

Back to the Future: Using Inhalers Correctly

The more things change, the more they stay the same. This old French saying seems to apply rather aptly to the situation faced by respiratory clinicians using inhaled therapy for their patients with obstructive lung disease. Since the development of the pressurized metered-dose inhaler (pMDI) in 1956, inhaled medication has become the standard of care for both asthma and chronic obstructive pulmonary disease.^{1,2} Since the mid-1970s it has become clear that more than 50% of adults, and even more children, do not use their pMDIs correctly.³ Data are available to show that poor inhaler technique leads to decreased asthma control with inhaled steroids⁴ and decreased bronchodilation with inhaled bronchodilators.⁵ The most common crucial error made when using a pMDI is incorrect timing of device actuation with taking a breath, sometimes referred to as poor hand-lung coordination.⁶

In addition to a constant call for patient education in inhaler use there have been multiple developments in inhaler technology to try to overcome this problem, including spacers for pMDI, dry-powder inhalers (DPIs) that are breath-actuated, breath-actuated pMDIs, and, most recently, soft mist inhalers.⁷ DPI is the most prevalent alternative to pMDI, since many of the newer potent inhaled steroids and long-acting β agonists are only available in DPI. Although DPIs are considered simpler to use than pMDIs,⁸ a well done evidence-based guideline found no difference between available devices for aerosol therapy.⁹ That report has been criticized because it was based only on randomized controlled studies, which, by their very nature, will only include patients who demonstrate ability to use the devices being tested and are taught correct technique prior to study entry.¹⁰

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In this issue of *RESPIRATORY CARE*, Khassawneh and colleagues present observational data on a cohort of 300 patients who used various inhaler devices, referred to 3 pulmonary clinics in Jordan.¹¹ Pharmacists made 524 observations of patient technique in using pMDI without a spacer ($n = 193$), Turbuhaler ($n = 146$), Diskus ($n = 103$), and Aerolizer ($n = 83$). The rates of misuse observed were 74.6%, 43.2%, 6.8%, and 16.9%, respectively. The rate of pMDI misuse is similar to the 76% rate of misuse reported by Molimard et al in a similar French study of 3,811

patients in primary care.¹² Molimard et al also found that the error rate was significantly less with DPI use, but still about 50%. Interestingly, a recent German study reported in abstract form, by Wieshammer et al, found that their cohort of 224 patients referred for pulmonary consultation misused the Aerolizer 9.1%, Discus 26.7%, HandiHaler 53.1%, and Turbuhaler 34.9% of the time.¹³ They did not assess pMDI use.

In both the Khassawneh et al¹¹ and Wieshammer et al¹³ studies the Aerolizer (a single capsule dose DPI) appeared to have a low overall error rate. It is hard to envision why the HandiHaler appeared to have a much higher rate of misuse in the Wieshammer et al study, since it is also a similar single capsule dose DPI. This approximate 50% misuse of the HandiHaler was also seen in another study 4 weeks after initial training.¹⁴ Of the DPIs, the Turbuhaler appeared to be misused consistently worse in the 3 studies that assessed it. Khassawneh et al conclude that “DPI devices had significantly lower rates of incorrect handling, when compared with the pMDI.”

I would find this argument much more compelling if the pMDI in their study was used with a spacer, especially since the most common error, seen two thirds of the time, was at the step “Trigger and simultaneously breathe in,” which is the very step that would be most benefited by use of a spacer. As they admit, spacers were not commonly used among their patients, either because their primary care physicians did not prescribe them, they were not readily available, or the patients found them inconvenient.

Of greater concern, Khassawneh et al found that the use of more than one type of inhaler increased the odds of incorrect handling of the inhaler. Since many of the controller medications for both chronic obstructive pulmonary disease and asthma are now in DPIs, and all the rescue inhalers are in pMDIs (though pirbuterol comes in a breath-actuated pMDI),⁸ most patients with obstructive lung disease will probably have at least 2 types of inhalers to use, which might increase their rate of inhaler misuse. The bane of the pulmonary clinician’s treatment of obstructive lung disease is that patient compliance with an aerosol medication regimen is a combination of adherence to the regimen and proper use of the device.¹⁵

And so we are “back to the future.” Although Khassawneh et al and others may have shown that DPIs are misused less than pMDIs, they are still misused to a substantial degree, which will probably lead to poor disease

control in those who misuse them. The only way to know if your patient is misusing the inhaler is to have the patient demonstrate the technique. Education on proper technique should be given by the prescriber and others who are trained to teach correct inhalation. If hand-lung dis-coordination with pMDI is the problem, then a spacer may well be of benefit. A spacer/mask combination or even a nebulizer for very young children or the elderly with cognitive impairment can be effective.^{8,16} In the words of the European Aerosol Drug Management Improvement Team, "Regular checking of inhalation technique by prescribers is crucial, as correct inhalation is one of the keystones of successful asthma management."¹⁷

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REFERENCES

1. American Thoracic Society/European Respiratory Society Task Force. Standards for the Diagnosis and Management of Patients with COPD. Version 1.2. New York: American Thoracic Society;2004. Updated October 8, 2007.
2. National Asthma Education and Prevention Program Expert Panel Report 3: guidelines for the diagnosis and management of asthma. NIH Publication Number 08-5846. October 2007.
3. Crompton GK. How to achieve good compliance with inhaled asthma therapy. *Respir Med* 2004;98(Suppl B):S35-S40.
4. Giraud V, Roche N. Misuse of corticosteroid metered-dose inhaler is associated with decreased asthma stability. *Eur Respir J* 2002;19(2): 246-251.
5. Lindgren S, Bake B, Larsson S. Clinical consequences of inadequate inhalation technique in asthma therapy. *Eur J Respir Dis* 1987;70(2): 93-98.
6. Konig P. Spacer devices used with metered-dose inhalers: breakthrough or gimmick? *Chest* 1985;88(2):276-284.
7. Newman SP. Inhaler treatment options in COPD. *Eur Respir Rev* 2005;14:102-108.
8. Geller DE. Comparing clinical features of the nebulizer, metered-dose inhaler and dry powder inhaler. *Respir Care* 2005;50(10):1313-1321.
9. Dolovich MB, Ahrens RC, Hess DR, Anderson P, Dhand R, Rau JL, et al. Device selection and outcomes of aerosol therapy: evidence-based guidelines. *Chest* 2005;127(1):335-371.
10. Crompton GK, Barnes PJ. Aerosol delivery devices. *Chest* 2006; 129(5):1388-1389.
11. Khassawneh BY, Al-Ali MK, Alzoubi KH, Batersseh MZ, Al-safi SA, Sharara AM, Alnasar HM. Handling of inhaler devices in actual pulmonary practice: metered-dose inhaler versus dry-powder inhaler. *Respir Care* 2008;53(3):324-328.
12. Molimard M, Raherison C, Lignot S, Depont F, Abouelfath A, Moore N. Assessment of handling of inhaler devices in real life: an observational study in 3811 patients in primary care. *J Aerosol Med* 2003;16(3):249-254.
13. Wieshammer S, Dreyhaupt J. Dry-powder inhalers in asthma and COPD: which factors determine the frequency of handling errors? A study of Aerolizer, Discus, HandiHaler, and Turbuhaler (abstract). *Chest* 2007;132:479S.
14. Dahl R, Backer V, Ollgaard B, Gerken F, Kesten S. Assessment of patient performance of the HandiHaler compared with the metered-dose inhaler four weeks after instruction. *Respir Med* 2003;97(100): 1126-1133.
15. Everard ML. Regimen and device compliance: key factors in determining therapeutic outcomes. *J Aerosol Med* 2006;19(1):67-73.
16. Allen SC, Ragab S. Ability to learn inhaler technique in relation to cognitive scores and tests of praxis in old age. *Postgrad Med J* 2002;78(915):37-39.
17. Crompton GK, Barnes PJ, Broeders M, Corrigan C, Corbetta L, Dekhuijzen R, et al. The need to improve inhalation technique in Europe: a report from the Aerosol Drug Management Improvement Team. *Respir Med* 2006;100(9):1479-1494.

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