

The ability of the community pharmacist to learn the proper actuation techniques of inhaler devices

W. Travis Cain, MD,^a Greg Cable, PhD,^b and John J. Oppenheimer, MD^c *Summit and Springfield, NJ*

Today, greater responsibility is placed on community pharmacists for the education of patients than ever before. Thus community pharmacists were recruited for this study and asked to demonstrate the proper steps in the actuation sequences of 3 inhaler devices. Baseline measurements were followed by an instructional session on the proper actuation technique, and then a posttest was conducted 4 to 6 weeks later. The mean changes between baseline and postinstruction percentage scores for the metered-dose inhaler device, the Turbuhaler, and the Diskus were (mean $\pm$ SD) 17.1% $\pm$ 15.4%, 22.6% $\pm$ 18.7%, and 38.4% $\pm$ 19.6%, respectively. This study demonstrates that a single instructional session can dramatically improve a community pharmacist's ability to demonstrate the correct method of actuation. (*J Allergy Clin Immunol* 2001;108:918-20.)

Key words: Community pharmacist, education, inhaler device, asthma, Turbuhaler, Diskus, metered-dose inhaler, actuation technique, change score

Current strategies for the treatment of asthma rely on the use of patient-administered inhalation therapy.¹ The use of hand-held inhalation devices provides a rapid, cost-effective, and generally safe mode of drug delivery to a patient's lungs. In the United States metered-dose inhalers (MDIs) are the most commonly used devices for aerosolized drug delivery. Even with the best inhalation technique, only 10% to 15% of the aerosol actually reaches the lung.² Several studies have shown that 24% to 89% of patients have poor technique when using their MDI.^{3,4} To remedy this, newer devices consisting of a dry-powder delivery system have been developed, including the Turbuhaler (AstraZeneca) and the Diskus (GlaxoSmithKline). These devices attempt to circumvent the difficulty in timing the actuation with inhalation and to increase the delivery of medication to the lungs. Errors in the use of these newer alternative devices are still possible and may even be common.⁵

In today's context of care, the time a physician can spend with a patient has been compressed, resulting in fewer opportunities to educate patients in the proper use of their medication. As a result, community pharmacists

Abbreviations used

DPI: Dry-powder inhaler
MDI: Meter-dose inhaler

have been delegated greater responsibility for educating patients in the proper use of medication.

Several studies have examined the ability of medical personnel to properly use inhalation devices. Demonstration of the correct inhalation technique by health professionals using placebo MDIs and the use of visual education aids have been reported to be more effective than verbal instruction alone for improving a patient's inhalation technique.⁶ Hanania et al⁷ compared respiratory therapists, primary care physicians, and registered nurses with respect to the ability to perform the correct technique. They found that respiratory therapists (67% $\pm$ 5%) outperformed primary care physicians (48% $\pm$ 7%) and registered nurses (39% $\pm$ 7%).⁷

Previous research has demonstrated that pharmacists knowledgeable in the use of MDIs are effective in instructing asthmatic patients in proper inhalation technique.^{6,8,9} This study examines 2 related issues. First, the skill level of a sample of community pharmacists in actuating each of 3 inhaler devices (ie, MDIs, the Turbuhaler [AstraZeneca], and the Diskus [GlaxoSmithKline]) and second, the improvement that can be achieved by providing a brief instructional session with each inhaler device.

METHODS

Atlantic Health Systems' Internal Review Board approved the study protocol. Community-based pharmacists were recruited to participate in the study, and written informed consent was obtained.

Placebo inhaler devices were acquired, each from the respective manufacturer: placebo MDIs (Allen and Hanburys, Division of GlaxoSmithKline), placebo Diskus Demonstrators, (GlaxoSmithKline), and placebo Turbuhalers (Astra USA). The MDI devices contained the propellants trichlorofluoromethane and dichlorodifluoromethane, as well as lecithin only, whereas the dry-powder inhaler (DPI) devices were empty.

Baseline levels of performance were first obtained for each pharmacist with each of the 3 placebo inhaler devices. Manufacturers have outlined the correct implementation of 6 steps for each device. The steps are provided in Table I. The performance of each pharmacist was determined by constructing an additive score for each device on the basis of the number of correct steps performed during the actuation process. A score of 1 was given for a step properly performed, and a score of zero was given for a step incorrectly performed or when any step was omitted. A single investigator (W.T.C.)

From ^aOverlook Hospital, Summit; ^bAtlantic Health System; and ^cPulmonary and Allergy Associates, Springfield.

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Reprint requests: John Oppenheimer, MD, 101 Madison Ave, Morristown, NJ 07960.

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who was previously trained in the proper use of the 3 inhaler devices scored each of the pharmacists. This eliminated the possibility of measurement error related to poor interrater reliability.

After baseline scores were obtained for each pharmacist, the investigator who had obtained these scores provided individual instruction. Instruction in the proper use of each device was complete when the pharmacists had mastered each device to the satisfaction of the instructor. After a 4- to 6-week interim period, pharmacists were again evaluated on the proper actuation technique for each of the 3 devices by the same investigator. Scoring was performed in an identical manner.

Baseline and postinstruction scores were both converted into the percentage of steps that were correctly performed for each pharmacist. These were used to calculate the absolute difference between baseline and postinstruction percentages. Means and SDs were calculated from the aggregated individual absolute differences.

RESULTS

The results demonstrate a wide distribution in the overall baseline competency with each of the 3 devices studied. The mean baseline and postinstruction scores for the MDI were $72.2\% \pm 12.8$ and $89.3\% \pm 12.8$, respectively. The pharmacists demonstrated far less baseline knowledge with both the Turbuhaler and the Diskus, devices as indicated by the mean baseline percentage correct scores of $61.2\% \pm 13.4$ and $49.8\% \pm 18.6$, respectively. However, pharmacists exhibited significant improvement from baseline to the period after instruction with both devices. The mean postinstruction scores were $83.8\% \pm 15.8$ and $88.3\% \pm 12.4$, respectively.

Fig 1 depicts the percentage change for each of the individual steps for each of the 3 inhaler devices examined.

DISCUSSION

Primary care physicians may tacitly rely on the community pharmacist to educate patients in the proper use of medications. This includes the correct actuation sequence for inhaler devices. Few studies have attempted to evaluate the knowledge and ability of the community pharmacist to properly educate a patient in the use of an inhaler device.^{7,8} To our knowledge, no previous study has assessed the effectiveness of a brief instructional session for improving performance in the actuation process.

Our findings reveal an alarming lack of knowledge regarding the correct actuation sequence of inhaler devices among community-based pharmacists. Both primary care physicians and specialists should not assume that their patients are receiving accurate instructions on the use of inhalation devices from their local pharmacist. Not surprisingly, and consistent with earlier findings, this was especially true with the newer devices, the Turbuhaler (AstraZeneca) and the Diskus (GlaxoSmith-Kline).⁸ Pharmacists initially had the most difficulty with correctly priming the DPI devices. If this is done improperly, the devices may not be able to deliver any of the prescribed dosage to the patient. These DPI devices are of great benefit to patients who previously were unable to coordinate the proper use of the MDI. In fact, the pharmacists demonstrated particularly poor skills involving

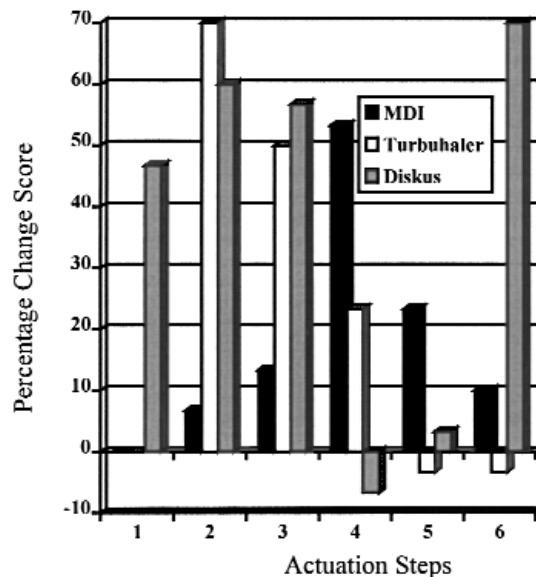


FIG 1. Absolute percentage change for individual actuation steps.

TABLE I. Correct steps to using an inhaler device

Correct steps to use an MDI

1. Remove the cap.
2. Shake canister thoroughly.
3. Breathe out steadily to FRC or RV.
4. Insert or place the mouthpiece 2-4 cm away from mouth while keeping the canister upright.
5. Discharge the inhaler while taking a slow, deep breath.
6. Hold breath in full inspiration for 5-10 seconds and exhale.

Correct steps to use a Turbuhaler

1. Remove the cover.
2. Turn the bottom clockwise until it clicks while keeping the inhaler upright.
3. Turn the bottom counterclockwise to the maximum while keeping the inhaler upright.
4. Turn head away from the inhaler and exhale to FRC or RV.
5. Place the mouthpiece between lips horizontally or vertically and inhale deeply and forcefully.
6. Hold breath in full inspiration for 5-10 seconds and exhale.

Correct steps to use a Diskus

1. Put thumb on the thumb grip and push the grip away from you as far as it will go until the mouthpiece appears and snaps into position.
2. Slide the lever away from you as far as it will go until it clicks while keeping the Diskus horizontally.
3. Holding the Diskus horizontally and away from mouth, breathe out to FRC or RV.
4. Put the mouthpiece to lips and breathe in steadily and deeply.
5. Remove the Diskus from mouth. Hold breath in full inspiration for 5-10 seconds and exhale.
6. Put thumb on the thumb grip and slide the thumb grip back toward you as far as it will go to click it shut.

FRC, Functional residual capacity; RV, residual volume.

steps for coordination of the actuation process with the mechanics of inhalation with the DPI. The errors detected in this simple assessment session, if translated to patient self-medication errors, are potentially significant.

However, we also found that, without exception, the average skill level of our sample of pharmacists in the actuating process could be increased and maintained, at least in the short term (ie, 4 to 6 weeks). Brief instructional sessions with pharmacists may improve the quality of the demonstrations pharmacists provide to patients and, in turn, the quality with which patients execute the actuation process. Future research should make use of randomized controlled tests of competing instructional methods by using pharmacists who practice in different contexts to determine which approach produces the largest improvements. Ultimately, outcomes of patients may be improved by these brief instructional sessions with pharmacists. While managed care is in ascendancy, physicians will have diminished time with patients for instruction in the use of medications. It would be wise to assist the health care professionals to whom this critical task has been transferred.

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