# Breathe Easy By Avoiding Common Errors With Inhaled Devices

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Inhalation as a route of administration is an ideal method used to treat asthma or chronic obstructive pulmonary disease (COPD). This route of administration provides direct contact with lung tissue, often quickly controlling untoward symptoms. Inhaled medications are considered by many persons to be beneficial because they can be taken at a lower dose than oral medications and are relatively easy to administer in an emergency through a mask device or to an intubated patient. These devices contain a single medication or a combination of medicines such as a corticosteroid to reduce inflammation in the airways, a bronchodilator to relax the muscles around the airways and increase air flow, a combination of bronchodilators, or a combination of a bronchodilator and a corticosteroid. "Rescue" inhalers used to relieve asthma attacks or sudden breathing problems contain short-acting bronchodilators. They provide temporary relief of wheezing, coughing, chest tightness, and other breathing symptoms (see Table 1).

"Maintenance" inhalers used to control COPD and asthma contain long-acting bronchodilators and corticosteroids. These medications are used typically once or twice daily, even in the absence of symptoms, to reduce swelling for at least 12 hours (see Table 2).[1]

Pressurized metered-dose inhalers (MDIs) typically consist of a small canister of medicine fitted into a plastic body with a mouthpiece. MDIs deliver medication by pressing the canister into the plastic body while inhaling through the mouthpiece. MDIs that allow the use of a spacer make it easier to coordinate inhalation and device actuation, thus improving medication delivery to the airway.

Dry-powder breath-activated inhalers are preloaded with the medicine already inside the device or have a capsule that must be inserted into the inhaler and punctured by the device before each dose is inhaled. Prior to use, a single dose of the powder needs to be loaded into the mouthpiece, often by turning or twisting the inhaler body until a "click" signals the dose is ready to be inhaled. A single dose is simply delivered by taking a deep breath while the lips are sealed around the inhaler.[1]

Although they are a breakthrough for many persons, inhaled medicines will only work if they are delivered correctly into the lungs using the inhaler. Little or no medicine reaches the lungs if the inhaler device is used incorrectly. The correct use of an inhaler depends on its type, and each device has its own unique directions. Even though pharmaceutical companies provide detailed instructions for consumers, including short videos online to help visualize the proper administration technique, it has been suggested that up to 94% of people with asthma and COPD use their inhalers incorrectly.[1–3] Although many of the errors occur in the home, even health care providers are known to make the same mistakes.[1] Given the variety of misadministration issues, it is not uncommon for patients to present to the emergency department, believing that their inhaler is broken or empty when their symptoms have not subsided. In one case, a patient newly diagnosed with asthma returned for care because of a lack of symptom management. When asked about his inhaler, the patient described using his inhaler in his house without success, so he started to use it in his car with the windows up (because he knew that it was a more confined space). He described releasing the inhaler into the air, and then breathing deeply for 15 minutes. He said he had been taught how to use his inhaler by his physician, who during his visit, held the device in the air and released 2 puffs to demonstrate its use.[4]

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*ISMP is a nonprofit organization that works closely with health care practitioners, consumers, hospitals, regulatory agencies, and professional organizations to educate caregivers about preventing medication errors. ISMP is the premier international resource on safe medication practices in health care institutions. If you would like to report medication errors to help others, E-mail us at: ismpinfo@ismp.org or call (800)FAIL-SAF(e). This Medication Error Reporting Program keeps information confidential and secure. We will include only the level of detail that the reporter wishes in our publications.

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J Emerg Nurs 2017;43:268-71.
0099-1767



http://dx.doi.org/10.1016/j.jen.2017.03.004

TABLE 1
**Common rescue inhalers in the United States**

| Generic name | Brand name(s) | Inhaler type |
|---|---|---|
| Albuterol (short-acting bronchodilator) | ProAir HFA<br>Proventil HFA<br>Ventolin HFA | Metered-dose inhaler |
| | ProAir RespiClick | Dry-powder breath-activated inhaler |
| Levalbuterol (short-acting bronchodilator) | Xopenex HFA | Metered-dose inhaler |

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A number of common mistakes are made with most types of inhalers that have been around for many years. ED staff should be familiar with these mistakes and be prepared to coach patients on proper use of inhalers.[5–7] Simple actions such as not completely exhaling before a dose, not forming a tight seal around the mouthpiece with the lips, or not holding their breath long enough after inhaling a dose can have an impact on administration. It is not uncommon to have a patient present for care after trying to use an "empty" inhaler, believing it still contains medicine. These actions have a direct impact on medication administration. Some newer inhalers now have a dose counter to track usage or a locking mechanism that does not allow the user to prepare another dose if the device is empty.

When using a pressurized MDI device, common errors occur, including failing to shake the canister or prime the inhaler, which can result in administration of only a partial dose. Aiming the inhaler at the tongue or upper palate rather than the throat also can create suboptimal results.[5,6]

A number of errors have been reported to the Institute for Safe Medication Practices (ISMP) with the use of the newer dry powder devices.

- A patient discharged from the hospital with a Spiriva HandiHaler was readmitted 3 days later after taking 3 Spiriva capsules by mouth each day. He was unaware that the drug was intended to be inhaled.
- A color-blind patient was unable to tell if the indicator window on a Tudorza Pressair inhaler was red or green. The window turns green when the inhaler is loaded with a dose and ready to use, and red when the dose has been completely inhaled.
- In the pharmacy, an order for Incruse Ellipta was mistaken as "Increase Ellipta," and the pharmacist dispensed Breo Ellipta, the only "Ellipta" inhaler with which he was familiar.[6]

Errors with these devices include failing to load a dose before inhaling or holding the mouthpiece upside down during and after loading a dose. In some cases, the capsule containing the medication is not replaced or pierced prior to each dose, or in some cases, as previously described, the capsule has been administered orally. It is also vitally important to teach patients that placing the capsule *into the inhaler mouthpiece instead of the chamber that is designed to hold the capsule* can result in swallowing or choking on the capsule during inhalation.[5,6]

The final type of adverse event with inhaled medications are those that are a result of an omission of therapy. A recent study in Pennsylvania identified more than 8700 reported omissions of respiratory treatments in inpatients during a 5-year period, and these omissions were the highest among patients 61 to 90 years of age. Missed doses were associated with a variety of contributing factors including missing medications, lack of resources (personnel), patient refusal, and miscommunication of dose requirements. Luckily, only a few of these cases resulted in patient harm.[8]

ED practitioners are in an ideal position to have an impact on the proper use of inhaled medications. Initially, ED nurses should assess the patient's understanding of inhaler use, either during the intake triage process, during administration of the inhaler, or later in discussion before discharge. Staff also should have the authority to request assistance from respiratory colleagues for help with inhaler instruction if it is noted that the patient has a lack of knowledge of proper device use. Many free resources are available from pharmaceutical companies for both staff and patients. In addition, a free reference copy of a poster outlining inhaler types and safety considerations can be downloaded at https://www.ismp-canada.org/download/InhalationDevices-ReferencePoster.pdf.[4]

Inhaled medications can make significant contributions to improved patient outcomes for a variety of disease states. Understanding proper administration techniques and ensuring patient understanding of these common errors can help improve administration of these medications, allowing everyone to breathe easier.