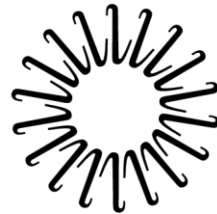


Bronchodilators

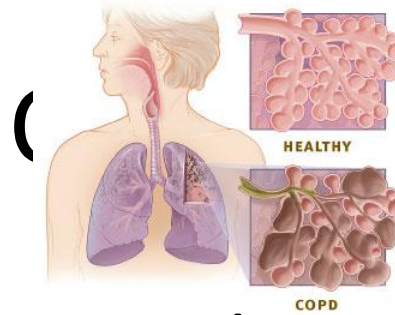


Lifespan Cardiovascular Institute

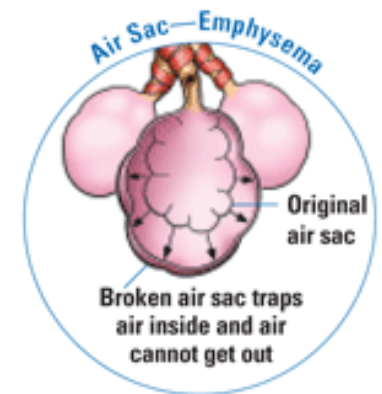
**Rhode Island Hospital • The Miriam Hospital
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Center For Cardiac Fitness
Pulmonary Rehab Program
The Miriam Hospital



- = Chronic Obstructive Pulmonary Disease
- Chronic Bronchitis
- Emphysema
- Asthma*



Pulmonary Fibrosis

- Minimal inflammation
- Fibrosis can occur in the absence of inflammation
- Corticosteroids do not alter or slow progression of PF

PF Treatment

- Mild to moderate
 - Nintedanib
 - Pirfenidone
- Severe/advanced
 - Sildenafil 20 mg 3x/day

Pulmonary Hypertension

- Can be a complication of pulmonary fibrosis
- Exacerbations are treated w/broad-spectrum abx and high dose glucocorticoids (prednisone 1 mg/kg/day orally or methylprednisolone 1-2 gm IV/day)

Bronchodilators

- Help to:
 - Improve airway flow + decrease airway obstruction
 - Decrease secretions
 - Decrease inflammation

Anti-Cholinergics

- Mechanism of action –
 - Blocks acetylcholine (ACh) in the lung
 - Decreases muscle tone of lung
 - Decreases secretions
- Side effects
 - Headache
 - Dry mouth
 - Cough

Anti-Cholinergics

- Examples include:
 - Ipratropium (Atrovent) – Short-acting
 - Tiotropium (Spiriva) – Long-acting

Beta Agonists

- Mechanism of action –
 - Works directly on the smooth muscle of the lung to decrease airway obstruction
- Side effects
 - Tremors
 - Increased heart rate + blood pressure
 - Chest pain

Beta-Agonists

- Examples include:
 - Albuterol (Ventolin) – Short-acting
 - Levalbuterol (Xopenex) – Short-acting
 - Pirbuterol (Maxair) – Short-acting

 - Salmeterol (Serevent) – Long-acting
 - Formoterol (Foradil) – Long-acting
 - Arformoterol (Brovana) – Long-acting

Anti-Cholinergics vs. Beta Agonists

- Anti-cholinergics > Beta agonists
 - Less side effects
 - Longer acting
 - Improves symptoms longer and better

Combination Therapy

- Anti-cholinergics + beta agonists
- Better together than separately
- Combo tx > Anti-cholinergics > Beta agonists

- Example:
 - Ipratropium + albuterol (Combivent)

Inhaled Corticosteroids

- Mechanism of action –
 - Sss
- Side effects

Tips for Use

Technique for use of a metered dose inhaler (MDI)

Shake canister vigorously for 5 seconds.
Uncap mouthpiece and check for loose objects in the device.
Insert MDI into spacer. Hold the MDI upright with the index finger on the top of the medication canister and the thumb supporting the bottom of the inhaler. You may need to use the other hand to hold the spacer.
Breathe out normally.
Close lips around spacer. For spacers that have a mask, hold the mask snugly to the face. If no spacer is available, close lips around mouthpiece or position it about 4 cm from the mouth.
Keep tongue away from the spacer opening or mouthpiece.
Press down the top of the medication canister with the index finger to release the medication.
At the same time as the canister is pressed, inhale deeply and slowly through the mouth until the lungs are completely filled; this should take four to six seconds.
Hold the medication in the lungs as long as possible (4 to 10) seconds before exhaling. If using a spacer, you may inhale a second time and hold the breath if needed.
If a second puff is needed, wait approximately 15 to 30 seconds between puffs, or long enough to perform the next inhalation properly. Shake canister again before use.
Recap mouthpiece.
Rinse your mouth with water after using an inhaled glucocorticoid, and spit the water out rather than swallowing it.

These instructions do NOT apply to dry powder inhalers.
Cleaning instructions are provided separately.
More detailed information about individual medication formulations can be found at
<http://www.accessdata.fda.gov/scripts/cder/drugsatfda/index.cfm>.

Tips for Use

Technique for use of MDI with spacer or valved holding chamber

Warm MDI canister to body temperature

Assemble apparatus and check for loose objects in the device

Shake canister vigorously

Hold canister in vertical position

Breathe out normally

Place holding chamber in mouth, or place mask completely over nose and mouth

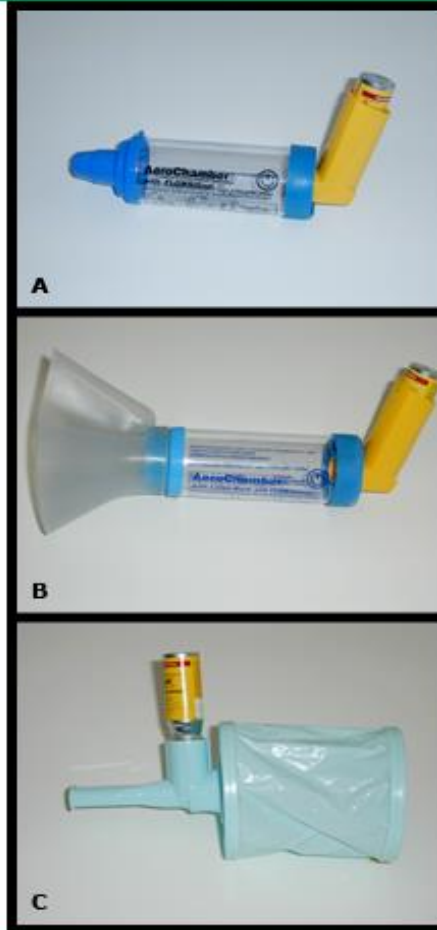
Encourage patient to breathe through mouth

Breathe in slowly and actuate MDI once at the beginning of inspiration

Allow about 15-30 seconds between actuations, or long enough to perform each inhalation properly.

Tips for Use – MDI w/Spacers

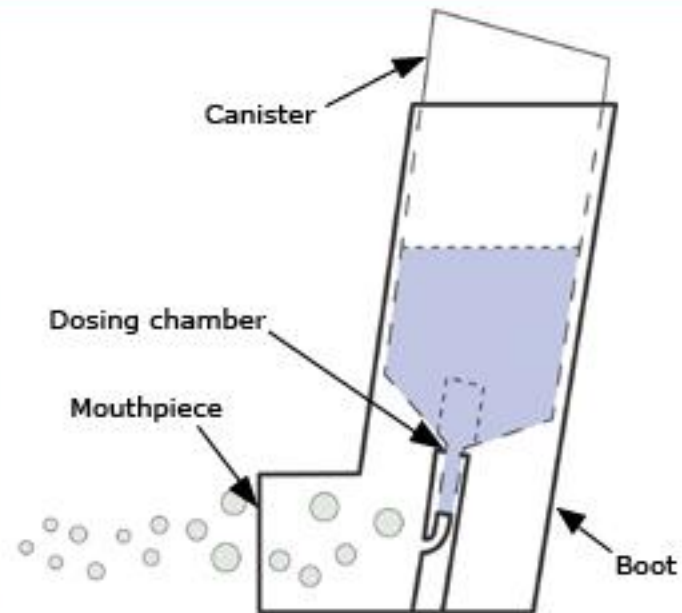
Accessory devices used with metered dose inhalers



(A) AeroChamber, (B) AeroChamber with mask, and (C) InspirEase. These devices can make it easier to use a metered dose inhaler and decrease the amount of drug that lands in the mouth and throat.

Tips for Use – MDI

Metered dose inhaler

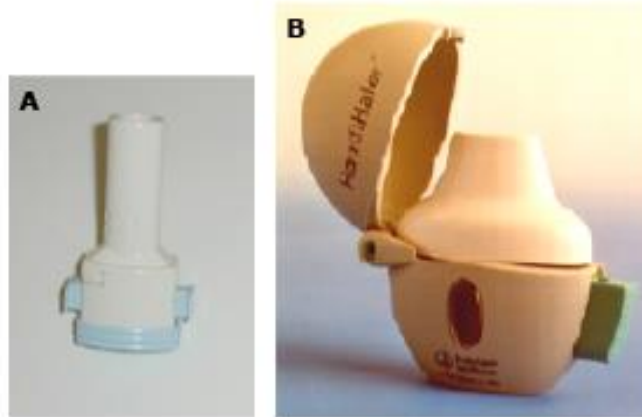


Medication is stored under pressure in the canister and released from the dosing chamber when the canister is pressed downward.

Tips for Use – DPIs

Examples of various dry powder inhalers

Single-dose devices



Multiple-dose devices



With these devices, the patient inhales the medication in the form of a fine powder rather than an aerosol. (A) Aerolizer, (B) HandiHaler, (C) Flexhaler, (D) Diskus, (E) Twisthaler.

Courtesy of Dean Hess, RRT, PhD.

Tips for use

- Empty vs. full?
 - Counter
 - Mark doses on a calendar
 - Math (for inhalers used on a regular basis)
 - True or false – Drop the canister into a bowl of water to see how it floats is an accurate method of determine fullness

Tips for Use

- Compliance is key!
 - Use your inhaler at the same time as something else
 - Example:
 - With morning meds
 - With breakfast
 - At bedtime
- Clean your inhalers + spacers!
 - Weekly