Delivery of inhaled medicines with pMDIs and spacers

Note: Breath-actuated metered-dose inhalers cannot be used with a spacer.

Use of a pMDI without a spacer

Inhalation technique

Manufacturers of most pMDIs recommend shaking the device before actuating. The physical characteristics of each formulation, including the effects of shaking, differ widely but, for simplicity, it is best always to recommend shaking of pressurised metered-dose inhalers.

pMDIs require coordination of actuation with inhalation. Failure to achieve this is a common error among patients using pMDIs.[Price 2017]

Poor inhaler technique with ICS-containing medicines can reduced medication efficacy and lead to increased risk of hospitalisations and emergency room visits, and poor asthma control.[McIvor 2018]

Resources

National Asthma Council Australia's **how-to videos on inhaler technique for all device types**

National Asthma Council Australia and NPSMedicineWise **Checklists for correct use of common inhaler types**

When can a pMDI be used without a spacer?

In practice, optimal delivery of inhaled medicines involves a balance between maximising the proportion of respirable medicine and maximising efficiency of inhalation by the patient within real-world constraints. The optimal delivery of salbutamol in real-world circumstances is not well defined.

For day-to-day use of salbutamol, most adults gain sufficient relief from symptoms when using a pressurised metered-dose inhaler on its own. A spacer may only be needed during a flare-up.

The use of a spacer is always recommended for ICS delivered by manually actuated pressurised metered-dose inhalers, to reduce the risk of local adverse effects and increase delivery to the airways.

For children, a spacer should always be used with pMDIs. A face mask attached to the space is used for young children unable to form a tight seal on the spacer mouthpiece.

Spacers

pMDIs can be used with a spacer to obviate the need to coordinate inhalation with actuation and help optimise drug delivery, enhance lung deposition, and reduce systemic side effects by minimising oropharyngeal deposition of medication.[McIvor 2018]

Spacers are designed to increase delivery of aerosol medications to the lungs while reducing oropharyngeal deposition. A spacer can improve medication deposition to lower airways by up to 50%.[Thorsson 1998]

Spacers should always be used when taking ICS.

When a spacer is used with a pMDI, delivery of the medicine to the patient's airways is maximised when the patient takes a slow, deep breath from the spacer after each actuation.[Barry 1994, Rau 1996]

Resources

National Asthma Council Australia's factsheet on **AeroChamber Plus* Flow-Vu* Spacers for pressurised metered-dose inhalers**

National Asthma Council Australia's **Spacers for pressurised metered-dose inhalers**

Standard (single-breath) technique

Multiple actuations of a pressurised metered-dose inhaler into a spacer can reduce the amount of respirable medicine available, because aerosol particles can agglomerate into larger particles or become attached to the spacer walls.[Barry 1994]

The ideal way to deliver inhaled medicines via pMDI and spacer is to shake the device, ask the person to breathe out all the way into the spacer, actuate a single puff into the spacer, and have the person immediately take a slow deep breath from the spacer, then hold their breath for 5 seconds. This process should be repeated until the total intended number of actuations has been taken.

Patients should be trained to follow these instructions when using their inhalers. Inhaling slowly with a single breath maximises delivery of the medicine to the lungs and minimises deposition in the upper airways when using a manually actuated pMDI with or without a spacer, or when using a breath-actuated pressurised metered-dose inhaler.[Laube 2011]

Resources

National Asthma Council Australia's **how-to videos on inhaler technique for all device types**

Tidal breathing technique

Slow breathing may not be possible for patients with acute asthma, very young children, or for some patients with cognitive impairment or reduced manual dexterity. Tidal breathing through the spacer (e.g. four breaths in and out without removing the spacer) is used in these situations.

First aid instructions should include how to use inhaler and spacer.

Care of spacers

Priming before first use

Check instructions for new spacers.

In the past, most plastic spacers required washing or priming with multiple actuations before first use to reduce electrostatic charge, which compromised delivery of the medicine. Manufacture of these types of spacers has been discontinued, but some may still be available for sale until stock depleted.

Spacers with an antistatic inner lining do not need priming as they do not accumulate electrostatic charge.[Vincken 2018]

Cleaning

Spacers should be cleaned monthly and after the resolution of any respiratory tract infection.

To clean a spacer:

- Dismantle as per manufacturer's instructions, if necessary.
- Wash parts in warm water with liquid dishwashing detergent.
- Allow to air dry without rinsing.
- Reassemble carefully, if necessary.

Spacers remain effective for a period between 6 and 12 months, depending on use and type. The should be replaced annually.

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Resources

Rigby D. **Inhaler device selection for people with asthma or chronic obstructive pulmonary disease**. Aust Prescr 2024; 47: 140-147.

National Asthma Council Australia's **Spacer use and care**

National Asthma Council Australia's factsheet on **AeroChamber Plus* Flow-Vu* Spacers for pressurised metered-dose inhalers**

National Asthma Council Australia's **Spacers for pressurised metered-dose inhalers**