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Increasing participation in and improving outcomes from pMDI training

Mark Sanders

Clement Clarke International Ltd.

A recent report by the Healthcare Quality Improvement Partnership about deaths from asthma in the UK reminds us that, despite the medical and pharmaceutical communities' best efforts, asthma remains a killer.[1] The report contains many recommendations, one of which emphasizes "how," "why" and "when" to use asthma therapy, as well as the recognition of situations in which asthma is not controlled and emergency advice should be sought. The Global Initiative for Asthma repeatedly draws attention to inhaler technique and to checking technique before stepping up medication.[2] Therefore, pressurized metered dose inhaler (pMDI) technique training remains a significant issue, impacting not only disease control but healthcare professional time and therapy costs. pMDI training should be a "carbon copy" experience for the patient, with ample opportunity to practice correct inhaler use safely and repeatedly.

Impediments to pMDI delivery

The "distinct impediments" to pMDI drug delivery have been defined as: compliance (the ability to adhere to a regimen), competence (the ability to understand an instruction) and contrivance (the seemingly perverse ability, despite comprehension, to use a device in an incorrect manner).[3] These are frequently confused and/or amalgamated. Inhaler technique training should focus mainly on competence while reducing contrivance. The available tools and personnel are a combination of patient instruction leaflets, the pharmacist, and the healthcare professional, employing placebo pMDIs or other training aids (for example, the 2-Tone Trainer from Canday Medical and the In-Check Dial from Clement Clarke International). Patients, however, also use the internet and ask family members and friends who use pMDIs. These "more accessible resources" can provide poor technique under the guise of authority. The one person who is best-placed to impact pMDI training is the healthcare professional, yet he or she may not be personally affected by lung disease, has never used a pMDI, and be reluctant to inhale repeatedly from a placebo product. In addition, time is tight and training budgets are low.

To help address this, a respiratory training initiative, the Isle of Wight Respiratory Inhaler Project, was conducted in 2010-2011. The outcome was a powerful message: when healthcare professional and patient-focused training delivery were consistent and improved, the result was a seven-fold return on training aid investment, in terms of reduced bronchodilator treatment costs, a halving of emergency asthma admissions and a 75% reduction in deaths.[4]

Simple training aids

The core steps to correct pMDI use (Table 1), therefore, need to be second nature and trainers must be alert to common mistakes, most of which relate to coordination of canister actuation and inspiratory maneuver. An in-house research program at Clement Clarke International has resulted in two simple training aids: the Trainhaler and the In-Check Flo-Tone. The Trainhaler is a true simulator of pMDI use. It contains no propellants (using only air to generate the "whoosh") and its appearance and functionality are that of a pMDI (Figure 1). It enables the healthcare professional and patient to repeatedly demonstrate and practice pMDI use without concerns relating to placebo.

Correct pMDI technique

pMDI Instruction Steps

(Mistakes commonly made by patients are shown in purple text)

Check pMDI for debris and shake before use

Exhale fully

Put inhaler into mouth, over teeth and seal lips around mouthpiece

Inhale gently

Press canister

Continue inhaling for about 5 seconds

Hold breath for 10 seconds

Wash mouth out with water-Spit out

Figure 1

Trainhaler (pMDI training device) + Flo-Tone (coordination device)

The Trainhaler is used with the Flo-Tone attachment (Figure 1). It makes a sound like a whistle when the user is inhaling at a flow rate appropriate to actuate the canister (Figure 1) and can guide inhalation duration.

Research with the Flo-Tone has shown: competence by users (from age 7 years), the ability to generate and maintain an adequate inspiratory flow rate, and overall technique in adults has been significant, and Flo-Tone is without effect on the *in vitro* proportion of respirable particles.[5-7] As the Trainhaler is essentially a pMDI facsimile training tool, no aerosol performance studies exist. Results are now awaited from a study in asthma and COPD patients about the effect of Trainhaler + Flo-Tone use on drug usage, exacerbations and hospitalizations. UK and US clinical handling data, however, are currently available.[8-9] The overall study designs were similar, assessing mainly adult (n= 69), largely pMDI-naïve volunteers (n= 55) through scored assessments of pMDI technique following instruction with pMDI or Trainhaler + Flo-Tone patient instruction leaflets but no additional coaching.

In the UK study, three of five assessed tasks ("start to inhale gently," "press canister" and "continue inhaling for about 5 seconds") showed significant improvement ($p = < 0.05$) following Trainhaler + Flo-Tone usage. The "breathe out fully" task was not significantly different. The "put inhaler into mouth, over teeth and seal lips around mouthpiece" task was not tested owing to top scores before and after instruction. An overall mean score was determined in the US study, with the Trainhaler + Flo-Tone usage scoring 17.3 out of a maximum score of 22 from 14 assessments; patient instruction leaflets a score of 15.1 ($p = < 0.05$); and the no-instruction control group 12.9 ($p = < 0.01$). Interestingly, the "start to inhale" and "continue inhaling" tasks were also singled out in the US study (plus the "breathe out fully" task) as being the main differences. For patients with a history of years of pMDI misuse, a single training session was insufficient, suggesting that repeated practice with Trainhaler + Flo-Tone at home would be beneficial and/or use of the Flo-Tone as an attachment to a treatment pMDI.

Training goals for the future

We need a substantial shift in the current approach to pMDI training and goals to achieve beyond new training aids. Training should not be an intermittent review process but become a routine part of "taking medicine." The capability to train should no longer be a poor relation but be properly recompensed. It should be possible—and essential—to reproduce and maintain the Isle of Wight Respiratory Inhaler Project findings.[4] We should strive to improve training itself and outcomes from better training. Training aid companies need to extend their collaborations to encourage uptake of training devices. We should also investigate the benefits of formal record keeping, promoting patient interest in self-support and exploring daily/regular versus intermittent use of training tools.

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Mark Sanders is Managing Director of Clement Clarke International Ltd., Edinburgh Way, Harlow, CM20 2TT, UK, Tel: +44 1279 414969, msanders@clement-clarke.com. Website: www.clement-clarke.com. Mark is also an acknowledged expert in the history of inhalation devices, info@inhalatorium.com. Website: www.inhalatorium.com.