Respiratory Diseases
Lecture: 5

millenniumegypt.com
Inhalation Techniques

- Inhaling is often the best way to take medicine for asthma and COPD. (the main dosage form)
- Inhaled medicines go directly to the airways and cause fewer side effects.

**Inhaler types**

1. **1-MDI**
   - metered-dose inhalers

2. **2-DPI**
   - Dry-powder inhalers

1-Metered-dose Inhalers MDI:

- [https://www.youtube.com/watch?v=nvwR74XpKUM](https://www.youtube.com/watch?v=nvwR74XpKUM)
- Because of this misunderstanding :D, we need to know how to use the inhalers correctly!
- They deliver the medication in the form of Aerosol "mist".
- They are Cheaper than DPI but their major problem is the "co-ordination" between pressing the canister, inhaling the dose and holding the mouthpiece in the same time ;/
- There are 3 different methods for using metered-dose inhalers:

<table>
<thead>
<tr>
<th>1-Open-mouth method</th>
<th>2-Close-mouth method</th>
</tr>
</thead>
<tbody>
<tr>
<td>When compare it with Close, it's the most effective and easier</td>
<td>This method is not preferred over the spacer or open-mouth methods. Less medicine reaches the airways.</td>
</tr>
<tr>
<td><a href="https://www.youtube.com/watch?v=rgb-J9AV2IY">Demo:</a></td>
<td><a href="https://www.youtube.com/watch?v=9ipqxF-4p5g">https://www.youtube.com/watch?v=9ipqxF-4p5g</a></td>
</tr>
<tr>
<td><strong>Steps:</strong></td>
<td></td>
</tr>
<tr>
<td>1. <strong>Remove</strong> the cap. Hold the inhaler <strong>upright</strong>.</td>
<td></td>
</tr>
<tr>
<td>2. <strong>Check</strong> to be sure the mouth piece is free of any foreign object (such as a coin).</td>
<td></td>
</tr>
<tr>
<td>3. <strong>Shake</strong> the inhaler. (إلقاء و المعلق في واحد اقتلى من الثاني)</td>
<td></td>
</tr>
<tr>
<td>4. <strong>Prime</strong> the inhaler (spray it in the air .. priming is for the sealed one only) (لما نفتح واحدة جديدة)</td>
<td></td>
</tr>
<tr>
<td>5. Tilt the head back slightly. <strong>Breathe out</strong> slowly. (regulate your breathing breath in and out 3-4 times .. pt. must be in upright position sitting or standing not sleeping as the drug may deposit in his throat)</td>
<td></td>
</tr>
</tbody>
</table>
6. **Place the inhaler** in the mouth. Close the mouth. (seal it with your lips not teeth)

7. **Press down** on the canister firmly as you start to breathe in slowly. (Press down until the medicine is released.)

8. **Breathe in** slowly for a count of 3 to 5 seconds.

9. **Hold your breath** for a slow count to 10 (10 seconds)

10. If more puffs are prescribed, the ideal is to **wait between doses. (repeat again from step 5)**

    - For bronchodilators that are SABA, it is **best to wait 10 minutes** between doses. But it may be found that it more practical to wait 3 to 5 minutes. These fast-acting inhalers begin to open the airways quickly. When the patient waits after the first dose, the next doses can go deeper into the lungs.

    - For other inhalers, the patient should try to wait 1 minute between puffs.

11. **Rinse and gargle** with mouth wash or with water after using any steroid inhaler (even when it’s combined with another medicine). (to reduce the side effects from the drug deposition)

### 3-Spacer (aerochamber) method: (spacer for MDI only !!!)

- The spacer method is **often preferred in case of acute asthmatic attack or for pediatrics.**
- A spacer deposits less medicine in the mouth and the back of throat.
- **2 advantages:** less risk of fungal infection & overcoming co-ordination problem ;)

- **Demo:** [https://www.youtube.com/watch?v=ltB-ZOfkgY](https://www.youtube.com/watch?v=ltB-ZOfkgY)
- **Steps:**

  - **same as above (the 1st 4 steps) then we need to**
  1. **Attach the inhaler to the spacer.**
  2. **Press down on the canister firmly until the medicine is released. This will put 1 puff of the medicine into spacer.**
  3. **Breathe in slowly for 3-5 seconds.** Many spacers whistle if you inhale too fast.

And then the last 3 steps also

- hexagonal or circular rubber mask
- علاج الإنفلونزا
- acute attack
- البشر في الانفانت
- SABA dose: 1-2 puffs every 4-6hr
- Puff= 100Mg

المفروض نستني بين البخة و التانية بس لو في حالة الإصابة إحضنا أداة خاصة للاطفال و عاجزة الحقه ممكن كذا واحدة مع بعض

2010-2011 رشة في ال
### Doses left:

<table>
<thead>
<tr>
<th>Number of days</th>
<th>Number of doses</th>
</tr>
</thead>
<tbody>
<tr>
<td>For the patient to find out the number of days that he/she can use a new MDI, the following steps should be followed:</td>
<td>To find out the number of doses left in the MDI, follow the steps below.</td>
</tr>
<tr>
<td><strong>Step 1:</strong> Each inhaler is marked with the number of doses it contains. Find the number of doses marked on the inhaler.</td>
<td><strong>Step 1:</strong> Count the number of puffs the patient has used from one inhaler for a certain number of days. Example: 4 puffs per day times 40 days — 160 puffs used</td>
</tr>
<tr>
<td>Example: 200 doses (or puffs) <strong>Step 2:</strong> Add up the number of puffs the patient uses each day. Example: 2 puffs in the morning plus 2 puffs in the evening = 4 puffs/day <strong>Step 3:</strong> Take the number of doses (puffs) marked on the new inhaler. Divide it by the number of puffs the patient uses each day. Example: 200 doses (puffs) divided by 4 puffs = 50 days of use</td>
<td><strong>Step 2:</strong> Subtract the number of puffs used from the total puffs marked on the inhaler. Example: 200 doses (puffs) minus 160 puffs used = 40 puffs left <strong>Step 3:</strong> Divide the number of puffs left by the number of puffs that will be used each day. Example: 40 puffs left divided by 4 puffs per day = 10 days of use left</td>
</tr>
<tr>
<td>Take the number of days of use in the new inhaler. On the calendar, ask the patient to count that number of days ahead from the first day the inhaler will be used. Mark the date on the calendar that shows when the inhaler will be empty. Ask the patient to re-fill the inhaler prescription a day or two before the target empty date.</td>
<td></td>
</tr>
</tbody>
</table>

### MDI Care/Maintenance:

- The mouth-piece and the cap should be rinsed daily in warm water.
- **They should be washed in mild soap and rinse in warm water (or using dishwasher) at least 2 times a week, and more often (more than once daily) if the patient has an infection.**
- The mouthpiece and cap must be dried before use the inhaler again. (Leave it to dry don't use tissue or towel.
  - ممكن يستعمل منديل النضاره عشان مش بيسبب (residues)
- While the cleaned inhaler is drying, the patient must use another inhaler. (ننصحه يشترى 2 من كله حاجة)
- The spacer should be cleaned well. The instructions on the package insert for the specific spacer should be followed.
2- Dry-powder inhalers:

- These types of inhaler don't have a gas propellant to 'squirt' the medicine out of a canister. Instead, **each dose contains a tiny amount of medicine in a powder form that is sucked in.** Various devices are made by different companies. Each has a different method of providing the correct amount of powder for each dose. **Patients need to breathe in fairly hard to get the powder into the lungs** (*depends on deep breath activation or actuation*).
- They are Either **single- dose DPI** or **multi- dose DPI**.
- **Advantages:**
  - Overcoming the co-ordination problem → Compliance & ↑ outcome
  - Have dose counter
  - Contain lactose as a filler (sugary), we can know if any drug deposits on our mouth, unlike MDI sometimes there is bitter taste at the end but is not as clear as DPI.
- **Disadvantages:**
  - Expensive

<table>
<thead>
<tr>
<th>Diskus</th>
<th>Turbohaler</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="https://www.youtube.com/watch?v=IW9thi9HtaM" alt="Diskus Diagram" /></td>
<td><img src="https://www.youtube.com/watch?v=J9Rv_ix3Fg" alt="Turbohaler Diagram" /></td>
</tr>
</tbody>
</table>
**Steps:**

1. Hold the Diskus with one hand.
2. Place your thumb on the thumb grip. Then push it as far away from you as it will go. You will now see the mouth piece.
3. **Slide the "trigger/lever" away from you until you hear it click.** Your dose is now ready to be inhaled.

4. Bring the Diskus opening up to your mouth. **Be careful not to tilt the Diskus. It must stay in a level position until after you inhale the medicine.**
5. Place the Diskus opening up to the mouth. Take in a slow, deep breath. As you breathe in, count to 5. This allows you to breathe all the medicine into your airways.
6. Hold your breath for up to 10 seconds. Move the, Diskus away from your mouth.
7. Breathe out slowly.
8. Close the Diskus by sliding the thumb grip back over the mouth piece.
9. Rinse and gargle with diluted mouth wash or just with water if you’re not able to use mouth wash. This helps prevent hoarseness and an infection in your mouth from the inhaled steroids.

10. **Never wash the Diskus after use. (but may wipe them with a clean damp cloth to remove any residues)**

**Doses left:**
The dose counter counting down each 1, 5 or 20 dose and last doses appear in **Red** to remind us for refill.

---

**Turbohaler has a reservoir containing medication for 100 - 200 dosage. It doesn't contain lactose & therefore has no taste.**

**Steps:**

1. **Unscrew the lift off the cover. Hold the inhaler upright.**
2. **Turn the grip as far as it will go & then back again till you hear a click sound**
3. Breathe out away from the inhaler
4. Close lips around the mouthpiece, breathe in forcefully & deeply through the mouth. Don’t chew or bite hard on the mouthpiece.
5. Remove inhaler from the mouth, hold breath for 10 sec.
6. If> 1 dose is needed, wait for 1 min & repeat as before. Always replace the cover after use.

> All Turbohaler inhaler devices (made by AstraZeneca) have Braille markings on their inhaler base, but of course not everyone can read Braille.
**Diskhaler (Capsule inhaler)**

<table>
<thead>
<tr>
<th>Multi-dose DPI &quot;more convenient&quot;</th>
<th>Single-dose DPI (Aerolizers)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="https://example.com/diskhaler-diagram.png" alt="Diskhaler Diagram" /></td>
<td><img src="https://example.com/aerolizer-diagram.png" alt="Aerolizer Diagram" /></td>
</tr>
</tbody>
</table>

**Examples:** Relenza & Ventolin

**Steps:**

1. Remove the cover & check that the device & mouthpiece are clean.
2. If a new medication disk is needed, pull the corners of the white cartridge out as far as it will go, then press the ridges on the sides inwards to remove the cartridge.
3. Place the medication disk with its numbers facing up on the white rotating wheel then slide the cartridge all the way back in.
4. Pull the cartridge all the way out, then push it all the way in until the highest number on the medication disk can be seen in the indicator window.
5. With the cartridge fully inserted, & the device kept flat, raise the lid as far as it goes, to pierce both sides of the medication blister.
6. Move the Diskhaler away from the mouth & breathe out as much as possible until no air is left in the lungs.
7. Place the mouthpiece between the teeth & lips, making sure not to cover the air holes on the mouthpiece. Inhale as quickly & deeply as possible. Don’t breathe out.

**Examples:** Miflonide & Foradil

**Steps:**

1. take the lid off the Aerolizer®.
2. Twist the top of the Aerolizer® to open it.
3. Place the capsule in the hole in the center of the Aerolizer®.
4. Twist to close the top of the Aerolizer®
5. Hold the Aerolizer® with the mouthpiece up. Press the buttons on the sides of the Aerolizer® once firmly. This will pierce the capsule, so you can inhale the medication when you breathe in.
6. Hold the Aerolizer® away from your mouth and gently breathe out. Do not blow into the Aerolizer®.
7. Seal your lips around the mouthpiece.
8. Inhale rapidly and deeply. Continue to take a full, deep breath.
9. Resume normal breathing.
10. You can repeat steps 2 to 5 again to make sure you inhale the medication.
11. Twist the top of the Aerolizer® to open. Throw away the used capsule.
12. Place the lid back on the Aerolizer® when not in use. This will help keep the Aerolizer® clean and dry.

[https://www.youtube.com/watch?v=wak2lw_4GjM](https://www.youtube.com/watch?v=wak2lw_4GjM)

[https://www.youtube.com/watch?v=jFFic-Ahh34](https://www.youtube.com/watch?v=jFFic-Ahh34)
How to sequence inhalers:
Many people use several inhalers at a time. The patient should keep in mind that bronchodilators work faster than inhaled steroids. So, the patient should use bronchodilators first because these fast-acting inhalers open the airways quickly. The steroids should be inhaled last, so then they can go deeper into the lungs.

The general rules are:

- **First**, the patient should use fast-acting bronchodilator (SABA OR SAMA), for example, salbutamol.
- **Next**, any other bronchodilators prescribed for regular use should be inhaled (LABA OR LAMA), for example, Ipratropium.
- **Last**, the steroid inhaler should be used.

Inhalers are color-coded
- Blue & grey ➔ for Short acting bronchodilators
- Green ➔ for long acting bronchodilators
- Brown, orange, Red, purple ➔ Steroids

When should you seek help?
Medical care should be sought if any of the following happen to the patient:

- Change in the mucus colour, consistency, or amount.
- Wheeze, cough, or shortness of breath gets worse, even after taking the medication and it has time to work.
- Difficulties in breathing.
- Troubles in walking or talking

Gargling
It’s very important that the patient rinses and gargles after the use inhaled steroids. Advise the patient to rinse and gargle with mouth wash or just water after using any steroid inhaler (even when it’s combined with another medicine). This will prevent unwanted side effects that may occur with inhaled steroid use. One of these side effects is the oral thrush "candidiasis fungal infection".

And not Fever as it may indicate a viral infection also!
Peak Flow meter:
Additional Questions to Ask in Patient Assessment

1. Have you ever used a product like this? Which one?
2. What is the purpose of use?
3. What is your current asthma management plan?

Definitions:
- **Peak Expiratory Flow Rate (PEFR):** a measure of the force with which a breath is expelled from the lungs.
- **Forced Vital Capacity (FVC):** a measure of the maximal volume of air forcibly exhaled from the point of maximal inhalation.
- **Forced Vital Volume in 1 second (FEV1):** Volume of air exhaled during the first second of the FVC which, when reduced, indicates an airflow obstruction.

**INDICATION:**
Used to measure lung function for patients with moderate to severe persistent asthma. Ambulatory peak expiratory flow (PEF) monitoring is recommended in guidelines as a useful self-management activity for patients with asthma. Emphasis is placed on using the peak flow meter as a monitoring tool and not as a diagnostic device.

- Determine the severity of asthma
- Check response to treatment during an acute episode.
- Monitor progress in treatment of chronic asthma, and provide objective information for any possible adjustment in therapy.
- Detect worsening lung function and thereby avoid a possible serious incident with early intervention.
- Identify the relationship between changes in PEP and exposure to allergens, irritants, and other triggers.
- Establish the patient's personal best PEF.

**personal best PEF:**
- A patient's personal best value is the highest reading achieved over a 2- to 3-week period when their asthma is considered well controlled.
- An unusually high PEF value can be obtained if the patient "spits" or coughs into the peak flow meter, so judgment must be used in determining if the outlying value should be used to establish a personal best.
- The personal best value is used to calculate three zones adapted to traditional traffic light system: red, yellow, green. Each patient should have a written, individualized action plan similar to the example in the following box.

Asthma is a chronic condition needed to be evaluated regularly.
Green zone — PEFR 80-100% of personal best
All systems “go”. Patient is relatively symptom free and maintain current asthma Management, program. If patient is taking continuous medication and the peak flow is constantly in the green zone with minimal variation (Step down), the health care provider may consider gradually decreasing daily medication.

Yellow/orange zone — PEFR 50-80% of personal best.
"Caution," as asthma is Worsening. Health care provider should be contacted to fine-tune therapy (step up). A temporary increase in asthma Medication is indicated, if patient is on Chronic medications, maintenance therapy will Probably, need to be increase.

Red zone — PEFR < 50% of personal best
"Danger" asthma management and treatment are failing to control symptoms; Patients should be used inhaled bronchodilator. If peak flow readings don’t return to at least the Yellow zone, the health care provider Should be contacted. Aggressive therapy needs to be started. Maintenance therapy will have to be increased.

Patient counselling

MEASUREMENT

Step 1: Before each use, the marker or arrow should be at the zero or bottom position of the numbered scale. Gum or food should be removed from the mouth.

Step 2: The patient must stand up straight (if Linable to stand, he/she should sit with good posture).

Step 3: The patient should take a deep breath, filling the lungs completely.

Step 4: the patient should put the mouthpiece in his/her mouth and close the lips tightly around it, making sure to keep the tongue away from the mouthpiece (this will generate unusually high readings).

Step 5: The patient should blow out as fast and hard as possible. He/she should be instructed to "blow a fast, hard blast" rather than "slowly blowing". The force of the breath will move the marker.

Step 6: The number is noted.
• If the patient coughed or made a mistake, the number is not recorded. The test is repeated.
• Steps 1-6 are repeated two more times (the closer the readings, the more accurate), and the highest if the three rating is recorded, an average shouldn’t be calculated.
• Patients should use the meter when they sense that their asthma is getting worse and to determine if the treatment plan is working.

Cleaning (as previous)
Peak flow meters should be cleaned weekly with hot soapy water. Some meters can be put in a dishwasher. If the patient has a cold or other respiratory infection, the peak flow meter should be cleaned more frequently.

Routine (زي الشرح)
The patient should measure the PEF close to the same time each day, one suggestion is to measure the peak flow twice daily on rising (7-9 am) and in the evening (6-8 pm), preferably before using asthma medications. If once a day monitoring is required, the peak flow meter is used when the patient wakes up before taking the medication. The patient should maintain an asthma diary, and chart the highest of the three readings and include symptoms, medication use, and any restricted activity.

Personal best (زي الشرح)
Patients should take peak flow readings when their asthma is under good control. Measurements should be taken at least twice a day for 2-3 weeks, either on waking and between noon and 2 pm, or before and after taking short-acting inhaled B2 agonist for relief as instructed by the clinician. The personal best is used to calculate 3 zones of measurement of the asthma action plan.