Medicines Management and Pharmacy Services

Leeds Centre for Respiratory Medicine

The Leeds Inhaler Device Guide:

Inhaler Technique Instructions for Healthcare Professionals and Patients

1st Edition

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Contents

Glossary of Drug Classes

SABA	Short-Acting Beta$_2$-Agonist
SAMA	Short-Acting Muscarinic Antagonist
LABA	Long-Acting Beta$_2$-Agonist
LAMA	Long-Acting Muscarinic Antagonist
ICS	Inhaled Corticosteroid

The following brand names and registered trademarks mentioned throughout this guide are acknowledged:

Inhaler Devices:

Accuhaler®, Aeroliser, Autohaler®, Breezhaler®, Clickhaler®, Easi-Breathe®, Easyhaler®, Ellipta®, Forspiro®, Genuair®, HandiHaler®, NEXThaler®, Novolizer®, pMDI, Podhaler®, Pulvinal®, Respimat®, Spiromax®, Turbohaler®, Turbospin®, Twisthaler®, AeroChamber® Plus, AeroChamber® Plus for Infant or Toddler, Able Spacer®, A2A Spacer®, DispozABLE® Spacer, Optichamber® Advantage, Optichamber® Diamond, Pocket Chamber®, Space Chamber Plus®, Volumatic® Spacer, Vortex®

Brand names:

AirFluSal®, Airomir®, AirSalb, Anoro®, Asmabec, Asmanex®, Asmasal, Atimos Modulite®, Atrovent®, Bricanyl®, Budelin®, Clenil Modulite®, Colobreathe®, Duaklir®, DuoResp®, Eklira®, Flixotide®, Flutiform®, Foradil®, Fostair®, Incruse®, Neovent®, Onbrez®, Oxis®, Pulmicort®, Qvar®, Relvar®, Salamol, Salbulin®, Seebri®, Seretide®, Serevent®, Sirdupla™, Spiolto®, Spiriva®, Striverdi®, Symbicort®, Tobi®, Ultibro®, Ventolin®, Vertine.

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Acknowledgement for the use of promotional product images is specified in each monograph. Where no promotional product images were available, photos of placebo inhalers are used.

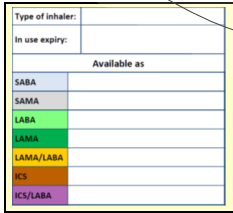
How to Use the Leeds Inhaler Device Guide

Prior to prescribing any new inhaler, each patient should receive training and education in the use of the inhaler device and have demonstrated satisfactory inhaler technique.[1,2,3] Additionally, correct inhaler technique should be assessed regularly at each clinic visit, and following an exacerbation.[1,2] If a patient is unable to use a particular device correctly, an alternative device should be used.[1]

Decisions about which inhaler device should be prescribed for any patient is complicated by the wide range of inhaler devices available in the UK market. As of the end of 2015, there are 21 different inhaler devices licensed for treating patients with asthma, COPD or cystic fibrosis. This guide aims to provide both healthcare professionals and patients with information about how to use each inhaler device, as well as describing key features of each device and essential 'need to know' details to explain the critical steps required to use each device correctly.

The Leeds Inhaler Device Guide does not aim to make any recommendation about which inhaler device should be prescribed for any patient. The choice of device to prescribe will depend on a number of factors, including indication, local formularies, how easy the inhaler device is for any individual to use, patient preference, and cost. However, it is important to remember that **the best inhaler device is the one that the individual patient can use.**

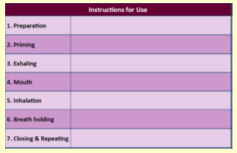
Components of Inhaler Device Monographs



This section provides background information on the type of inhaler device in each monograph; whether it is a pressurised metered dose inhaler (pMDI), a breath-actuated pMDI, Soft Mist Inhaler, or a dry powder inhaler.

If patients require more than one inhaler device to manage their respiratory disease, a list of drugs available in each device is provided, divided by class of drug. This may aid prescribing decisions, to ensure consistency of prescribing patterns.

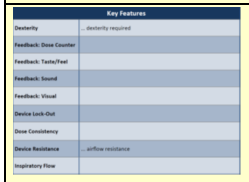
As many inhaler devices may have relatively short in-use life span, this information is provided in the 'Expiry' section.



The Instructions for Use section of the monograph provides detailed guidance on exactly how to use each inhaler device.

To provide a consistent approach to using inhaler devices, this has been standardised into 7 steps.

The important critical steps that are required to obtain the most benefit from each inhaler device are highlighted in bold text.



The Key Features section outlines different aspects of inhaler devices that may help healthcare professionals and patients understand how easy or hard different devices are to use.
A subjective assessment has been made of the complexity of the inhaler device and the level of *Dexterity* that patients may need to have to operate it effectively. Devices described as requiring a high level of dexterity may not be suitable for people with physical impairment.
Description of the *Feedback* mechanisms of each inhaler device illustrates ways in which patients may know that they have used their inhaler correctly, or know whether it is empty. Some devices have a *Lock-Out* mechanism that prevents anyone operating an empty inhaler device, making it clear when a new inhaler is required.
The *Dose consistency* describes the variation in the dose received by the patient, as this often depends on how hard or fast they inhale through the device.
The *Device Resistance* describes how hard it feels when inhaling through this inhaler device. Further explanation of this is described later. This information will be useful to adjust settings of In-Check DIAL inspiratory flow meter (available quarter 2 2016) to measure whether patients can inhale through different inhaler devices at the correct speed of inhalation. This required speed of inhalation to receive a clinically effective dose is described in the *Inspiratory Flow* section.

This section describes the essential 'need to know' details to explain the critical steps required to use each device correctly.

Types of Inhaler Device

There is a wide variety of different inhalers currently on the market, and can be broadly classified into pressurised metered dose (pMDI), dry powder (DPI), breath-actuated MDI (BA-MDI) and soft mist.

• Pressurised metered-dose inhalers

pMDIs are widely prescribed as they are cheap and can deliver a wide variety of medications.[4] Despite their wide prescription many patients cannot use pMDIs correctly, even with education and training.[5-7] One study reported that only 79% of patients could use a pMDI correctly after expert training.[8] Many of the difficulties with pMDIs are related to the need to coordinate activation of the device while inhaling slowly and deeply; and approximately 60 and 92% of patients with COPD and asthma, respectively, inhaling too fast from a pMDI.[9,10] The optimal inspiratory flow rate through a pMDI is 25-60 L/min, equivalent to taking a full deep inspiration over 3-5 seconds. When patients are taught to use pMDI devices, they should be advised to inhale **slowly and steadily** through the inhaler.

The use of extra-fine particle pMDIs (e.g. Qvar, Fostair) has been shown to demonstrate equivalent efficacy to other pMDIs but with a reduced equivalent dose of corticosteroid.[11-14] These have been reported to be less dependent upon good inhaler technique than other pMDIs due to longer duration of aerosol emission[15] and lung deposition being affected less by inspiratory flow[16] and coordination.[17]

A spacer is a device that is attached to a pMDI, and produces a reservoir into which the drug aerosol can be generated. This allows the patient to actuate the pMDI without having to coordinate inhalation. There is evidence that the addition of a spacer can increase deposition within the lung of the patient.[18]

• Breath-actuated metered-dose inhalers

BA-MDIs, such as Autohaler and Easi-Breathe devices, are a development from the original pMDIs. They contain a flow trigger, and the drug is released only when the patient inhales through the inhaler device. BA-MDIs may improve the deposition of aerosol within the lungs of patients who have difficulty coordinating inhalation and actuation of pMDIs.[17,19] When patients are taught to use BA-MDI devices, they should be advised to inhale **slowly and steadily** through the inhaler.

• Soft mist inhalers

The only current device on the European market is the Respimat. This does not require a propellant or the patient's inspiratory flow to generate an aerosol. The aerosol is generated by a spring that forces the liquid drug formulation through an extremely fine nozzle system, resulting in an aerosol containing a high fine particle fraction.[20] The Respimat has a long aerosol generation time and a low aerosol velocity. These features reduce problems with coordination of actuation and inhalation, and result in a higher lung and lower oropharyngeal deposition.[20] When patients are taught to use a Respimat, they should be advised to inhale **slowly and steadily** through the inhaler.

• Dry powder inhalers

There are a number of DPIs currently available on the market. Some of these devices are single dose, such as the HandiHaler, Breezhaler or Aerolizer, which require loading of a capsule containing the drug in powder form. Others are multiple dose, such as Turbohaler, Accuhaler, Genuair, Ellipta or NEXThaler.

One of the main advantages that DPIs have over pMDIs are that the generation of the drug aerosol is driven by the patient's inhalation. As a consequence there is no need for an aerosol propellant, or for coordination between actuation of the device and inhalation. DPIs are designed so that force of inhalation creates turbulence within the device, which deaggregates (breaks down) the powder into fine particles that are small enough to be deposited in the lungs.

This turbulence is created by the inspiratory flow generated by the patient through the inhaler device and the internal resistance of the inhaler device itself. This means that low-resistance inhaler DPI devices (such as the Breezhaler) require much faster inspiratory flows than through high-resistance DPI devices (such as the Easyhaler or HandiHaler). If a person cannot generate sufficient inspiratory flow then the drug may not be delivered optimally, as insufficient deaggregation of the dry powder will occur, and large drug particles will be inhaled, which will deposit mainly in the mouth and oropharynx rather than in the lungs. When patients are taught to use any DPI device, they should be advised to inhale as **quickly and deeply** as possible through the inhaler.

Use of placebo inhalers

For infection control reasons, placebo inhaler devices should be for 'single patient use' only.

Placebo inhaler devices are obtained free-of-charge from manufacturers via their drug reps, or by directly contacting the manufacturer. Ordering information for placebo devices has been collated by the London Medicines Evaluation Network, and is available at: http://www.medicinesresources.nhs.uk/upload/Availability%20of%20placebo%20inhalers%20FINAL_June13_LMEN.pdf

As it is often difficult to obtain enough placebo inhalers to assess inhaler technique prior to prescribing every new inhaler device, their use is often rationed to use with patients where there is deemed to be a greatest need to teach inhaler technique prior to prescribing inhalers. Decisions about whether or not to use placebo inhalers may be assisted through the use of an In-Check DIAL inspiratory flow meter, which provides an objective measure of a person's to inhale correctly through different devices.

- Placebo devices might be used for patients where it is less certain that they would be able to use an inhaler device. These patients must receive training and assessment *prior* to being given a prescription.
- If patients are judged to be more likely to be able to use an inhaler device, a prescription may be written before inhaler technique training and assessment, which would be performed using their new inhaler devices.

Use of In-Check DIAL Inspiratory Flow Meters

This is a useful device to aid inhaler technique assessment. It mimics the internal resistance of a range of inhaler devices allowing the measurement of inspiratory flow rate and ensuring the patient can inhale through devices at clinically effective inspiratory flow rates.[21,22]

The current In-Check DIAL 6T&S (Clement Clarke Ltd, Harlow, UK) is validated for just six inhaler devices (Accuhaler, Autohaler, Easi-Breathe, pMDI, Turbohaler [old and new styles]), and so has limited practical value with the wide range of inhaler devices currently available in the UK.

A new, updated version of the In-Check DIAL inspiratory flow meter is anticipated to be launched in the UK in Quarter 2 2016, which will be able to measure inspiratory flow for all inhaler devices, classified by the intrinsic airflow resistance of each device.

The Leeds Inhaler Device Guide documents the airflow resistance of each inhaler device currently available in the UK, and we recommend the use of these new In-Check DIAL inspiratory flow meters for routine inhaler technique assessment, once they are available in the UK.

Other Tools Available to Assess Inspiratory Flow

- **Inhaler device whistles**

Accuhaler [GlaxoSmithKline]

Ellipta [GlaxoSmithKline]

Turbohaler [AstraZeneca]

Inhaler device whistles are used to assess and ensure patients are able to inhale at, or above, the optimal inspiratory flow necessary to be able to use the device correctly. These are available from the manufacturer.

- **Flo-tone Trainer [Clement Clarke]**

The Flo-Tone trainer is whistle device that attaches to the mouthpiece of a pMDI inhaler device, which is used to teach patients how fast to inhale through pMDI devices. During inhalation, the Flo-Tone will 'whistle', providing an audible signal that the user is inhaling through the pMDI at the correct inspiratory flow and should actuate the inhaler.

Recommendations for Performing Inhaler Technique Assessments

Stepwise Prescribing of Inhaled Medication

1. Confirm the diagnosis
2. Determine the severity of respiratory disease
3. Decide on the class of drug required
4. Teach and assess inhaler technique in order to *Objectively* assess which device the patient can use
    - Is the patient happy with that device?
5. Select the drug that is available in that device

Tips for Practical Inhaler Device Selection

1. Inhaler technique should be assessed prior to prescribing inhalers in patients who have never used inhaled medication before.
2. The In-Check DIAL inspiratory flow meter should be used to determine which device(s) the patient is physically able to inhale through.
3. Assess whether your patient is likely to be able to use the device they can achieve the optimal inspiratory flow through. (Take into account age, dexterity, level of understanding, confusion status etc).
    - If likely to be competent, prescribe required drug and train and assess inhaler technique using new inhaler devices.
    - If competency is doubtful or uncertain, train and assess inhaler technique using placebo device.

Inhaler Technique Assessments

Step 1 - Check inspiratory flow

The In-Check DIAL inspiratory flow meter should be used. Depending on the patient and the drug classes required (e.g. SABA, LAMA, LABA, LAMA/LABA, ICS/LABA etc.), check the patient's inspiratory flow through a range of different devices. It is useful to check inspiratory flow two or three times through each device to ensure that the patient achieves the same inspiratory flows consistently.

Step 2 - Teach correct inhaler technique

Where possible, education on correct inhaler technique requires the healthcare professional to demonstrate correct inhaler technique to the patient. It will be useful to keep your own set of placebos for you to use.

- Data from a small study in asthmatic patients identified that the most successful method of teaching correct inhaler technique is to demonstrate correct inhaler technique using placebo inhalers so that the patient can copy the demonstrator, and to explain each step with emphasis on the critical steps (those that if the patient fails to perform they receive no dose e.g. failing to remove the cap on a pMDI).[23]

Step 3 - Check inhaler technique and check understanding

Once the patient has been taught and shown how to use their inhaler, they should be asked to demonstrate how they would use it. This allows the healthcare professional to check they understand how to use their inhaler device, and to reinforce any steps they are unable to perform correctly.

Step 4 - Educate patient on rationale for using inhaled medication

Adherence to prescribed inhaled medication may be improved if the rationale for using each medicine is explained to the patient. This should also include when and how to use their inhaler devices.

Aerosol science & inhaled medication

- **Effects of particle size on lung deposition**

Depending on their particle size, inhaled drug particles will deposit in different regions of the lung. Particles <1 µm are likely to reach the peripheral airways and alveoli or will be exhaled, particles 1–5 µm will deposit in the large and conducting airways, while particles >5 µm will predominately deposit in the oropharynx.[24,25]

There are three different mechanisms of deposition of aerosols: inertial impaction, sedimentation and diffusion (figure 1). However for the particle size used in aerosol therapies of approximately 1 – 10 µm, only two of these mechanisms predominate: inertial impaction and gravitational sedimentation. The third mechanism, Brownian motion/diffusion is only relevant in aerosols less than 1 micron in diameter, and consequently is unlikely to be important for inhaled drugs.

Inertial impaction occurs in either the oropharynx, or at bifurcations of main branches of the bronchial tree, particularly in the large central airways. It occurs mainly with large particles or high velocity particles (i.e. those with high inertia), where they are unable to follow the airstream when it changes direction, thus impacting on the airway wall.[24,26]

Gravitational sedimentation occurs for smaller particles that are able to follow the airstream and penetrate the more peripheral bronchioles and alveoli. Here, the airstream flows slower, allowing the particles to settle on to the airway surfaces either during the course of slow steady breathing or during breath-holding.[24,26] Breath-holding is important for smaller particle sizes owing to the increased chance of exhalation of the drug, because they can remain airborne for a considerable time.[16]

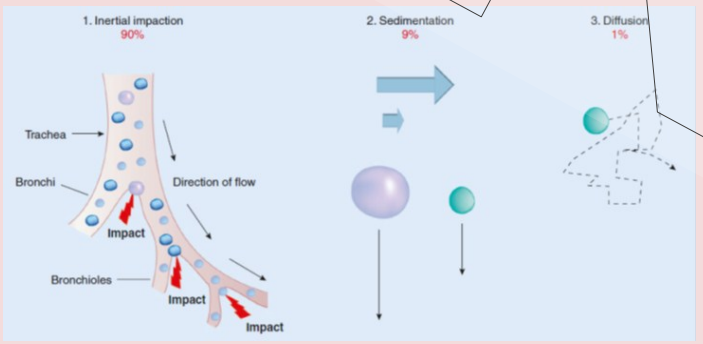


Figure 1. Particle deposition in the respiratory tract. (Adapted with permission)[26]

Implications for practice:

Particle size is important: those that are too small may be exhaled; those that are too large experience inertial impaction in the oropharynx and large conducting airways.

Increased aerosol particle speed increases the probability of deposition by impaction in the oropharynx and large conducting airways; slow aerosol particle speed allows more particles to penetrate the peripheral bronchial tree.

Increasing the inhalation volume allows the aerosol to penetrate peripheral bronchioles.

Breath-holding increases gravitational sedimentation.

Effects of inspiratory flow on lung deposition

The total lung deposition of an inhaled drug is strongly affected by the speed of inhalation. DPIs require a fast and deep inhalation to 'suck up' the drug in the inhaler device. A fast inhalation rate generates a large internal turbulent force in the inhaler device, which is required to break up the formulation of the metered dose to produce particles of a size distribution that will penetrate the peripheral airways.[26,27,28] Failure to achieve this high internal force increases the likelihood of the dose impacting in the mouth and throat. By contrast, aerosol inhalers, such as the MDI, require a slow and deep inhalation, with an inspiratory flow rate of less than 60 l/min. This is owing to the device generating its own aerosol, and so a slower inhalation rate is required to ensure that the drug deposits in the peripheral airways, since a fast inhalation will increase the velocity of the drug particles, thus increasing inertial impaction in the oropharynx as described above.[10,27] Some of the effect of excessive inspiratory flow with a pMDI can be mitigated by using pMDI devices with smaller particle sizes in the aerosol, which may have a greater lung deposition if the inspiratory flow from 30.8 to 67.1 L/min.[16] However these faster inspiratory flows will reduce lung deposition of 6-µm particles.[16]

Faster inspiratory flow rates through a pMDI (180 vs. 30 L/min) increases inertial impaction of aerosols in the oropharynx and at bifurcations in the large central airways, thus reducing lung deposition in the peripheral airways by 33%.[29] A significant proportion of patients with asthma and COPD have been shown to have an inspiratory flow that is much too high for an MDI, which may reduce the clinical effectiveness of inhaled drugs.[9,10]

Other studies have demonstrated that lung deposition from DPI devices increases as inspiratory flow increases. The is particularly so for Turbohaler, and to a lesser degree for Accuhaler, devices where lung deposition increases with faster inspiratory flows.[29,30]

As a consequence, when a patient uses an aerosol inhaler such as the MDI, a slow inspiratory flow rate will produce significantly greater lung deposition than when used at a faster inspiratory flow rate. In contrast, when dry powder inhalers such as a Turbohaler or Accuhaler are used, a faster inspiratory flow rate will produce significantly greater lung deposition than a slower inspiratory flow rate.

The ability of patients to use specific inhalers can vary with time. During times of increased hyperinflation, such as acute exacerbations of asthma, or progression to severe emphysema, patients may not be able to generate sufficient inspiratory flow through high-resistance devices. In this situation, a low-resistance device, such as a pMDI or pMDI plus spacer, may be more appropriate.

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This section is adapted from:

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ACCUHALER

Photo. ©GlaxoSmithKline

Type of inhaler:	Single dose DPI - doses contained in separate blisters in a foil strip
In use expiry:	No restrictions

Available as

SABA	Ventolin (salbutamol)
SAMA	
LABA	Serevent (salmeterol)
LAMA	
LAMA/LABA	
ICS	Flixotide (fluticasone)
ICS/LABA	Seretide (fluticasone/salmeterol)

Key Features	
Dexterity	Low-Moderate dexterity required
Feedback: Dose Counter	Has a dose counter. Counts individual doses. Last 5 numbers highlighted in red text
Feedback: Taste/Feel	Taste of powder (contains lactose)
Feedback: Sound	n/a
Feedback: Visual	n/a
Device Lock-Out	No lock-out - lever can continue to be pushed back when device is empty
Dose Consistency	Relatively consistent dosing across range of inspiratory flow rates (30-90 L/min)
Device Resistance	Medium-low airflow resistance
Inspiratory Flow	Inspiratory flow - test with In Check DIAL inspiratory flow meter Inspiratory flow - test with Accuhaler whistle

Instructions for Use	
1. Preparation	**Check dose counter before use, and then open inhaler.**
2. Priming	Hold inhaler horizontally, or with mouthpiece uppermost. **Push lever back completely**
3. Exhaling	**Exhale fully and away from mouthpiece**
4. Mouth	**Place mouthpiece between teeth and lips**
5. Inhalation	**Inhale strongly and deeply.**
6. Breath holding	Remove inhaler from your mouth and hold your breath for up to 10 seconds (or as long as possible), then breathe out slowly.
7. Closing & Repeating	Wait a few seconds before repeating steps 3-6 to ensure you inhaled the full dose. Close cover after use.

What you need to know / Critical Steps	
Priming	Ensure lever is pushed back completely. Do not close device before inhalation
Multi-Dosing	Risk of multi-dosing from multiple actuations
Dose Wasting	Exhaling into device will lose the dose. Tilting, inverting or shaking the device may lose the dose.
Vents	n/a
Inspiratory Method	Quick and deep
Other information	Inhaler may sound/feel gritty if incomplete inhalation of dose
Cleaning	Wipe the mouthpiece with a dry tissue

AEROLISER

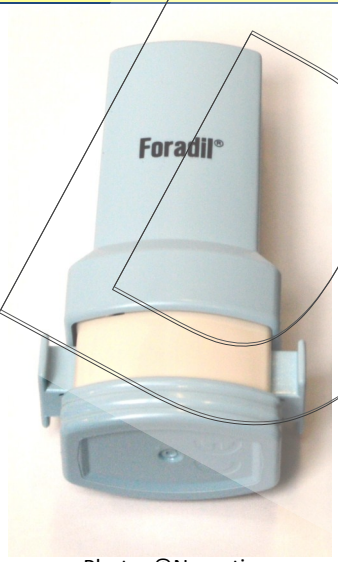

Photo. ©Novartis

Type of inhaler:	Single dose DPI - doses contained in separate capsules
In use expiry:	No restrictions

Available as

SABA	
SAMA	
LABA	Foradil (formoterol)
LAMA	
LAMA/LABA	
ICS	
ICS/LABA	

Key Features

Dexterity	High dexterity required
Feedback: Dose Counter	No dose counter. Placement of capsule for each dose.
Feedback: Taste/Feel	Taste of powder (contains lactose)
Feedback: Sound	Whirring sound during inhalation
Feedback: Visual	Transparent capsule should be empty
Device Lock-Out	n/a
Dose Consistency	Relatively consistent dosing across range of inspiratory flow rates
Device Resistance	Low airflow resistance
Inspiratory Flow	No validated test available

Instructions for Use

1. Preparation	Remove the cap and rotate the mouthpiece of the inhaler towards the arrow on the bottom of the inhaler to open.
2. Priming	Remove one capsule from the blister and place into the chamber in the middle of the inhaler. Twist the mouthpiece in the opposite direction to close, until you hear a click. Press the side buttons inward to pierce the capsule and release.
3. Exhaling	Exhale fully and away from the mouthpiece.
4. Mouth	**Place mouthpiece between teeth and lips**
5. Inhalation	**Inhale strongly and deeply** - you should hear a whirring noise
6. Breath holding	Remove inhaler from your mouth and hold your breath for up to 10 seconds (or as long as possible), then breathe out slowly.
7. Closing & Repeating	Wait a few seconds before repeating steps 3-6 to ensure you inhaled the full dose. Remove the capsule and replace cap.

What you need to know / Critical Steps

Priming	Capsule must be placed into the chamber and pierced.
Multi-Dosing	Single dose – use one capsule at a time.
Dose Wasting	Wasted dose if inhalation not repeated and capsule not emptied.
Vents	n/a
Inspiratory Method	Strong and deep
Other information	Occasionally small fragments of the capsule may be inhaled (usually if the capsule is pierced more than once). This is not harmful. Capsules can get stuck in the inhaler and no 'whirring' noise will be heard during inhalation. If this occurs tap the base of inhaler on a hard surface to release the capsule.
Cleaning	Wipe the mouthpiece and capsule compartment with a dry cloth or a soft clean brush .

AUTOHALER

Photo. ©Teva

Type of inhaler:	Breath-actuated MDI
In use expiry:	No restrictions

Available as

SABA	Airomir (salbutamol)
SAMA	
LABA	
LAMA	
LAMA/LABA	
ICS	Qvar (beclometasone)
ICS/LABA	

Key Features	
Dexterity	Low dexterity required
Feedback: Dose Counter	No dose counter
Feedback: Taste/Feel	Taste of aerosol. Both Autohalers contain small amounts of ethanol (maybe unpleasant taste for children)
Feedback: Sound	Click on inhalation
Feedback: Visual	Lever should be in upright position before inhalation and lowered down after each puff.
Device Lock-Out	No lock-out - lever can continue to be pushed up when device is empty
Dose Consistency	Consistent metered dose across a range of inspiratory flow rates (30-60 L/min); significantly reduced at fast inspiratory flow rates (>60L/min)
Device Resistance	Low airflow resistance
Inspiratory Flow	Test with In Check DIAL inspiratory flow meter

Instructions for Use	
1. Preparation	**Remove the cap**
2. Priming	Shake the inhaler. Keeping the inhaler upright, without blocking
3. Exhaling	Exhale fully and away from the mouthpiece.
4. Mouth	**Place mouthpiece between teeth and lips**
5. Inhalation	**Inhale slowly and deeply** - do not stop when device 'clicks'
6. Breath holding	Remove inhaler from your mouth and hold your breath for up to 10 seconds (or as long as possible), then breathe out slowly.
7. Closing & Repeating	Wait a few seconds before repeating steps 2-6 to ensure you inhaled the full dose. Replace cap after use.

What you need to know / Critical Steps	
Priming	Must be primed in the vertical position. Ensure the lever is pushed upright.
Multi-Dosing	Single dose - cannot multi-dose
Dose Wasting	Wasted dose if dose release slide used at the bottom of the inhaler
Vents	Air vents at the bottom of the device
Inspiratory Method	Slow and steady
Other information	Lever must be pushed into upright position before each dose.
Cleaning	Clean the mouthpiece weekly with a dry tissue or cloth

BREEZHALER

Photo. ©Novartis

Type of inhaler:	Single dose DPI - doses contained in separate capsules
In use expiry:	30 days after first use

Available as

SABA	
SAMA	
LABA	Onbrez (indacaterol)
LAMA	Seebri (glycopyrronium)
LAMA/LABA	Ultibro (glycopyrronium/indacaterol)
ICS	
ICS/LABA	

Key Features	
Dexterity	High dexterity required
Feedback: Dose Counter	No dose counter. Placement of capsule for each dose.
Feedback: Taste/Feel	Taste of powder
Feedback: Sound	Whirring sound during inhalation
Feedback: Visual	Transparent capsule should be empty
Device Lock-Out	n/a
Dose Consistency	Relatively consistent dosing across range of inspiratory flow rates (50-100 L/min)
Device Resistance	Low airflow resistance
Inspiratory Flow	No validated test available

Instructions for Use	
1. Preparation	**Remove the cap and tilt the mouthpiece to open the inhaler**.
2. Priming	**Remove one capsule from the blister and place into the chamber in the middle of the inhaler. Close the mouthpiece and press down until you hear a click. Press the side buttons inward to pierce the capsule and release.**
3. Exhaling	Exhale fully and away from the mouthpiece.
4. Mouth	**Place mouthpiece between teeth and lips**
5. Inhalation	**Inhale strongly and deeply** - you should hear a whirring noise
6. Breath holding	Remove inhaler from your mouth and hold your breath for up to 10 seconds (or as long as possible), then breathe out slowly.
7. Closing & Repeating	Wait a few seconds before repeating steps 3-6 to ensure you inhaled the full dose. Remove the capsule and replace cap.

What you need to know / Critical Steps	
Priming	Capsule must be placed into the chamber and pierced.
Multi-Dosing	Single dose– use one capsule at a time.
Dose Wasting	Wasted dose if inhalation not repeated and capsule not emptied.
Vents	n/a
Inspiratory Method	Strong and deep
Other information	Occasionally small fragments of the capsule may be inhaled (usually if the capsule is pierced more than once). This is not harmful. Capsules can get stuck in the inhaler and no 'whirring' noise will be heard during inhalation. If this occurs tap the base of inhaler on a hard surface to release the capsule.
Cleaning	Clean the mouthpiece inside and outside weekly with a dry tissue or lint-free cloth

Leeds Centre for Respiratory Medicine

CLICKHALER

Type of inhaler:	Reservoir Multidose DPI
In use expiry:	6 months after removed from foil pouch

Available as	
SABA	Asmasal (salbutamol)
SAMA	
LABA	
LAMA	
LAMA/LABA	
ICS	Asmabec (beclometasone)
ICS/LABA	

Key Features	
Dexterity	Low dexterity required
Feedback: Dose Counter	Dose counter
Feedback: Taste/Feel	Taste of powder (contains lactose)
Feedback: Sound	n/a
Feedback: Visual	n/a
Device Lock-Out	Device locks when empty
Dose Consistency	Relatively consistent dosing across range of inspiratory flow rates (15-60 L/min)
Device Resistance	Medium airflow resistance
Inspiratory Flow	No validated test available

Instructions for Use	
1. Preparation	**Remove the cap.**
2. Priming	Shake the inhaler, and then hold it upright, with your thumb on the base. **Press the button down firmly, until you hear a click, then release.**
3. Exhaling	Exhale fully and away from the mouthpiece.
4. Mouth	**Place mouthpiece between teeth and lips**
5. Inhalation	**Inhale strongly and deeply**
6. Breath holding	Remove inhaler from your mouth and hold your breath for up to 10 seconds (or as long as possible), then breathe out slowly.
7. Closing & Repeating	Wait a few seconds before repeating steps 3-6 to ensure you inhaled the full dose. Close cover after use.

What you need to know / Critical Steps	
Priming	Must be primed in the upright position
Multi-Dosing	Risk of multi-dosing from multiple actuations
Dose Wasting	Exhaling into device will lose the dose. Tilting or inverting the device may lose the dose. Wasted dose if multiple actuations used during a single breath
Vents	Air vents in the middle of the device
Inspiratory Method	Strong and deep
Other information	No coordination is required.
Cleaning	Press down on the end of the mouthpiece to remove it and wipe with a dry cloth or tissue.

EASI-BREATHE

Photo. ©Teva

Type of inhaler:	Breath-actuated MDI
In use expiry:	No restrictions

Available as

SABA	Salamol (salbutamol)
SAMA	
LABA	
LAMA	
LAMA/LABA	
ICS	Qvar (beclometasone)
ICS/LABA	

Key Features	
Dexterity	Low dexterity required
Feedback: Dose Counter	No dose counter
Feedback: Taste/Feel	Taste of aerosol
Feedback: Sound	Audible aerosol spray when dose delivered
Feedback: Visual	n/a
Device Lock-Out	n/a
Dose Consistency	Consistent metered dose across a range of inspiratory flow rates (20-60 L/min); significantly reduced at fast inspiratory flow rates (>60L/min)
Device Resistance	Low airflow resistance
Inspiratory Flow	Test with In Check DIAL inspiratory flow meter

Instructions for Use	
1. Preparation	**Remove the cap**
2. Priming	Shake the inhaler, and then hold it upright, with your thumb on the base.
3. Exhaling	Exhale fully and away from the mouthpiece.
4. Mouth	**Place mouthpiece between teeth and lips**
5. Inhalation	**Inhale slowly and deeply**- do not stop when device 'puffs'
6. Breath holding	Remove inhaler from your mouth and hold your breath for up to 10 seconds (or as long as possible), then breathe out slowly.
7. Closing & Repeating	Replace cap after use.

What you need to know / Critical Steps	
Priming	Must be primed in the upright position
Multi-Dosing	Single dose - cannot multi-dose
Dose Wasting	n/a
Vents	Do not block air vents at the top of the device
Inspiratory Method	Slow and deep
Other information	Do not unscrew top half of Easi-Breathe device
Cleaning	Salamol: Unscrew and remove the top of the inhaler and remove the metal cannister. Rinse the bottom of the empty inhaler in warm running water for 30 seconds. Then dry thoroughly (leave overnight if possible) and reassemble. Qvar: Clean the mouthpiece weekly with a dry tissue or cloth.

EASYHALER

Photo. ©Orion

Type of inhaler:	Reservoir Multidose DPI
In use expiry:	6 (salbutamol, beclometasone and budesonide) and 4 (formoterol)months after removing from foil pouch

Available as

SABA	Easyhaler salbutamol
SAMA	
LABA	Easyhaler formoterol
LAMA	
LAMA/LABA	
ICS	Easyhaler beclometasone; Easyhaler budesonide
ICS/LABA	

Key Features

Dexterity	Low dexterity required
Feedback: Dose Counter	Has a dose counter. Counts down in steps of 10 doses. Red indicator begins to show with 20 doses remaining.
Feedback: Taste/Feel	Taste of powder (contains lactose)
Feedback: Sound	n/a
Feedback: Visual	n/a
Device Lock-Out	n/a
Dose Consistency	Consistent dosing across range of inspiratory flow rates (30-60 L/min)
Device Resistance	High airflow resistance
Inspiratory Flow	No validated test available

Instructions for Use

1. Preparation	**Check dose counter before use, and then remove cap.**
2. Priming	Shake the inhaler, then **whilst holding the inhaler upright press the button all the way down and then release it.** You should hear a click sound.
3. Exhaling	**Exhale fully and away from mouthpiece**
4. Mouth	**Place mouthpiece between teeth and lips**
5. Inhalation	**Inhale strongly and deeply.**
6. Breath holding	Remove inhaler from your mouth and hold your breath for up to 10 seconds (or as long as possible), then breathe out slowly.
7. Closing & Repeating	Wait a few seconds before repeating steps 3-6 to ensure you inhaled the full dose. Replace cap after use.

What you need to know / Critical Steps

Priming	Must be primed in the vertical position
Multi-Dosing	Single dose - cannot multi-dose
Dose Wasting	Exhaling into device will lose the dose. Tilting, inverting or shaking the device may lose the dose.
Vents	n/a
Inspiratory Method	Quick and deep
Other information	Unused doses collect in bottom chamber with clear window
Cleaning	Clean the mouthpiece weekly with a dry tissue or cloth.

ELLIPTA

Photo. ©GlaxoSmithKline

Type of inhaler:	Single dose DPI - doses contained in separate blisters in a foil strip
In use expiry:	6 weeks after opening the tray
Available as	
SABA	
SAMA	
LABA	
LAMA	Incruse (umeclidinium)
LAMA/LABA	Anoro (umeclidinium/vilanterol)
ICS	
ICS/LABA	Relvar (fluticasone furoate/vilanterol)

Key Features	
Dexterity	Low dexterity required
Feedback: Dose Counter	Has a dose counter. Counts down each dose. Red indicator when less than 10 doses remain.
Feedback: Taste/Feel	Taste of powder (contains lactose)
Feedback: Sound	n/a
Feedback: Visual	n/a
Device Lock-Out	n/a
Dose Consistency	Consistent dosing across range of inspiratory flow rates (43.5-130 L/min)
Device Resistance	Medium-low airflow resistance
Inspiratory Flow	No validated test available. Test with Ellipta whistle.

Instructions for Use	
1. Preparation	**Check dose counter before use.**
2. Priming	Hold inhaler in the upright position. **Open the cover completely.**
3. Exhaling	**Exhale fully and away from mouthpiece**
4. Mouth	**Place mouthpiece between teeth and lips**
5. Inhalation	**Inhale strongly and deeply.**
6. Breath holding	Remove inhaler from your mouth and hold your breath for up to 10 seconds (or as long as possible), then breathe out slowly.
7. Closing & Repeating	Wait a few seconds before repeating steps 3-6 to ensure you inhaled the full dose. Close cover after use.

What you need to know / Critical Steps	
Priming	Ensure cover is pushed back completely. Do not close device before inhalation
Multi-Dosing	Single dose - cannot multi-dose
Dose Wasting	Potential to waste doses if cap is opened and closed more than once without inhalation. Exhaling into device will lose the dose. Tilting, inverting or shaking the device may lose the dose.
Vents	Do not block air vents
Inspiratory Method	Quick and deep
Other information	No coordination is required.
Cleaning	Use a dry tissue to clean the mouthpiece

FORSPIRO

Photo. ©Sandoz

Type of inhaler:	Single dose DPI - doses contained in separate blisters in a foil strip
In use expiry:	No restrictions
Available as	
SABA	
SAMA	
LABA	
LAMA	
LAMA/LABA	
ICS	
ICS/LABA	AirFluSal (fluticasone/salmeterol)

Key Features	
Dexterity	Moderate-high dexterity required. Requires significant manipulation.
Feedback: Dose Counter	Has a dose counter. Counts individual doses. Last 10 doses highlighted with red border.
Feedback: Taste/Feel	Taste of powder (contains lactose)
Feedback: Sound	n/a
Feedback: Visual	Loading and priming of each dose can be observed. Used foil blisters will appear in the side chamber (although used blisters will not appear until 2 days after each one is used)
Device Lock-Out	No lock-out - lever can continue to be pushed back when device is empty
Dose Consistency	Relatively consistent dosing across range of inspiratory flow rates (30-90 L/min)
Device Resistance	Medium-low airflow resistance
Inspiratory Flow	No validated test available

Instructions for Use	
1. Preparation	Ensure side chamber is closed. **Open cap, then check dose counter before use.**
2. Priming	Hold inhaler horizontally, or with mouthpiece uppermost. **Push white lever open completely until it clicks, then close it again fully until it clicks back into original position**
3. Exhaling	**Exhale fully and away from mouthpiece**
4. Mouth	**Place mouthpiece between teeth and lips**
5. Inhalation	**Inhale strongly and deeply.**
6. Breath holding	Remove inhaler from your mouth and hold your breath for 5 to 10 seconds (or as long as possible), then breathe out slowly.
7. Closing & Repeating	Wait a few seconds before repeating steps 3-6 to ensure you inhaled the full dose. Close cap after use.

What you need to know / Critical Steps	
Priming	Ensure white lever is pushed open completely until it clicks, then closed again fully until it clicks back into original position.
Multi-Dosing	Single dose - reportedly cannot multi-dose
Dose Wasting	Exhaling into device will lose the dose. Tilting, inverting or shaking the device may lose the dose.
Vents	Do not block air inlets to the side of the mouthpiece
Inspiratory Method	Quick and deep
Other information	The foil strip must be torn away against the 'teeth' of the side chamber. Failure to do so may cause the inhaler to jam.
Cleaning	Clean the outside of the mouthpiece with a dry tissue

GENUAIR

Photo. ©AstraZeneca

Type of inhaler:	Reservoir Multidose DPI
In use expiry:	90 (Eklira) or 60 (Duaklir) days after removal from foil pouch
Available as	
SABA	
SAMA	
LABA	
LAMA	Eklira (aclidinium)
LAMA/LABA	Duaklir (aclidinium/formoterol)
ICS	
ICS/LABA	

Key Features	
Dexterity	Low dexterity required
Feedback: Dose Counter	Dose counter. Counts down in steps of 10 doses. Red indicator shows for last 10 doses.
Feedback: Taste/Feel	Taste of powder (contains lactose)
Feedback: Sound	'Click' on inhalation, and 'whirring' noise during inhalation
Feedback: Visual	Coloured control window changes from red to green after priming (pressing the button), then back to red after inhalation
Device Lock-Out	Device locks when empty
Dose Consistency	Consistent dosing across range of inspiratory flow rates (so long as inhalation speed >35L/min to cause device to click)
Device Resistance	Medium airflow resistance
Inspiratory Flow	No validated test available

Instructions for Use	
1. Preparation	**Check dose counter and ensure that the coloured control window is red before use. Remove the cap.**
2. Priming	**Hold the inhaler upright with the button facing up. Press the button all the way down and then release it.**
3. Exhaling	**Exhale fully and away from mouthpiece**
4. Mouth	**Place mouthpiece between teeth and lips**
5. Inhalation	**Inhale strongly and deeply** - do not stop when device 'clicks'
6. Breath holding	Remove inhaler from your mouth and hold your breath for up to 10 seconds (or as long as possible), then breathe out slowly.
7. Closing & Repeating	Wait a few seconds before repeating steps 3-6 to ensure you inhaled the full dose. Replace cap after use.

What you need to know / Critical Steps	
Priming	Must be primed in the vertical position
Multi-Dosing	Single dose - cannot multi-dose
Dose Wasting	Exhaling into device will lose the dose. Tilting, inverting or shaking the device may lose the dose.
Vents	n/a
Inspiratory Method	Quick and deep
Other information	Device will not 'click' with low inhalation speed (low emitted dose), preventing further doses to be primed
Cleaning	Wipe the mouthpiece with a dry tissue.

HANDIHALER

Type of inhaler:	Single dose DPI - each dose contained in separate capsules.
In use expiry:	Capsules: 9 days after opening the blister. HandiHaler device: discard after 12 months

Available as	
SABA	
SAMA	
LABA	
LAMA	Spiriva (tiotropium)
LAMA/LABA	
ICS	
ICS/LABA	

Key Features	
Dexterity	High dexterity required
Feedback: Dose Counter	Remaining capsules may be counted.
Feedback: Taste/Feel	Taste of powder (contains lactose). Capsule will vibrate during inhalation
Feedback: Sound	Vibration of capsule heard and/or felt during inhalation
Feedback: Visual	Open to visualise empty capsule after use.
Device Lock-Out	n/a
Dose Consistency	Consistent dosing over low to moderate inspiratory flow (28-60 L/min), but significant reduction at lower inspiratory flows.
Device Resistance	High airflow resistance
Inspiratory Flow	No validated test available

Instructions for Use	
1. Preparation	**Open dust cap and mouthpiece**
2. Priming	**Remove capsule from blister strip and insert capsule into centre chamber.** Close mouthpiece until a click is heard and keeping the inhaler upright, **press the piercing button once and release.**
3. Exhaling	**Exhale fully and away from mouthpiece**
4. Mouth	**Place mouthpiece between teeth and lips**
5. Inhalation	**Inhale slowly and deeply**, but at a rate sufficient to hear the capsule vibrate.
6. Breath holding	Remove inhaler from your mouth and hold your breath for up to 10 seconds (or as long as possible), then breathe out slowly.
7. Closing & Repeating	Wait a few seconds before repeating steps 3-6 to ensure you inhaled the full dose. Open mouthpiece to empty the used capsule and close the mouthpiece and dust cap.

What you need to know / Critical Steps	
Priming	Capsule must be placed into the chamber and pierced.
Multi-Dosing	Single dose - cannot multi-dose.
Dose Wasting	Exhaling into device will lose the dose.
Vents	n/a
Inspiratory Method	Quick and deep
Other information	Occasionally small fragments of the capsule may be inhaled (usually if the capsule is pierced more than once). This is not harmful.
Cleaning	Clean monthly. Open the dust cap and mouthpiece, and also the base by lifting the piercing button. Rinse the inhaler with warm water to remove any powder. Leave to dry for 24 hours. If needed, the mouthpiece may be cleaned with a moist tissue.

NEXTHALER

Photo. ©Chiesi

Type of inhaler:	Reservoir Multidose DPI
In use expiry:	6 months after removed from foil pouch
Available as	
SABA	
SAMA	
LABA	
LAMA	
LAMA/LABA	
ICS	
ICS/LABA	Fostair (beclometasone/formoterol)

Key Features	
Dexterity	Low dexterity required
Feedback: Dose Counter	Has a dose counter. Counts down each dose. Red arrows indicate when less than 10 doses remain.
Feedback: Taste/Feel	Taste of powder (contains lactose)
Feedback: Sound	'Click' on inhalation
Feedback: Visual	n/a
Device Lock-Out	n/a
Dose Consistency	Relatively consistent dosing across range of inspiratory flow rates (30-90 L/min)
Device Resistance	Medium-high airflow resistance
Inspiratory Flow	No validated test available. Breath actuated mechanism -device will only release dose with correct speed of inhalation.

Instructions for Use	
1. Preparation	**Check dose counter before use.**
2. Priming	**Hold inhaler in the upright position**, and shake the device. **Open the cover completely.**
3. Exhaling	Exhale fully and away from mouthpiece
4. Mouth	**Place mouthpiece between teeth and lips**
5. Inhalation	**Inhale strongly and deeply** - do not stop when device 'clicks'.
6. Breath holding	Remove inhaler from your mouth and hold your breath for up to 10 seconds (or as long as possible), then breathe out slowly.
7. Closing & Repeating	Wait a few seconds before repeating steps 3-6 to ensure you inhaled the full dose. Close cover after use.

What you need to know / Critical Steps	
Priming	Must be primed in the vertical position.
Multi-Dosing	Single dose - cannot multi-dose
Dose Wasting	Contains dose protector - exhaling into device will NOT lose the dose
Vents	Do not block air vents
Inspiratory Method	Quick and deep
Other information	Device will not 'click' with low inhalation speed (no dose will be released).
Cleaning	Use a dry tissue or cloth to clean the inhaler

NOVOLIZER

Type of inhaler:	Reservoir Multidose DPI
In use expiry:	Cartridge: 3 months after opening. Novolizer device: 1 year or 2,000 doses (which ever comes first)

Available as

SABA	Salbulin (salbutamol)
SAMA	
LABA	
LAMA	
LAMA/LABA	
ICS	Budelin (budesonide)
ICS/LABA	

Instructions for Use

Inserting the Cartridge
1. Lightly press together the ribbed buttons on the lid, and pull gently forwards to lift it off.
2. Take the new cartridge out of the aluminium foil packaging.
3. Insert the cartridge into the Novolizer with the dose counter facing the mouthpiece.
4. Replace the lid on the Novolizer device.

1. Preparation	**Check dose counter and ensure that the coloured control window is red before use. Remove the cap.**
2. Priming	**Hold the inhaler upright with the button facing up. Press the button all the way down and then release it.**
3. Exhaling	**Exhale fully and away from mouthpiece**
4. Mouth	**Place mouthpiece between teeth and lips**
5. Inhalation	**Inhale strongly and deeply** - do not stop when device 'clicks'
6. Breath holding	Remove inhaler from your mouth and hold your breath for up to 10 seconds (or as long as possible), then breathe out slowly.
7. Closing & Repeating	Wait a few seconds before repeating steps 3-6 to ensure you inhaled the full dose. Replace cap after use.

Key Features

Dexterity	Low-moderate dexterity required
Feedback: Dose Counter	Dose counter. Counts down in steps of 20 doses. Shaded indicator shows for last 20 doses.
Feedback: Taste/Feel	Taste of powder (contains lactose)
Feedback: Sound	'Click' on inhalation, and 'whirring' noise during inhalation
Feedback: Visual	Coloured control window changes from red to green after priming (pressing the button), then back to red after inhalation
Device Lock-Out	n/a
Dose Consistency	Inconsistent dosing across range of inspiratory flow rates (lower effective dose with low inhalation speed)
Device Resistance	Medium-low airflow resistance
Inspiratory Flow	No validated test available

What you need to know / Critical Steps

Priming	Must be primed in the vertical position
Multi-Dosing	Single dose - cannot multi-dose
Dose Wasting	Exhaling into device will lose the dose. Tilting, inverting or shaking the device may lose the dose.
Vents	n/a
Inspiratory Method	Quick and deep
Other information	Device will not 'click' with low inhalation speed (low emitted dose), preventing further doses to be primed
Cleaning	Clean regularly and when the cartridge is changed. Remove the cap and then the mouthpiece by twisting it anticlockwise. Turn the device upside down and remove the lid. Tap to remove any remaining powder. Clean the mouthpiece, dispensing slide and powder inhaler with a soft, lint-free dry cloth.

pMDI

Type of inhaler:	Pressurised Metered Dose Inhaler
In use expiry:	No restrictions, except: Atimos Modulite: 3 months at room temp.; Flutiform: 3 months after removal from foil pouch; Fostair: 5 months at room temp.

Available as

SABA	Airomir, AirSalb, Salamol, Ventolin (salbutamol)
SAMA	Atrovent (ipratropium)
LABA	Atimos Modulite (formoterol); Neovent, Serevent, Vertine (salmeterol)
LAMA	
LAMA/LABA	
ICS	Clenil Modulite, Qvar (beclometasone); Flixotide (fluticasone)
ICS/LABA	Flutiform (fluticasone/formoterol); Fostair (beclometasone/formoterol); Seretide, Sirdupla (fluticasone/salmeterol)

Instructions for Use

1. Preparation	**Remove the cap.**
2. Priming	Shake the MDI inhaler, and then hold it upright, with your thumb on the base.
3. Exhaling	Exhale fully and away from the mouthpiece.
4. Mouth	**Place mouthpiece between teeth and lips**
5. Inhalation	**Inhale slowly and deeply, pressing the canister down to release the medicine at the start of inhalation,** and continue to inhale deeply
6. Breath holding	Remove inhaler from your mouth and hold your breath for up to 10 seconds (or as long as possible), then breathe out slowly.
7. Closing & Repeating	Replace cap after use.

Key Features

Dexterity	Moderate dexterity required. Haleraid available for GSK MDIs to assist actuation for people with physical limitations
Feedback: Dose Counter	Usually no dose counter. (Exceptions: Flutiform, Seretide, Sirdupla - counts each dose)
Feedback: Taste/Feel	Taste of aerosol. Some MDIs contain small amounts of ethanol (maybe unpleasant taste for children)
Feedback: Sound	Audible aerosol spray
Feedback: Visual	n/a
Device Lock-Out	n/a
Dose Consistency	Consistent metered dose across a range of inspiratory flow rates (25-60 L/min); significantly reduced at fast inspiratory flow rates (>60L/min)
Device Resistance	Low airflow resistance
Inspiratory Flow	Inspiratory flow - test with In Check DIAL inspiratory flow meter Inspiratory flow - test with Flo-Tone whistle & Trainhaler

What you need to know / Critical Steps

Priming	Must be primed in the vertical position
Multi-Dosing	Single dose - cannot multi-dose
Dose Wasting	Wasted dose if multiple actuations used during a single breath
Vents	n/a
Inspiratory Method	Slow and steady
Other information	Good co-ordination of inhalation and actuation is required
Cleaning	Clean the mouthpiece with a dry tissue or cloth

pMDI + SPACER (Multiple breath method)

Available Spacers
Volumatic ± mask

Type of inhaler:	Pressurised Metered Dose Inhaler + large volume spacer
In use expiry:	Replace after 6 to 12 months
Compatible MDIs	Ensure MDI is compatible with spacer before prescribing. Volumatic Spacer is generally only compatible with GSK MDIs
When to use	Useful for: • Infants and toddlers. • Reducing side effects with high doses of inhaled corticosteroids. • People with poor co-ordination. • People who are unable to hold their breath after inhalation, and during exacerbations.

Key Features	
Dexterity	Low-moderate dexterity required
Feedback: Dose Counter	n/a
Feedback: Taste/Feel	May reduce taste of pMDI aerosol
Feedback: Sound	Click of valve audible when breathing in and out
Feedback: Visual	n/a
Device Lock-Out	n/a
Dose Consistency	Consistent dosing when used correctly.
Device Resistance	Low airflow resistance
Inspiratory Flow	No validated test available

Instructions for Use	
1. Preparation	**Remove the cap from inhaler, and assemble the two parts of the Volumatic spacer.**
2. Priming	Shake the inhaler, then **place the mouthpiece of the inhaler into flat end of the spacer** and hold it upright, with your thumb on the base
3. Exhaling	Exhale fully and away from mouthpiece
4. Mouth	**Place mouthpiece of spacer between teeth and lips and actuate one dose into spacer**
5. Inhalation	**Inhale slowly and deeply through the mouth for 5 to 6 breaths.**
6. Breath holding	Then remove the mouthpiece of the spacer from your mouth. No breath-holding manoeuvre is required.
7. Closing & Repeating	Remove inhaler from the spacer and replace cap.

What you need to know / Critical Steps	
Priming	Delay between actuation of MDI into Spacer and inhalation results in reduced effective dose
Multi-Dosing	Multiple actuations of MDI into Spacer results in large particle sizes and reduced effective dose.
Dose Wasting	Important only to use single actuations into the spacer.
Vents	n/a
Inspiratory Method	Slow and steady. Multiple breath
Other information	Useful for people with poor co-ordination. Useful when high doses of inhaled corticosteroid are prescribed
Cleaning	Clean twice a week. Take the two halves apart and wash with warm water containing a mild detergent, using a soft toothbrush or bottle brush if necessary. Do not rub with a cloth as this creates static. Rinse with clean water and dry at room temperature. Ensure the valve runs freely prior to re-use.

pMDI + SPACER (Single breath method)

Available Spacers:
- AeroChamber Plus (+/- mask)
- AeroChamber Plus for Infant or Toddler (+ mask)
- Able Spacer (+/- mask)
- A2A (+/- mask)
- DispozABLE Spacer
- Optichamber Advantage
- Optichamber Diamond (+ mask)
- Pocket Chamber (+/- mask)
- Space Chamber Plus
- Volumatic Spacer (+/- mask)
- Vortex (+/- mask)

Type of inhaler:	Pressurised Metered Dose Inhaler + small volume spacer
In use expiry:	Check manufacturer's instructions. AeroChamber Plus may need to be replaced after 12 months. DispozABLE Spacer - single use for emergencies, such as ambulances and schools. Volumatic spacer should be replaced after 6 to 12 months.
Compatible MDIs	Ensure MDI is compatible with spacer before prescribing.
When to use	Useful for: • Infants and toddlers. • Reducing side effects with high doses of inhaled corticosteroids. • People with poor co-ordination.

Key Features	
Dexterity	Low-moderate dexterity required
Feedback: Dose Counter	n/a
Feedback: Taste/Feel	May reduce taste of pMDI aerosol
Feedback: Sound	Click of valve audible when breathing in and out
Feedback: Visual	n/a
Device Lock-Out	n/a
Dose Consistency	Consistent dosing when used correctly.
Device Resistance	Low airflow resistance
Inspiratory Flow	No validated test available

Instructions for Use	
1. Preparation	**Remove the cap from inhaler (and from the spacer if using an Aerochamber)**
2. Priming	Shake the inhaler, then **place the mouthpiece of the inhaler into flat end of the spacer** and hold it upright, with your thumb on the base
3. Exhaling	Exhale fully and away from mouthpiece
4. Mouth	**Place mouthpiece of spacer between teeth and lips and actuate one dose into spacer**
5. Inhalation	**Inhale slowly and deeply through the mouth** (if using Aerochamber, a whistling sound indicates that the inspiratory rate is too fast)
6. Breath holding	Remove spacer from your mouth and hold breath for 10 seconds (or as long as comfortable), then breathe out slowly.
7. Closing & Repeating	Remove inhaler from the spacer and replace cap(s).

What you need to know / Critical Steps	
Priming	Delay between actuation of MDI into Spacer and inhalation results in reduced effective dose
Multi-Dosing	Multiple actuations of MDI into Spacer results in large particle sizes and reduced effective dose.
Dose Wasting	Important only to use single actuations into the spacer.
Vents	n/a
Inspiratory Method	Slow and steady. Multiple breath
Other information	Useful for people with poor co-ordination. Useful when high doses of inhaled corticosteroid are prescribed
Cleaning	Check manufacturer's instructions. AeroChamber Plus: remove flat end of the spacer, and soak in lukewarm soapy water for a few minutes. Air dry in a vertical position, then reassemble when dry.

PODHALER

Type of inhaler:	Single dose DPI - each dose contained in separate capsules
In use expiry:	Discard Podhaler device and case after 7 days of use
Available as	
Antibiotic	Tobi (tobramycin)

Instructions for Use

1. Preparation	Wash and fully dry your hands. **Unscrew the top of the case. Then unscrew the mouthpiece.**
2. Priming	**Remove capsule from blister strip and insert capsule into inhaler chamber.** Screw the mouthpiece on until it stops. Do not overtighten. Hold the inhaler with the mouthpiece pointing down, then pierce the capsule by pressing the blue button **once and release.**
3. Exhaling	**Exhale fully and away from mouthpiece**
4. Mouth	**Place mouthpiece between teeth and lips, to make a tight seal**
5. Inhalation	**Inhale strongly and deeply**.
6. Breath holding	Remove inhaler from your mouth and hold your breath for up to 5 seconds, then breathe out slowly.
7. Closing & Repeating	Wait a few seconds, and breath normally, before **repeating steps 3-6 to ensure you inhaled the full dose**. Unscrew mouthpiece to empty the used capsule and take **the other 3 capsules in the same way**. When the full dose (4 capsules) have been inhaled, replace the mouthpiece and place the inhaler back in the storage case.

Key Features

Dexterity	High dexterity required
Feedback: Dose Counter	Remaining capsules may be counted.
Feedback: Taste/Feel	n/a
Feedback: Sound	n/a
Feedback: Visual	Capsules can be inspected to see if they are empty after inhalation.
Device Lock-Out	n/a
Dose Consistency	Relatively consistent dosing across range of inspiratory flow rates (40-85 L/min)
Device Resistance	Medium-low airflow resistance
Inspiratory Flow	No validated test available

What you need to know / Critical Steps

Priming	Capsules must only be removed immediately before use. Never place a capsule directly into the inhaler mouthpiece.
Multi-Dosing	Single dose - cannot multi-dose
Dose Wasting	Exhaling into device will lose the dose. Tilting, inverting or shaking the device may lose the dose.
Vents	n/a
Inspiratory Method	Quick and deep
Other information	Occasionally small capsule fragments may be inhaled (usually if the capsule is pierced more than once). This is not harmful.
Cleaning	Wipe the mouthpiece with a clean, dry cloth

PULVINAL

Type of inhaler:	Reservoir Multidose DPI
In use expiry:	No restrictions

Available as

SABA	Pulvinal salbutamol
SAMA	
LABA	
LAMA	
LAMA/LABA	
ICS	Pulvinal beclometasone
ICS/LABA	

Note: This inhaler device was discontinued in the UK in November 2015

Instructions for Use	
1. Preparation	**Unscrew cap**. Keeping the inhaler upright, gently tap it against a hard surface to level the powder inside the inhaler.
2. Priming	**Keeping the inhaler upright, press the button on the side of the inhaler and rotate the base as far as it will go in an anti-clockwise direction until a red mark shows in the hole below the button. Then whilst keeping the inhaler upright, twist the base back in a clockwise direction as far as it will go until it clicks and a green mark shows in the hole below the button.**
3. Exhaling	**Exhale fully and away from mouthpiece**
4. Mouth	Place mouthpiece between teeth and lips, whilst holding the inhaler upright.
5. Inhalation	**Inhale strongly and deeply.**
6. Breath holding	Remove inhaler from your mouth and hold your breath for a few seconds (or as long as possible), then breathe out slowly.
7. Closing & Repeating	Wait a few seconds before repeating steps 3-6 to ensure you inhaled the full dose. Replace cap after use.

Key Features	
Dexterity	Moderate dexterity required
Feedback: Dose Counter	No dose counter, but medication powder is visible (replace when red ring at the bottom of the window is visible)
Feedback: Taste/Feel	Taste of powder (contains lactose)
Feedback: Sound	n/a
Feedback: Visual	n/a
Device Lock-Out	n/a
Dose Consistency	Relatively consistent dosing across range of inspiratory flow rates (slow to fast)
Device Resistance	High airflow resistance
Inspiratory Flow	No validated test available

What you need to know / Critical Steps	
Priming	Must be primed in the vertical position
Multi-Dosing	Risk of multi-dosing from multiple actuations
Dose Wasting	Exhaling into device will lose the dose
Vents	n/a
Inspiratory Method	Quick and deep
Other information	Cap must be replaced after use to prevent exposure to moisture
Cleaning	Wipe the mouthpiece regularly with a soft cloth or fibre-free tissue

RESPIMAT

Type of inhaler:	Soft Mist MDI
In use expiry:	3 months after canister has been loaded

Available as

SABA	
SAMA	
LABA	Striverdi (olodaterol)
LAMA	Spiriva (tiotropium)
LAMA/LABA	Spiolto (tiotropium/olodaterol)
ICS	
ICS/LABA	

Instructions for Use

Inserting the Cartridge
1. With cap closed, press safety catch and pull off clear base.
2. Push the cartridge into the inhaler completely & replace clear base.
3. Whilst holding the inhaler upright with the cap closed, turn the base in the direction of the red arrows until it clicks, and then open cap.
4. Point inhaler towards the ground, and press the dose release button
5. Repeat steps 3-4 until a cloud is visible, then three further times (to fully prime the inhaler)

1. Preparation	Ensure cartridge has been inserted into the inhaler and the device primed for use correctly.
2. Priming	**Whilst holding the inhaler upright with the cap closed, turn the base in the direction of the red arrows until it clicks, and then open cap.**
3. Exhaling	Exhale fully and away from mouthpiece
4. Mouth	**Place mouthpiece between teeth and lips**
5. Inhalation	**Inhale slowly and deeply, pressing the button to release the medicine at the start of inhalation**, and continue to inhale deeply
6. Breath holding	Remove inhaler from your mouth and hold your breath for up to 10 seconds (or as long as possible), then breathe out slowly.
7. Closing & Repeating	Discard capsule from central chamber and replace cap.

Key Features

Dexterity	High dexterity required
Feedback: Dose Counter	Has a dose indicator
Feedback: Taste/Feel	Taste of aerosol
Feedback: Sound	Audible 'click' on pressing the button to release a dose
Feedback: Visual	n/a
Device Lock-Out	Device locks when empty
Dose Consistency	Lung deposition may be reduced with fast inspiratory flow rates
Device Resistance	Low airflow resistance
Inspiratory Flow	No validated test available

What you need to know / Critical Steps

Priming	Must be loaded and primed before first use. If not used for 7 days, spray one puff towards the ground; If not used for 21 days, re-prime device using spraying 3 puffs towards the ground
Multi-Dosing	Single dose - cannot multi-dose.
Dose Wasting	Ensure cap is closed when priming the device, to prevent inadvertent actuation of a dose
Vents	Do not block air vents
Inspiratory Method	Slow and steady
Other information	People with physical limitations may struggle to load the device
Cleaning	Clean the mouthpiece and metal part of the inhaler once a week with a damp cloth or tissue

SPIROMAX

Photo. ©Teva

Type of inhaler:	Reservoir Multidose DPI
In use expiry:	6 months after removed from foil pouch

Available as

SABA	
SAMA	
LABA	
LAMA	
LAMA/LABA	
ICS	
ICS/LABA	DuoResp (budesonide/formoterol)

Key Features	
Dexterity	Low dexterity required
Feedback: Dose Counter	Has a dose counter. Counts down in steps of 2 doses.
Feedback: Taste/Feel	Taste of powder (contains lactose), and gritty texture of powder
Feedback: Sound	n/a
Feedback: Visual	n/a
Device Lock-Out	n/a
Dose Consistency	Increased dose delivery at higher inspiratory flow rates (90L/min vs. 40L/min), but likely insignificant clinical impact.
Device Resistance	Medium airflow resistance
Inspiratory Flow	No validated test available

Instructions for Use	
1. Preparation	**Check dose counter before use.**
2. Priming	**Hold inhaler in the horizontal or upright position**, and shake the device. **Open the cap completely.**
3. Exhaling	**Exhale fully and away from mouthpiece**
4. Mouth	**Place mouthpiece between teeth and lips**
5. Inhalation	**Inhale strongly and deeply.**
6. Breath holding	Remove inhaler from your mouth and hold your breath for up to 10 seconds (or as long as possible), then breathe out slowly.
7. Closing & Repeating	Wait a few seconds before repeating steps 3-6 to ensure you inhaled the full dose. Close cover after use.

What you need to know / Critical Steps	
Priming	Must be primed in the horizontal or vertical position
Multi-Dosing	Single dose - cannot multi-dose. Multiple actuations of device winds dose counter down, but does not load dose (appears empty before it actually is).
Dose Wasting	Exhaling into device will lose the dose
Vents	Do not block air vents
Inspiratory Method	Quick and deep
Other information	Dose emission from Spiromax is less dependent on airflow than the Turbohaler
Cleaning	Wipe the mouthpiece with a dry tissue

TURBOHALER

Photo. ©AstraZeneca

Type of inhaler:	Reservoir Multidose DPI
In use expiry:	No restrictions

Available as	
SABA	Bricanyl (terbutaline)
SAMA	
LABA	Oxis (formoterol)
LAMA	
LAMA/LABA	
ICS	Pulmicort (budesonide)
ICS/LABA	Symbicort (budesonide/formoterol)

Key Features	
Dexterity	Moderate dexterity required
Feedback: Dose Counter	Has a dose counter (Symbicort), which counts in steps of 20 doses; or dose indicator (Bricanyl, Oxis, Pulmicort), indicates empty when red mark reaches bottom of indicator window.
Feedback: Taste/Feel	Generally no taste
Feedback: Sound	n/a
Feedback: Visual	n/a
Device Lock-Out	n/a
Dose Consistency	Inconsistent dosing across range of inspiratory flow rates (lower effective dose with low inhalation speed)
Device Resistance	Medium airflow resistance (Symbicort); Medium-high airflow resistance (Pulmicort, Oxis, Bricanyl)
Inspiratory Flow	Test with In Check DIAL inspiratory flow meter, or with Turbohaler whistle.

Instructions for Use	
1. Preparation	**Check dose counter before use, and then unscrew cap.**
2. Priming	Shake the inhaler, then whilst **keeping it upright, rotate grip as far as it will go in one direction. Then turn it as far as it will go in the other direction** (it does not matter which way you turn it first). You should hear a click sound.
3. Exhaling	**Exhale fully and away from mouthpiece**
4. Mouth	**Place mouthpiece between teeth and lips**
5. Inhalation	**Inhale strongly and deeply.**
6. Breath holding	Remove inhaler from your mouth and hold your breath for up to 10 seconds (or as long as possible), then breathe out slowly.
7. Closing & Repeating	Wait a few seconds before repeating steps 3-6 to ensure you inhaled the full dose. Replace cap after use.

What you need to know / Critical Steps	
Priming	Must be primed in the vertical position
Multi-Dosing	Single dose - cannot multi-dose. Multiple actuations of device winds dose counter down, but does not load dose (appears empty before it actually is)
Dose Wasting	Exhaling into device will lose the dose
Vents	Do not block air vents
Inspiratory Method	Quick and deep
Other information	Turn Aid available for people with physical limitations. Desiccant can be heard when shaking the device - it is not the amount of drug remaining.
Cleaning	Wipe the mouthpiece with a dry tissue once a week

TURBOSPIN

Photo. ©Actavis

Type of inhaler:	Single dose DPI - each dose contained in separate capsules
In use expiry:	Discard Turbospin inhaler after completion of each treatment pack
Available as	
Antibiotic	Colobreathe (colistimethate sodium)

Instructions for Use

1. Preparation	**Remove the cap. Then unscrew the mouthpiece.**
2. Priming	**Remove capsule from blister strip and insert capsule into inhaler chamber with the widest end first.** Screw the mouthpiece on until it stops. Do not overtighten. Hold the inhaler with the mouthpiece pointing upwards then pierce the capsule by gently pushing the piston upwards **once and release.**
3. Exhaling	**Exhale fully and away from mouthpiece**
4. Mouth	**Place mouthpiece between teeth and lips, to make a tight seal**
5. Inhalation	**Inhale slowly and deeply, but at a rate sufficient to hear the capsule vibrate.** (If the capsule does not vibrate, the chamber of the inhaler device should be tapped gently and the inhalation repeated.)
6. Breath holding	Remove inhaler from your mouth and hold your breath for about 10 seconds, then breathe out slowly.
7. Closing & Repeating	Wait a few seconds, and breath normally, before repeating steps 3-6 to ensure you inhaled the full dose. Unscrew mouthpiece to empty the used capsule then replace the mouthpiece and replace the cap.

Key Features

Dexterity	High dexterity required
Feedback: Dose Counter	Remaining capsules may be counted.
Feedback: Taste/Feel	Taste of powder (may be unpleasant)
Feedback: Sound	n/a
Feedback: Visual	Capsules can be inspected to see if they are empty after inhalation.
Device Lock-Out	n/a
Dose Consistency	Relatively consistent dosing across range of inspiratory flow rates (30-90 L/min)
Device Resistance	Medium-low airflow resistance
Inspiratory Flow	No validated test available

What you need to know / Critical Steps

Priming	Capsules must only be removed immediately before use. Do not pierce the capsule more than once
Multi-Dosing	Single dose - cannot multi-dose
Dose Wasting	Exhaling into device will lose the dose. Tilting, inverting or shaking the device may lose the dose.
Vents	Do not cover the air slits with your fingers or mouth during inhalation.
Inspiratory Method	Quick and deep
Other information	Occasionally small capsule fragments may be inhaled (usually if the capsule is pierced more than once). This is not harmful.
Cleaning	Clean after each dose. Press the piston down firmly a few times, whilst keeping the chamber upside down. Clean the chamber using a tissue or cotton bud, then screw the mouthpiece back on and replace the cap.

TWISTHALER

Type of inhaler:	Reservoir Multidose DPI
In use expiry:	3 months after removed from foil pouch

Available as

SABA	
SAMA	
LABA	
LAMA	
LAMA/LABA	
ICS	Asmanex (mometasone)
ICS/LABA	

Key Features	
Dexterity	Low-moderate dexterity required
Feedback: Dose Counter	Dose counter. Counts individual doses. Shaded indicator shows for last 20 doses.
Feedback: Taste/Feel	Generally no taste
Feedback: Sound	n/a
Feedback: Visual	n/a
Device Lock-Out	Cap locks in place when empty
Dose Consistency	Consistent dosing across range of inspiratory flow rates (28-70 L/min)
Device Resistance	Medium-high airflow resistance
Inspiratory Flow	No validated test available

Instructions for Use	
1. Preparation	**Check dose counter before use, and ensure that the counter and the pointer on the cap are lined up.**
2. Priming	Shake the inhaler, then whilst **keeping it upright, grip the base and twist the cap anticlockwise to remove it. Ensure that the counter and the pointer on the inhaler device are now lined up.**
3. Exhaling	**Exhale fully and away from mouthpiece**
4. Mouth	**Place mouthpiece between teeth and lips**
5. Inhalation	**Inhale strongly and deeply.**
6. Breath holding	Remove inhaler from your mouth and hold your breath for up to 10 seconds (or as long as possible), then breathe out slowly.
7. Closing & Repeating	Wait a few seconds before repeating steps 3-6 to ensure you inhaled the full dose. Replace cap after use, and ensure that the counter and the pointer on the cap are lined up again.

What you need to know / Critical Steps	
Priming	Must be primed in the vertical position. Removal of cap primes the device
Multi-Dosing	Multiple actuations of device winds dose counter down, but does not load dose (appears empty before it actually is)
Dose Wasting	Exhaling into device will lose the dose. Tilting, inverting or shaking the device may lose the dose.
Vents	Do not block the air vents
Inspiratory Method	Quick and deep
Other information	Removing the cap causes the dose counter to count down
Cleaning	Wipe the outside of the mouthpiece with a dry cloth or tissue.

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