler recently released by the manufacturer.

The results of our study are similar to those found by other authors. The Easyhaler was the highest rated by the patients in the study. However, it must be remembered that the device that best meets the individual characteristics of each patient should be the one chosen. The mean total scores for each device (75, 67, 65) fall short of the theoretical maximum of 90, indicating the need for further research by manufacturers to develop the ideal inhaler. The following features should be taken into account: inhalation of the drug should be perceived, the device should be easy to use and to clean, be small and discreet, and have a dose counter and a comfortable mouthpiece. An additional feature we would like to see included is that the device indicate that the patient has inhaled correctly.

REFERENCES

1. Apter AJ, Reisine ST, Affleck G, Barrows E, ZuWallack RL. Adherence with twice-daily dosing of inhaled steroids. Socioeconomic and health-belief differences. *Am J Respir Crit Care Med* 1998;157:1810-7.

2. Cerveri I, Locatelli F, Zoia MC, Corsico A, Accordini S, de Marco R. International variations in asthma treatment compliance: the results of the European Community Respiratory Health Survey (ECRHS). *Eur Respir J* 1999;14:288-94.

3. Bender BG. Overcoming barriers to non adherence in asthma treatment. *J Allergy Clin Immunol* 2002;109(6 Suppl):554-9.

4. Chambers CV, Markson L, Diamond JJ, Lasch L, Berger M. Health beliefs and compliance with inhaled corticosteroids by asthmatic patients in primary care practices. *Respir Med* 1999;93: 88-94.

5. Put C, van den Bergh O, Lemaigre V, Demedts M, Verleden G. Evaluation of an individualised asthma programme directed at behavioural change. *Eur Respir J* 2003;21:109-15.

6. Global Initiative for Asthma, GINA. National Institutes of Health. National Health Lung and Blood Institute, 2002. Available at: <http://www.ginasthma.com>

7. Giner J, Basualdo LV, Casan P, Hernández C, Macián V, Martínez I, et al. Normativa sobre la utilización de fármacos inhalados. *Arch Bronconeumol* 2000;36:34-43.

8. Giner J, Macián V, Hernandez C, and EDEN Group. Multicenter prospective study of respiratory patient education and instruction in the use of inhalers (EDEN study). *Arch Bronconeumol* 2002;38: 300-5.

9. Brown PH, Lenney J, Armstrong S, Ning AC, Crompton GK. Breath-actuated inhalers in chronic asthma: comparison of Diskhaler and Turbohaler for delivery of beta-agonists. *Eur Respir J* 1992;5:1143-5.

10. Vilsvik JS, Ringdal N, Albrektsen T, Holthe S. Comparison of the acceptability to the Ventolin metered-dose inhaler and Bricanyl Turbuhaler. *Ann Allergy* 1993;70:300-4.

11. Gioulekas D, Papakosta D, Vordoyianni P, Baloti H, Vamvalis C. A comparison of the clinical efficacy and patient acceptability of terbutaline Turbuhaler and salbutamol Rotahaler, in adult patients with asthma. *Respir Med* 1996;90:205-9.

12. Wettengel R, Laurikainen K, Silvasti M, Toivanen P, Sauter K. Therapeutic equivalence and acceptability of two multidose powder inhalers in the treatment of asthma. *Respiration* 2000;67:77-82.

13. Jager L, Laurikainen K, Leinonen M, Silvasti M. Beclomethasone dipropionate Easyhaler is as effective as budesonide Turbohaler in the control of asthma and is preferred by patients. German Study Group. *Int J Clin Pract* 2000;54:368-72.

14. Zetterstrom O, Lahelma S, Keski-Karhu J, Silvasti M, Ostling-Kulling E, Ahonen A. Salbutamol via Easyhaler is at least as effective as salbutamol via Turbuhaler in the treatment of histamine-induced bronchoconstriction. *Respir Med* 2000;94:1097-102.

15. Tukianen H, Ryttila P, Hamalainen KM, Silvasti MS, Keski-Karhu J; The Finnish Study Group. *Respir Med* 2002;96:221-9.

16. Serra-Batlles J, Plaza V, Badiola C, Morejón E, Inhalation Devices Study Group. Patient perception and acceptability of multidose dry powder inhalers: a randomized crossover comparison of Diskus/Accuhaler with Turbuhaler. *J Aerosol Med* 2002;15:59-64.

17. Schweisfurth H, Malinen A, Koskela T, Toivanen P, Ranki-Pesonen M, German Study Group. Comparison of two budesonide powder inhalers, Easyhaler and Turbuhaler, in steroid-naïve asthmatic patients. *Respir Med* 2002;96:599-606.