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Inhalation therapy: Help patients avoid these mistakes

Faulty technique can sabotage the best of treatment plans for asthma and COPD. Here are some common errors and how you can help patients avoid them.

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PRACTICE RECOMMENDATIONS

› *Stress the importance of exhaling gently for a few seconds before inhaling (deeply and* slowly *for a metered dose inhaler, and deeply and* rapidly *for most dry powder inhalers).* (C)

› *Observe the inhaler technique of every patient receiving inhalation therapy on more than one occasion.* (C)

› *Don't rely on self-reports regarding inhaler technique; despite claims of proficiency, most patients make at least one mistake.* (C)

Strength of recommendation (SOR)

(A) Good-quality patient-oriented evidence

(B) Inconsistent or limited-quality patient-oriented evidence

(C) Consensus, usual practice, opinion, disease-oriented evidence, case series

For patients with asthma or chronic obstructive pulmonary disease (COPD), inhalation therapy is the foundation of treatment. Yet all too often, patients don't get the full value of their inhaled medications because they use their inhaler incorrectly. When technique is markedly flawed, suboptimal outcomes typically result.

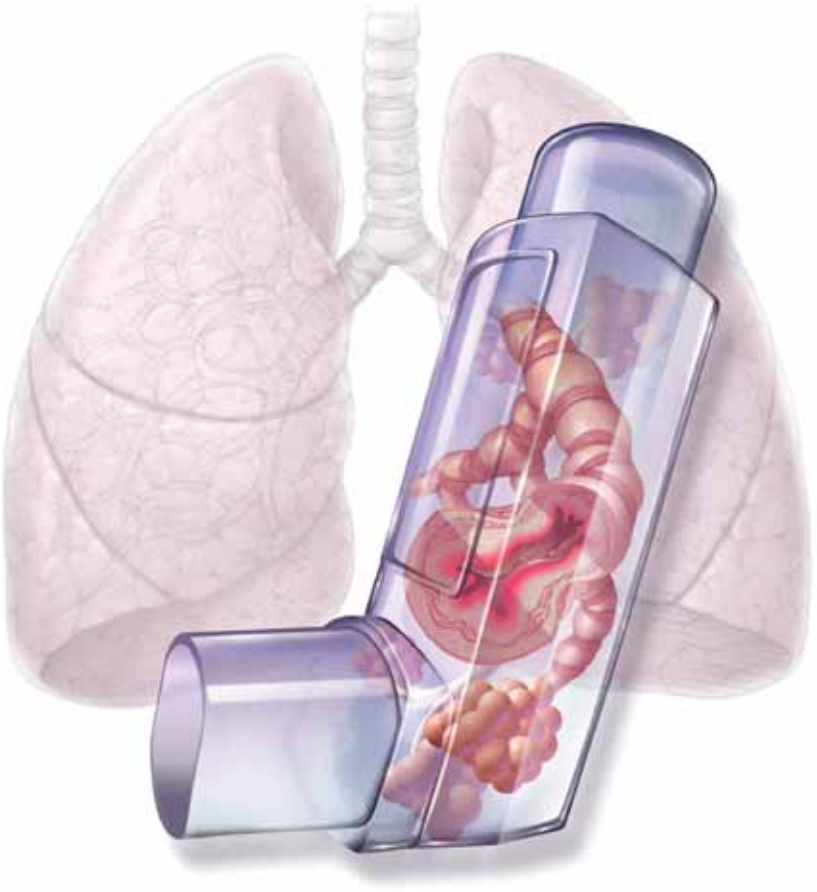
Given the number of Americans with asthma (at least 22 million)[1] and COPD (more than 13 million adults),[2] faulty inhaler technique is a major public health problem. In fact, the number of people suffering from COPD may be even larger: Close to 24 million US adults are believed to have impaired lung function.[3,4] For patients with asthma or COPD—many of whom are treated by family physicians—comprehensive education with a focus on correct use of an inhaler is essential.

In this review, we present evidence of frequent inhaler errors (from clinical studies) and highlight some of the more common mistakes (based on our clinical experience [**TABLE**][5]). Finally, we offer "time-efficient" solutions to inhaler problems—steps that physicians in busy primary care practices can take to ensure that patients with asthma or COPD get the maximum benefit from inhalation therapy.

Inhaler error is well documented

Since 1965, when it was first reported that many patients used metered dose inhalers (MDIs) incorrectly,[6] evidence has accumulated supporting the magnitude of the problem.[7-12] (Studies conducted in family practice settings are described in "Researchers look at inhaler problems in primary care" on page 716 and in **TABLE W1** at jfponline.com.[13-20])

Error rates vary widely from one clinical trial to another, depending on study criteria, type of device, and extent of patient education, among other factors. Nonetheless, several studies (spanning 3 decades) found the error rate to be



In one study, >98% of the patients claimed to know how to use their inhalation devices, but 94% committed at least one error.

close to, or greater than, 90%.[7,10,21]

The most recent of these, published in 2009,[21] was based on observation of the inhaler technique used by patients with asthma or COPD directly following appointments in an outpatient clinic. The authors found that, although >98% of the study participants claimed to know how to use their inhalers, 94% committed at least one error. In this study and a number of others, user error was more likely in patients using MDIs.[13,18,21,22]

Adding a spacer (eg, a valved holding chamber such as the AeroChamber) can be helpful, as the spacer affords the patient more time to inhale the medication. But patients who use an MDI with a spacer often make mistakes, too, and patient education is essential.[23-26]

Breath-activated dry powder inhalers (DPIs)—such as the Flexhaler, HandiHaler, Aerolizer, and Diskus—also reduce the likelihood of error. DPIs eliminate a step that MDI users often struggle with: the need to simultaneously press down on the canister and begin a slow, deep inhalation.

What's more, DPIs do not have to be shaken before use. Nonetheless, using a DPI still involves a series of actions. For the HandiHaler and Aerolizer, patients must load the dose, and some patients fail to read the directions and swallow the capsule instead of loading it into the device. Patients must remember to exhale away from the device (ie, not into the dry powder) before inhaling, then hold their breath for approximately 10 seconds. There is potential for error at each step.

Stress the need to exhale before using the inhaler

Forgetting to exhale before inhaling is a common, and significant, mistake regardless of the type of device. It is paramount to stress the need to exhale gently for a few seconds before inhaling (*slowly* and deeply for patients using an MDI, *rapidly* and deeply with most DPIs). For MDI users, poor timing, described earlier, is another common and serious mistake. Patients using an MDI with a valved holding chamber sometimes inhale for too long before pressing down on the inhaler, then are unable to continue inhaling although the aerosol is still in the chamber. A common error made by patients using multidose DPIs is simply to forget to load the dose.

CONTINUED

Researchers look at inhaler problems in primary care

A number of studies of various sizes (from 41 to 3955 patients) have assessed inhaler technique in patients being treated by clinicians in primary care. The researchers used a variety of scoring methods, as well. Among them were a simple 4-step (0-4) rating system, a 9-step system, a standardized inhaler-specific checklist, and a system that tracked the number of *omissions* patients made.[13-20] All found significant problems with inhaler technique. (You'll find a detailed look at the studies in **TABLE W1** at jfponline.com.)

In one study of 422 patients,[13] including young children, adolescents, and adults, participants received one point for correctly performing each of the following steps:

- Adequate preparation (shaking well for those using a metered dose inhaler [MDI]; loading correctly for patients using a dry powder inhaler [DPI])
- Adequate expiration, correct head position
- Adequate inspiratory technique
- Holding breath afterwards.

The researchers found that 25% of the patients had inadequate technique (≤2 on a 0-4 point scale). In this study, as in others that included patients using various types of devices, use of an MDI was associated with a higher rate of incorrect technique.

Another much-smaller study[14] used the same 4-step system to assess the technique of 50 patients, all of whom had the same type of DPI and had received extensive training in the correct use of the device. Despite the training, 27% of the patients received scores of ≤2 (inadequate technique). Sixty-eight percent received a score of 3 (adequate); only 5% received a score of 4 (good).

The 2 largest studies—one including 3955 patients using MDIs[20] and the other looking at 3811 patients using various kinds of devices[18]—found high levels of errors, as well. In the latter study, 76% of patients with MDIs made at least one error vs 49% to 55% of patients using DPIs.[18] The results convinced a large majority of the physicians caring for these patients of the need to check inhaler technique more frequently. In the study of MDI users alone, 71% of the patients made at least one mistake.[20] Inhaler misuse was associated with higher asthma instability scores, this study showed.

More recently, a researcher assessed the effects of an integrated primary care model on the management of asthma and/or COPD in middle-aged and elderly patients, in a study of 260 patients in 44 family practices.[19] The study included an evaluation of inhaler technique.

Participants were divided into an intervention group—137 patients who received education regarding inhaler use from a nurse—and a usual care group (123 patients). After 2 years, correct inhaler technique among those in the intervention group went from 41% at baseline to 54%. At the same time, the proportion of those in the usual care group with correct technique fell from 47% to 29%.[19]

Physicians need to brush up on their skills, too

It's not just patients who lack proficiency in inhaler technique. Numerous studies have demonstrated poor skill among physicians and other health care professionals.[27-34] Evidence also shows that targeted education results in substantial improvement.[32,35]

In one study undertaken to evaluate family medicine residents' proficiency in using asthma inhalers, participants (an intervention group at one clinic and a control

TABLE

Caution patients about these device-specific mistakes*

Metered dose inhaler
• Failing to shake inhaler well
• Failing to exhale gently before inhaling
• Exhibiting poor coordination (failing to press down on the canister and inhale simultaneously)
• Inhaling rapidly (inhalation should be very slow)
• Failing to inhale deeply or not inhaling at all
• Failing to hold one's breath long enough (10 seconds is optimal) or at all
• Failing to wait long enough (≥30 sec) before the next puff
• Pressing down on the canister 2 or 3 times in a row (this should be done only once)
• Failing to inspect the mouthpiece for foreign objects, such as coins
• Forgetting to periodically clean the actuator
• Holding the device upside down (the mouthpiece should be on the bottom)
• Leaving the cap on while pressing down
Metered dose inhaler plus spacer/VHC
• Placing the inhaler in the wrong end of the VHC
• Failing to shake the inhaler well
• Failing to exhale slowly before inhaling
• Waiting too long (several seconds) after pressing down on the device before inhaling†
• Pressing down on the canister 2 or 3 times in rapid succession (this should be done only once)
• Inhaling rapidly (some VHCs whistle to alert the patient to reduce the rate of inhalation)
• Exhaling instead of inhaling after pressing down on the canister
• Failing to hold one's breath long enough after a slow, deep inhalation (10 seconds is optimal)
Dry powder inhaler
• Shaking the DPI (it's not required with this type of device)
• Forgetting to exhale gently before inhaling
• Exhaling into the device (exhalation should be away from the DPI so the breath doesn't clump the powder)
• Inhaling slowly (with most DPIs, inhalation should be rapid)‡
• Failing to inhale at sufficient inspiratory flow rate†
• Failing to load the dose‡

*These are examples based on the experience of the authors; other errors are possible.

†Timing is not as crucial as it is for an MDI without a spacer, but the drug is still lost if inhalation is delayed.

‡Correct use varies by type of product (see product literature for specifics).

DPI, dry powder inhaler; MDI, metered dose inhaler; VHC, valved holding chamber.

Source: Adapted with permission from Self TH, et al. *Consultant*. 2003.[5]

group at another) all were given a pretest. The intervention group then received educational materials and a tutorial, as well as the opportunity for hands-on practice, after which both groups were given a post-test. The residents who received the training had a 170% jump, on average, in proficiency score, vs a 55% increase for the control group (P<.001).[35]

Another study—this one involving first-year interns—looked at level of improvement based on the type of education provided. Initially, only 5% of the interns could use an MDI

Lectures are relatively ineffective in teaching interns inhaler technique compared with a one-on-one approach, researchers concluded.

WATCH THE VIDEOS

Inhaled Medication Instructional Videos
Courtesy of:
National Jewish Health
Go to http://www.nationaljewish.org/healthinfo/medications/lung-diseases/devices/instructional-videos

without error. After a lecture and demonstration, 13% had an error-free technique. But when each intern participated in an intensive one-on-one session, the error-free rate reached 73%. The researchers' conclusion: Lectures are relatively ineffective in teaching interns inhaler technique compared with a one-on-one approach.[32]

The Chicago Breathe Project,[36] a new program aimed at improving education in the use of asthma inhalers for physicians and minority patients, provides further evidence of the value of clinician education. After a series of workshops for residents at 5 academic institutions, the physicians' knowledge of proper use of inhalers rose dramatically—from just 5% preprogram to 91% postprogram ($P<.001$). Six months after the educational activity, the residents (n=161) were more likely (44% vs 11% preprogram) to assess patients' inhaler technique.[36]

Teaching patients when time is tight

National and international guidelines stress the need to teach patients correct use of asthma and COPD inhalers.[1,37,38] Providing the requisite education includes observation of each patient's inhaler technique with proper use demonstrated, as needed.

The problem, of course, is how to provide that level of patient education within the time constraints of a busy family practice. We recommend these time-efficient solutions:

Enlist the help of other clinicians. While it is important that someone in your office be well trained and able to instruct patients in the proper use of inhalers, that individual need not be you. The National Institutes of Health recommends that the "principal clinician" introduce key educational messages, which can be reinforced and expanded on by other members of the health care team.[1]

After you advise patients that it is crucial for them to be trained in and adhere to proper inhaler technique, another health care professional—often a clinic nurse or pharmacist who has had special training—can provide the hands-on education. Studies have shown that when pharmacists who are competent in asthma management, including inhaler technique, work with physicians to optimize the education and overall management of patients with asthma, better outcomes often result, including a reduction in both emergency department visits and hospitalizations.[1,39,40]

Use videos to demonstrate correct technique. Videos are an effective teaching tool,[9] and many of them are device-specific. National Jewish Health, which is world renowned for its asthma care, has a set of instructional videos posted on YouTube and accessible from its Web site (http://www.nationaljewish.org/healthinfo/medications/lung-diseases/devices/instructional-videos). In addition to videos that demonstrate the use of an MDI alone and an MDI plus a valved holding chamber, the site has links to 6 DPI videos, each covering a different device.

Use intermittent observation. After the patient views the appropriate video, you or a member of your staff will still need to observe the patient's inhaler technique to ensure correct use. Ideally, this should occur at every visit.[1,37] When that's not possible, use intermittent observation, starting with the first 2 or 3 visits after the introduction of inhalation therapy and then switching to periodic observation to ensure that the patient is maintaining good technique.

In determining how often observation is necessary, keep in mind that simply *asking* patients whether they are having inhaler problems is not sufficient.[1] Patients tend to say they have little or no trouble when, in fact, most struggle, at times, with the devices. What's more, good technique tends to decrease over time, and repetitive education is important.

To motivate patients, try this communication technique

Motivational interviewing, a technique that has been used to help patients battle obesity, quit smoking, and control hypertension,[41-43] among other health problems, can help you identify inhaler problems that need to be addressed. It involves the use of open-ended questions (eg, "What worries you most about your asthma?"), affirmations ("You've done a great job testing your peak flow level every morning"), reflective listening ("You're tired of taking medicine every day"), and summary statements ("You know you should take your medicine every day but you're having trouble remembering it. Is that right?").

A pilot study[44] showed that when this technique was incorporated into an asthma education session, patient motivation increased. The ratio of perceived advantages vs disadvantages of taking asthma medication correctly improved, as well. Another study[45] found that when motivational interviewing was used during home visits to inner-city African American adolescents for asthma care, the patients' motivation, readiness to adhere to treatment, and asthma-related quality of life improved, although self-reported adherence to asthma medication did not. Further studies involving patients with asthma are under way (www.clinicaltrials.gov/ct2/results?term=asthma).

It is important to note that the use of motivational interviewing does not require a lengthy visit. One study found that on average, visits in which primary care physicians used this communication technique lasted less than 10 minutes.[46] JFP

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TABLE W1

Inhaler problems in primary care: A detailed look at the research

Study (number of participants)	Age (years)	Device used	Findings/comments
Hilton[13] (422)	All ages	MDI (63%) MDI + spacer (9%) DPI (28%)	25% of participants had inadequate technique* Less than half (45%) of MDI users had good technique
Dompeling[14] (50)	32-73	DPI	27% had inadequate technique*
Verver[15] (48)	15-85	DPI	94% did not use correct technique† Intervention group (received DPI training) had significant reduction in number of errors and reported less dyspnea
Dickinson[16] (173)	All ages	Various devices	At initial visit, 16% had good technique; after 12 months' education, 82% had good technique
Hesselink[17] (558)	16-75	DPIs (93%) MDI (7%)	24% had ≥1 "essential" mistake‡
Giraud[20] (3955)	>15	MDI	Misuse by 71% of patients;§ misuse resulted in reduced asthma stability (AIS score: 3.93 vs 2.86, *P*<.001)
Molimard[18] (3811)	All ages	MDI (14%) DPI (86%)	76% of MDI users made ≥1 error, as did 49%-55% of DPI users
Meulepas[19] (260)	≥40	MDI MDI with spacer DPI	At baseline, 41% of the intervention group (n=137) and 47% of controls (n=123) had correct technique; after 2 years of education, 54% of intervention group had correct technique vs 29% of controls

*Using 4-step scoring system developed by Hilton et al.[13]

†Using 9-step scoring system.

‡Per standardized inhaler-specific checklist.

§Misuse was defined as ≥1 error or the omission of ≥1 essential step.

AIS, asthma instability score; DPI, dry powder inhaler; MDI, metered dose inhaler.