

Counseling About Turbuhaler Technique: Needs Assessment and Effective Strategies for Community Pharmacists

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Optimal effects of asthma medications are dependent on correct inhaler technique. In a telephone survey, 77/87 patients reported that their Turbuhaler technique had not been checked by a health care professional. In a subsequent pilot study, 26 patients were randomized to receive one of 3 Turbuhaler counseling techniques, administered in the community pharmacy. Turbuhaler technique was scored before and 2 weeks after counseling (optimal technique = score 9/9). At baseline, 0/26 patients had optimal technique. After 2 weeks, optimal technique was achieved by 0/7 patients receiving standard verbal counseling (A), 2/8 receiving verbal counseling augmented with emphasis on Turbuhaler position during priming (B), and 7/9 receiving augmented verbal counseling plus physical demonstration (C) (Fisher's exact test for A vs C, $p = 0.006$). Satisfactory technique (4 essential steps correct) also improved (A: 3/8 to 4/7; B: 2/9 to 5/8; and C: 1/9 to 9/9 patients) (A vs C, $p = 0.1$). Counseling in Turbuhaler use represents an important opportunity for community pharmacists to improve asthma management, but physical demonstration appears to be an important component to effective Turbuhaler training for educating patients toward optimal Turbuhaler technique. Key words: asthma, Turbuhaler, technique, patient education, pharmacist, devices. [Respir Care 2005;50(5):617–623. © 2005 Daedalus Enterprises]

Introduction

Asthma is estimated to affect some 300 million people worldwide,¹ and contributes a large proportion of the burden of respiratory disease. Asthma accounts for about one percent of all disability-adjusted life years lost.¹ Even in countries such as Australia, which have good access to medical care, under-treatment and sub-optimal manage-

ment of asthma remain important problems.² The preferred method of drug administration for both reliever and preventer treatment in asthma is by inhalation, as this results in a faster onset of action, lower required doses, and fewer systemic adverse effects^{3–5} than with the oral route of delivery. However, the efficacy and adverse effects of inhaled medications are highly dependent not only on the drug efficacy but also on the delivery device and the way in which it is used by the patient. Therefore, patients and caregivers must be familiar with the characteristics of inhalation devices in order to ensure correct device use.⁶

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Because of problems with patient technique with conventional pressurized metered-dose inhalers (MDIs), breath-activated dry powder inhalers such as the Turbuhaler (Turbohaler) (AstraZeneca, Lund, Sweden) have been developed. As with all inhalation devices, correct Turbuhaler technique involves the completion of a series of steps, and some of these steps are critical to achieving good drug

delivery to the airways.^{7,8} The instructions for use of a Turbuhaler are described in the product information for the device, and are printed, with illustrations, on the manufacturer's package insert. Previous studies have demonstrated a high rate of incorrect Turbuhaler technique,⁸⁻¹⁰ with as many as 54% of Turbuhaler users not completing all steps correctly. While several studies have reported patient performance with Turbuhaler compared with other devices,^{8,9,11,12} little attention has been directed toward the best way of optimizing Turbuhaler technique.

In the present health care environment, education about medications occurs mostly during doctor consultations at the time of prescribing, and yet evidence points to the passivity of the patient and a low level of information exchange during such consultations.^{11,13} In recent years, pharmacists have become more active in patient care, and can demonstrate a positive impact on the outcomes of drug therapy in asthma patients.¹⁴ The stated aim of pharmacist-delivered asthma care is to optimize drug therapy, minimize drug-related problems, and improve self-management and quality of life of patients.¹⁵ Previous research has demonstrated that pharmacists are effective in instructing asthmatic patients in proper technique with pressurized MDIs.¹⁶ However, no previous studies have investigated the frequency and impact of interventions by pharmacists on Turbuhaler technique.

Therefore the aims of this pilot study were, first, to identify current sources of patient education about Turbuhaler technique, and, second, to compare the effect of 3 counseling methods provided at the community pharmacy level on Turbuhaler technique.

Methods

Approval for this pilot study was obtained from the University of Sydney Human Ethics Committee. This study consisted of 2 components: first, a telephone survey of Turbuhaler users, and, second, a counseling study conducted in a subset of the surveyed patients.

Telephone Survey

Pharmacists from a convenient sample of community pharmacies in an urban area were recruited and provided a list of eligible Turbuhaler users. Patients were eligible for this study if they had asthma, had been dispensed a Turbuhaler by the recruited pharmacist, and were aged 10 years or older. Patients were excluded if they did not self-administer their Turbuhaler medication, did not speak or understand English, or if this was their first Turbuhaler prescription. The pharmacists contacted each patient and asked if they were willing to be contacted for a survey. Patients who agreed were contacted by the researcher by telephone and were asked to provide consent for partici-

Table 1. Checklist for Turbuhaler Technique

| Step | Instruction |
|------|---------------------------------------------------------------|
| 1 | Remove the cap from the inhaler* |
| 2 | Keep inhaler upright* |
| 3 | Rotate grip anti-clockwise, then back until a click is heard* |
| 4 | Exhale to residual volume |
| 5 | Exhale away from the mouthpiece |
| 6 | Place mouthpiece between teeth and lips |
| 7 | Inhale forcefully and deeply* |
| 8 | Hold breath for 5 seconds† |
| 9 | Exhale away from mouthpiece |

*Described by van der Palen and colleagues⁸ as essential.

†Note that this step is not included in the product insert, but appears in the Turbuhaler instruction on the Global Initiative for Asthma (GINA) Web site (<http://www.ginasthma.com>), and in the checklist published by van der Palen and colleagues.⁸ See text for more information.

(Adapted from Reference 8.)

pation in a telephone survey—a questionnaire administered by the researcher about asthma medications and the sources, nature, and timing of any education the patient had received about Turbuhaler technique.

Counseling Study in Community Pharmacy

All patients who participated in the telephone survey were invited to participate in a further study, described as a study about asthma medications, which was carried out by one of the investigators (IB) at the patient's community pharmacy. At Visit 1 (baseline), after providing written informed consent, patients completed a questionnaire about disease severity and medications. Categorization of asthma severity was based on the Australian Asthma Management Handbook.¹⁷ After completion of the questionnaire, the patient's Turbuhaler technique was assessed on his/her own Turbuhaler, using a checklist (Table 1) developed from published data.⁸ The checklist comprises 9 steps, 4 of which (remove the cap, keep inhaler upright, rotate grip, inhale forcefully and deeply) have been identified as essential.⁸ Patients were given a score out of 9, corresponding to the number of steps correctly completed. Patients were considered to have "optimal technique" if they completed all 9 steps outlined in the checklist. Patients who completed all 4 essential steps were considered to have "satisfactory technique."

After assessment, patients were randomly allocated by computer-generated list to receive one of 3 types of counseling (see below), with all counseling delivered by one investigator (IB), a qualified pharmacist.

Group A received standard verbal counseling, which involved instructions on Turbuhaler technique use following the text of 2 standard items of printed material supplied by the manufacturer. These were, first, the product

information leaflet, which is packaged with each commercially-available Turbuhaler and which describes the product, the steps for its use (with illustrations), and answers to frequently asked questions, and, second, the computer-generated consumer medicine information leaflet, which provides information about the medication, adverse effects, cleaning, and storage of the Turbuhaler. The latter leaflet is normally made available by pharmacists to patients upon enquiry.

Group B received augmented verbal counseling, which consisted of the standard verbal counseling as described above plus extra verbal information, which included reinforcing the 4 essential steps (see Table 1),⁸ and advising the patients to hold the Turbuhaler upright, with the base on a flat surface during loading. The latter instruction was based on empirical evidence from the clinical practice of one of the investigators (HR). During both standard and augmented verbal counseling, the researcher was careful not to use hand gestures that might act as a surrogate physical demonstration.

Group C received augmented verbal counseling as above, plus a physical demonstration by the researcher, using a placebo Turbuhaler. The technique used in the physical demonstration was the same as illustrated in the product information, with the additional component of the Turbuhaler base being placed on a flat surface during loading.

Counseling for Groups A and B took approximately 5 min, with 5–10 min for Group C. Following the counseling (A, B, or C), patients' Turbuhaler technique was once again assessed, using the 9-step checklist. The allocated counseling was repeated, with emphasis on steps initially performed incorrectly, until optimal technique (score 9/9) was demonstrated by the patient or a maximum of 3 repeat instructions had been given. All patients were asked to return to the pharmacy after 2 weeks for Visit 2.

At Visit 2, Turbuhaler technique was again assessed using the 9-step checklist. At the end of Visit 2, all patients received augmented verbal counseling plus physical demonstration (as for the original Group C).

Analysis of Results

Telephone Survey. Descriptive analysis was carried out to determine the proportion of patients who had received information about Turbuhaler use, and the sources and modes of this instruction. If patients nominated more than one response, their first response was used for analysis.

Counseling Study. Descriptive analysis was used to summarize patient demographics, asthma severity,¹⁷ and asthma medication use. Total Turbuhaler technique score at each visit was reported as median (range) for each group, with a potential maximum of 9. The number of patients correctly completing each individual step of the checklist was

calculated. Differences between groups in post-instruction score (Visit 2) and in change in score (Visit 2 vs Visit 1) were assessed using Kruskal-Wallis analysis of variance with commercially available software (Analyse-It Software Ltd, Leeds, United Kingdom). A significance level of 0.05 was used. At both visits, the number of patients in each group (A, B, or C) with optimal technique (score 9/9) and satisfactory technique (4 essential steps correct) were calculated, and differences between groups were compared using Fisher's exact test.

Results

Telephone Survey

Of the 31 pharmacies contacted, 8 pharmacies agreed to participate in this study. The 8 pharmacists identified a total of 87 patients as eligible; all 87 patients agreed to participate, and completed the telephone survey. The majority of patients (46%) were using a Turbuhaler for Pulmicort (budesonide), with 35% using Bricanyl (terbutaline) and 19% of patients using both Pulmicort and Bricanyl. No patient was using eformoterol. Ninety-three percent of patients reported having received advice on Turbuhaler use. Seventy-five percent of patients identified their regular medical practitioner as the source of this advice, with only 8% of patients nominating the pharmacist. Most patients (96%) received this information only when their medication was first dispensed. When information about Turbuhaler use was given, 47% of patients reported receiving both verbal instruction and physical demonstration. In response to more specific questions, 62% of patients reported that a pharmacist had shown them the information leaflet for Turbuhaler, but only 33% of patients reported that a pharmacist had discussed the steps associated with Turbuhaler use during dispensing. Two percent of patients stated that they had been provided with additional information on the Turbuhaler, such as the consumer medicine information leaflet. When asked if their Turbuhaler technique had been checked after the time of first dispensing, 3% of patients reported that a pharmacist had checked their technique. Eleven percent of patients reported that their technique had been checked by another health care professional (primarily their usual doctor).

Counseling Study in Community Pharmacy

Of the 87 patients who participated in the telephone survey, 26 agreed to participate in a further study, and were enrolled in the counseling study. Their average age was 42 years (range 11–76 y). Two patients discontinued prior to the second visit (moving house, leg injury). The majority of patients (62%) had moderate asthma according to National Asthma Council guidelines¹⁷ (Table 2). There

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Table 2. Demographics and Baseline Data for Counseling Study*

| Characteristic | |
|-----------------------------------------------------------------|------------|
| Female sex (number and percent of patients) | 17 (65) |
| Age (mean and range in years) | 42 (11–76) |
| Occupation (number and percent of patients) | |
| Full-time | 10 (39) |
| Part-time | 5 (19) |
| Retired | 7 (27) |
| Student | 4 (15) |
| Asthma severity (number and percent of patients)† | |
| Mild | 4 (15) |
| Moderate | 16 (62) |
| Severe | 6 (23) |
| Medications used by Turbuhaler (number and percent of patients) | |
| Pulmicort (budesonide) | 12 (46) |
| Bricanyl (terbutaline) | 9 (35) |
| Pulmicort and Bricanyl | 5 (19) |
| Turbuhaler technique score at baseline (median and range)‡ | 5 (4–7) |

*n = 26

†Based on categorization in Asthma Management Handbook 2002, National Asthma Council Australia.¹⁷ The criteria are similar to those in the Global Initiative for Asthma (GINA) guidelines.¹

‡See Table 1⁸

were no significant differences between randomization groups in patient demographics, asthma severity, or medication use. At Visit 1, prior to intervention, median baseline Turbuhaler technique score was 5 (range 4–7). No patient demonstrated optimal technique (score 9/9), and only 6 patients (23%) had satisfactory technique (steps 1, 2, 3, and 7 correct). At Visit 2, 2 weeks after counseling, median Turbuhaler score for all patients had increased in all 3 intervention groups (Fig. 1). There was a significant difference between the 3 counseling groups in Visit 2 Turbuhaler technique score (Kruskal-Wallis, $p = 0.003$) and in change in Turbuhaler technique score from baseline (Kruskal-Wallis, $p = 0.006$), with the greatest numerical improvement occurring in Group C, who received a physical demonstration (no statistical test applied, because of small sample size). Optimal technique was recorded 2 weeks after counseling by 0/7 patients who received standard verbal counseling, 2/8 who received augmented verbal counseling, and 7/9 patients who received augmented verbal counseling plus physical demonstration (Fisher's exact test, Group A vs Group C, $p = 0.006$). The proportion of patients with satisfactory technique also increased, with 100% of Group C patients achieving satisfactory technique (Fig. 2).

Examination of each of the 9 steps in the Turbuhaler technique checklist⁸ indicated that at baseline there were particular problems with 3 of the 9 steps (Fig. 3). These

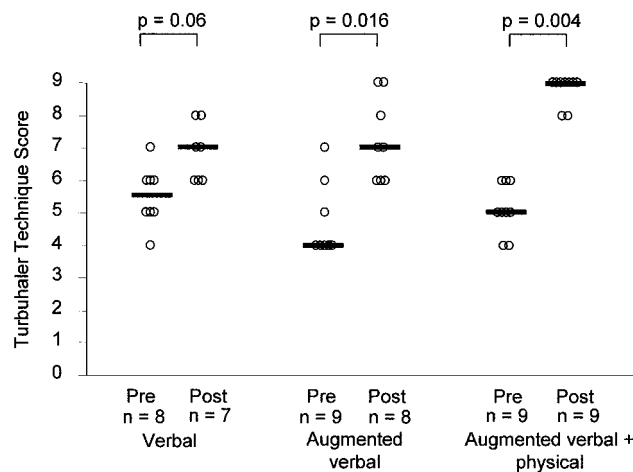


Fig. 1. Turbuhaler technique score before (pre) and 2 weeks after (post) counseling. Solid lines represent median values for Turbuhaler technique score before and after counseling. The p values are for change in score with counseling (Wilcoxon Rank sum test).

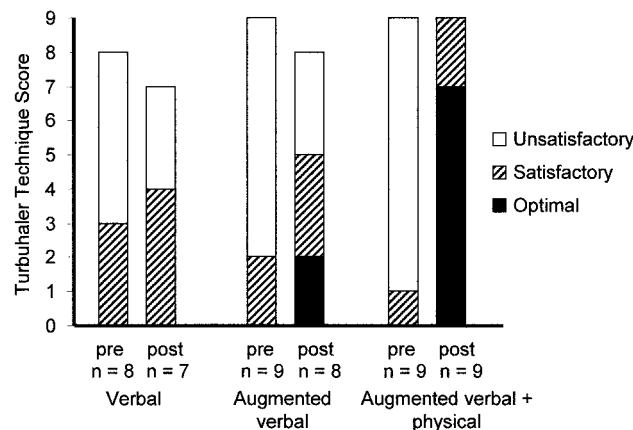


Fig. 2. Proportion of patients with optimal and satisfactory technique, before (pre) and 2 weeks after (post) counseling. Optimal technique = score 9/9, all Turbuhaler steps correct. Satisfactory technique = steps 1, 2, 3, and 7 correct (essential steps).⁸

were step 2 (keeping the Turbuhaler upright during loading), step 4 (exhaling to residual volume), and step 8 (holding the breath for 5 s). These steps were not completed correctly at baseline by 19, 24, and 26 of the 26 patients, respectively. Following counseling, the number of patients correctly completing each of these 3 steps increased in all 3 counseling groups (Fig. 3).

Discussion

Despite the potential for pharmacists to have a positive impact on asthma management,^{16,18} this pilot study has shown that pharmacists are currently performing only a minimal role in assessment and counseling about Turbuhaler technique. The study also showed that when coun-

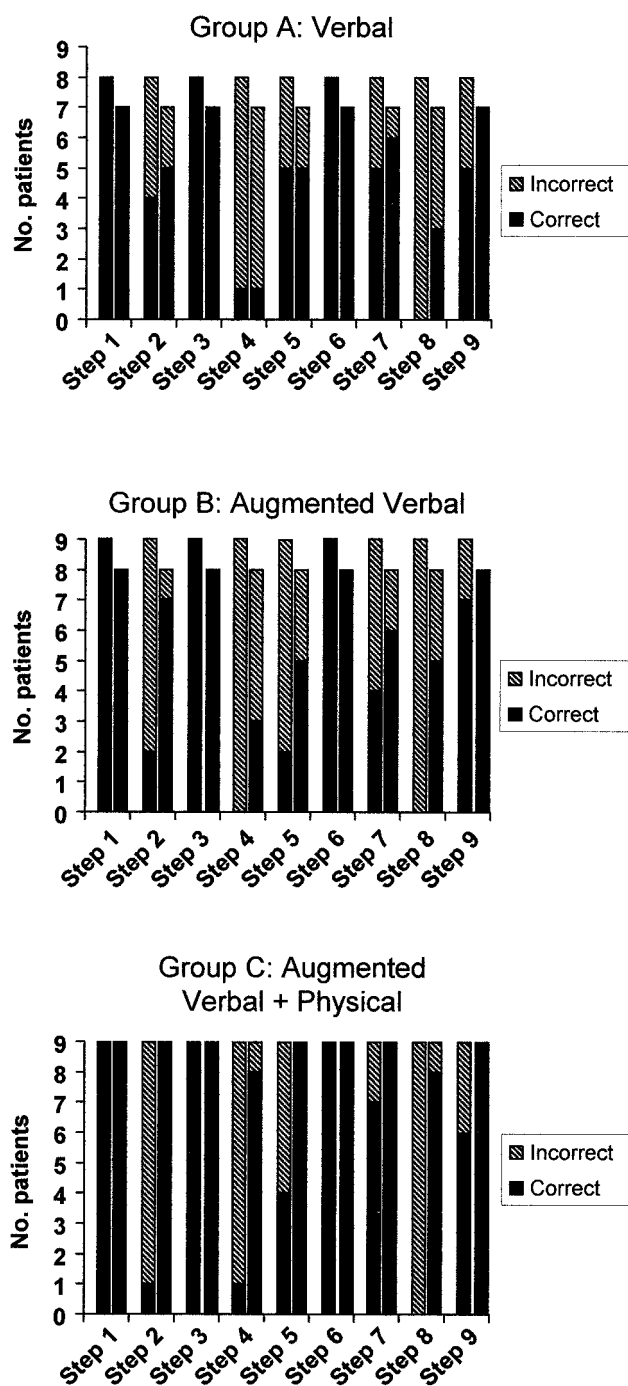


Fig. 3. Individual steps in Turbuhaler technique checklist,⁸ before and 2 weeks after counseling. Individual Turbuhaler checklist steps are listed in Table 1.

seling about Turbuhaler technique is delivered in the community pharmacy, a physical demonstration appears to be required in order to achieve optimal technique in the majority of patients. Verbal counseling alone, even when customized to focus on problem areas, appears to be insufficient to achieve optimal Turbuhaler technique.

Although pharmacists are in an excellent position to recognize patients whose asthma may be poorly controlled due to poor inhaler technique,^{19,20} it was clear from our telephone survey that community pharmacists rarely counsel patients on the steps involved in using a Turbuhaler, or check the patient's Turbuhaler technique at any stage. These results are consistent with published data for other asthma medications, which have shown counseling rates in the community pharmacy to be low.²¹ For example, it has been shown that patients need careful instruction in use of pressurized MDIs, including step-by-step demonstration at the time of dispensing, and observation of their technique.¹⁸ Because MDI technique tends to decline without routine review,²² it has been recommended that pharmacists should reassess a patient's MDI technique when prescriptions are refilled or renewed.

More generally, international asthma guidelines recommend that pharmacists should form part of a team approach to patient education about use of inhalers,²³ while the pharmacy practice guidelines from the American Society of Health-System Pharmacists specifically recommend that pharmacists should demonstrate the use of inhalers and should observe patients' medication-use capability.²⁴ The results of the present telephone survey in Australia confirm the findings of Mickle et al that few pharmacists give patient education when dispensing inhaled devices.²⁵ Potential barriers to such a role for community pharmacists include business pressures, lack of clinical knowledge, and time constraints.²⁶⁻³¹ However, dispensing asthma devices presents a unique opportunity to counsel patients about how to use them, a need not necessarily met by other health care providers. Pharmacists need to embrace an opportunity that has the potential for real impact on patient care.

Baseline data from the counseling study are consistent with previous studies, which have shown that poor inhaler technique is common among respiratory patients^{9,10,31} and that there is evidently a need for improving inhaler technique with some type of patient education.^{16,32-35}

The steps that were completed correctly by only few patients during initial assessment were holding the Turbuhaler vertically during loading, exhaling to residual volume before inhalation, and holding the breath after inhalation. Turbuhaler technique was assessed using a published inhaler-specific checklist,⁸ which was said to have been developed from guidelines issued by the Dutch Asthma Foundation. The individual steps in this checklist largely correspond to the steps described in the patient information statement issued by the manufacturer. However, it should be noted that the manufacturer's instructions do not incorporate a breath-hold following inhalation (step 8 of the checklist).⁸ A study of 14 children given β_2 agonist by Turbuhaler showed no significant benefit from a 10-second breath-hold.³⁵ It might be considered inappropriate to

include a breath-hold in the checklist for optimal Turbuhaler technique if patients have not previously been informed about this step, and if there is no published evidence to support its inclusion. Nevertheless, a post hoc analysis of the present data with exclusion of step 8 did not alter the study findings, and it should be noted that the breath-hold is included in the Turbuhaler instructions on the Global Initiative for Asthma Web site.³⁶ Aside from the issue of clinical benefit, inclusion of a breath-hold may be helpful to avoid confusion by patients who are also using pressurized MDIs.

There is evidence that the mode of counseling about inhaler technique affects the success of the intervention. For example, it has been shown that written instruction alone results in extremely low rates of correct Turbuhaler technique.⁹ In the present study, verbal counseling plus a physical demonstration appeared to be considerably more effective than verbal counseling alone (standard verbal counseling with or without extra verbal information, with no physical cues from hand movements). This may be due to the fact that patients were given a small amount of additional time to learn the correct Turbuhaler technique. In addition, by showing the patients how the device should be used, a clear mental image of the correct technique may have served as positive reinforcement. Studies with other devices have shown that personal instruction, including a step-by-step demonstration of appropriate device technique by a health care provider, is superior to provision of written information alone.³³ Furthermore, successful asthma education programs emphasize personal instruction when teaching MDI technique.³⁴ A personalized approach to device technique instruction has been demonstrated to achieve significant improvement in patient technique, regardless of whether previous instructions have been received.³⁷

The present investigation was intended as a pilot study, and the conclusions that can be drawn from its findings are inevitably limited by the small sample size and the short duration of follow-up. The small sample size means that the results are not necessarily generalizable to patients from other socio-economic or educational backgrounds or from nonurban areas, and also means that the results were subject to statistical instability, in that different outcomes for only a small number of patients could have resulted in nonsignificant differences between groups. The response rate of pharmacists was low (8 out of 31), and this again may limit the conclusions that can be drawn; however, the survey and interventions were delivered by an investigator rather than by the pharmacists themselves. There is also the possibility of nonresponse bias in the counseling study, as only 26 patients out of the original 87 agreed to participate; the need for 2 visits to the community pharmacy may have contributed. A 2-week follow-up may not necessarily be practical in the clinical setting, and results at 2 weeks may not adequately reflect long-term retention of

improved technique. For practical reasons, the same investigator assessed Turbuhaler technique and delivered the counseling; this could have resulted in observer bias, although the potential impact was limited by the rigorous use of an objective checklist for Turbuhaler technique, and of a standardized script for the counseling interventions.

Despite these limitations, the findings of this pilot study are consistent with the results of studies with other inhaler devices,^{33,34} and the magnitude of the improvement in Turbuhaler technique after the addition of a physical demonstration is sufficient to warrant further investigation. It would be important to extend future studies to investigate the clinical impact of changes in Turbuhaler technique, when used to administer either β_2 agonist or inhaled corticosteroid medications.

Conclusions

This study has demonstrated that it is feasible to deliver a brief counseling intervention about Turbuhaler use, including a physical demonstration, to asthma patients in the community pharmacy, and that such an intervention can result in a marked improvement in Turbuhaler administration technique, at least in the short term. Further studies are needed to investigate the frequency with which such an intervention needs to be delivered, and to establish whether optimizing Turbuhaler technique in this way can lead to better health outcomes for patients with asthma.

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