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Asthma and COPD devices

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Learning objectives

Upon completion of this continuing education lesson the reader should be able to do the following:

1. Have a general understanding of asthma and chronic obstructive pulmonary disease (COPD)
2. Have a general understanding of the different types of medications used to treat asthma and COPD
3. Demonstrate proper use of delivery devices for asthma and COPD medications and monitor treatment
4. Know when to refer the patient to the pharmacist

INTRODUCTION

Medications used to treat asthma and chronic obstructive pulmonary disease (COPD) are administered in unique ways. Rather than taken orally, they are often inhaled directly into the lungs using specific inhaler devices. This lesson will teach technicians how to effectively demonstrate several devices used to treat asthma and COPD and how to monitor therapy. To get optimal benefits from asthma and COPD medications, it is very important that these devices are used properly by the patient.

Asthma

Asthma is defined as "a condition characterized by paroxysmal or persistent symptoms such as dyspnea, chest tightness, wheezing, sputum production, and cough, associated with variable airflow limitation and airway hyper-responsiveness to endogenous or exogenous stimuli."[1] A more

simplified explanation is that the patient has trouble breathing. This breathing difficulty might be constant or might come and go. Symptoms can include shortness of breath, chest tightness, wheezing, and coughing. The troubled breathing or airflow limitation changes over time. Sometimes patients have no trouble breathing and sometimes they can't even recite a seven-digit phone number. People with asthma have attacks (worsening of symptoms) when they encounter certain triggers. These triggers can be external (eg, cat dander, dust mites) or internal (eg, emotional turmoil, changing hormones).

Chronic obstructive pulmonary disease

"Chronic obstructive pulmonary disease is a respiratory disorder largely caused by smoking. It is characterized by progressive, partially reversible airway obstruction and lung hyperinflation, systemic manifestations, and increasing frequency and severity of exacerbations."[2] Although most cases are caused by smoking, there are other causes of COPD. The condition is irreversible and gets worse over time. Symptoms can be somewhat controlled with treatment, but COPD is not currently curable.

The differences between asthma and COPD are outlined in Table 1.[2]

TABLE 1 - Differences between asthma and COPD[2]

	Asthma	COPD
Age of onset	Usually < 40 years old	Usually > 40 years old
Smoking history	Not causal (a person with asthma may smoke and smoking may make the asthma worse, but smoking doesn't cause asthma)	Usually > 10 pack-years (eg, if someone smoked 1 pack a day for 10 years, that would be 10 pack years, if someone smoked 2 packs per day for 5 years that would also be 10 pack years)
Sputum production (coughing up mucus, phlegm)	Infrequent	Often
Allergies	Often	Infrequent
Disease course	Stable (with exacerbations)	Progressive worsening (with exacerbations)
Spirometry (breathing tests to assess lung function)	Often normalizes with treatment	May improve with treatment but never normalizes
Clinical symptoms (eg, cough, shortness of breath)	Intermittent and variable	Persistent

COPD—chronic obstructive pulmonary disease.

MEDICATIONS USED TO TREAT ASTHMA AND COPD

There are many similarities between the medications used to treat asthma and those used to treat COPD. In general most of the medications are inhaled directly into the lungs. These medications either directly open up the airways or reduce inflammation in the lungs. The following highlights the most commonly used drug classes. More detailed explanation of the medications can be found in the September 2011 Tech Talk CE lesson, "An Asthma Overview."

Short-acting beta-agonists (SABAs)

The most common of these medications is salbutamol. It is usually inhaled through a metered-dose inhaler (MDI), but can be administered through a nebulizer, orally or intravenously. It quickly opens up the airways, but doesn't last very long. Salbutamol starts reducing airway resistance in 5–15 minutes. The peak improvement in pulmonary function occurs in 60–90 minutes. Bronchodilator action lasts about 3–6 hours.[4] Short-acting beta-agonists are used in both asthma and COPD.

Long-acting beta-agonists (LABAs)

These include medications such as formoterol and salmeterol. They can be administered via dry powder inhalers (Turbuhaler or Diskus) or by nebulizer. Unlike SABAs, they can keep the airways open for 8–12 hours. Long-acting beta-agonists are used in both asthma and COPD.

Anticholinergics

These medications also open up the airways, but by a different mechanism than the beta-agonists. They are used much more often in COPD than in asthma. Ipratropium is a short-acting anticholinergic, and it can be given by MDI and nebulizer. Tiotropium is a long-acting anticholinergic, and it is given via a HandiHaler, which is a type of dry-powder inhaler. As of press time, the most recent long-acting anticholinegic is glycopyrronium, a once-a-day dry powder inhaled medication.

Corticosteroids

Corticosteroids reduce lung inflammation, which is a driving force behind asthma. Inflammation is less of an issue in COPD, but reducing inflammation in COPD patients can reduce symptoms. Corticosteroids are most often administered via inhalation in both asthma and COPD. Corticosteroid medications like budesonide, fluticasone, and mometasone can be administered via MDI, dry-powder inhaler (Turbuhaler or Diskus), or nebulizer. In severe flareups of either asthma or COPD, corticosteroids can be given orally. The most common oral corticosteroid is prednisone. In hospital, corticosteroids like methylprednisolone can be given intravenously.

Leukotriene receptor antagonists

These medications (eg, montelukast and zafirlukast) reduce inflammation inside the lungs, but by a different mechanism than corticosteroids. They are given orally and only used in asthma.

Theophylline

Theophylline opens up the airways, and can be given orally or intravenously. It has a narrow therapeutic index and is no longer used in asthma or COPD treatment very often.

DEVICES USED TO DELIVER ASTHMA AND COPD MEDICATIONS

There are three main types of inhalation devices: metered dose inhalers (MDIs), which can be used with or without spacers,

dry powder inhalers, and nebulizers. Metered dose inhalars are all very similar. Dry powder inhalers include the Turbuhaler, Diskus, and Handihaler. Nebulizers will be discussed, but are becoming less and less common outside of institutions. Peak flow meters are used for the patient to self-monitor therapy. A summary of available devices is available in Table 2.

Metered dose inhaler (MDI)

Metered dose inhalers are the most common type of asthma and COPD devices. They have a propellant that sprays a medication mixture out of an actuator. The idea is that the droplets will be small enough to be inhaled deep into the lungs.

How to use an MDI[3,4]:

1. Remove the cap and look inside (sounds silly, but people have inhaled pennies, dimes, paper clips, etc., which were stuck in their inhalers, into their throats and choked).
2. Shake well.
3. Hold index finger on top of the canister and thumb on bottom of mouthpiece. Breathe all the air out of the lungs.
4. Place the mouthpiece in mouth.
5. Start inhaling and push down once on canister to spray. Keep inhaling slowly and deeply.
6. Hold your breath as long as you can (usually about 10 seconds).
7. Exhale slowly. I tell people to exhale through their nose, which makes them exhale more slowly; also, if they are using an inhaled corticosteroid, this way some of the corticosteroid ends up in the nasal cavity. This helps treat the allergic rhinitis that many people with asthma also have.
8. If the patient needs an additional puff, they need to wait 60 seconds, then go back to step 2 and shake well. If the patient simply sprays the MDI twice in a row without waiting and shaking again, the second puff will be all propellant and no medication.
9. Replace the cap.

There is an extra step if the MDI is for an inhaled corticosteroid: after using the MDI, rinse the mouth out with water. Mouth rinsing will help to prevent thrush (oral candidiasis). Because many inhaled corticosteroids are prescribed twice daily, it is often useful to tell patients to use their MDI before they brush their teeth in the morning and before they brush their teeth at night. That way they'll be rinsing their mouth with water anyway.

Maintenance. Most patients will never wash their MDI, and will never have any problems. However a little bit of cleaning can help the MDI work better and last longer. To clean an MDI, remove the canister. Then hold the mouthpiece under warm running water. This should clear any white build-up in the mouthpiece. Gently wash the mouthpiece in warm soapy water. Rinse well under running water again. Let the mouthpiece completely air dry before putting the canister back in. Remember to replace the cap. Cleaning can be done once a week or whenever there is significant white build up in the mouthpiece.

Remaining doses. All inhalers have the number of doses they contain printed on the package. Currently, most MDIs do not have a built-in dose counter (the only MDI I'm aware of that has a built-in dose counter is a combination mometasone–formoterol inhaler); therefore, it can be difficult for patients using MDIs to tell how many doses they have left. We used to tell patients to take the canister out and place it in a basin of water. If it sank, it still contained medication. If it floated, it was empty. That practice is now frowned upon as water from some sources may contaminate the canister. There are commercially available scales that are calibrated for MDIs that will tell you how many doses are left, but they aren't very common. I tell patients to gently shake an MDI beside the ear to see if it still has medication left in it. If you hear liquid sloshing around inside, there is still medication in it. However, the only 100% reliable method is to count the doses as you use them.

Valved spacer

Valved spacers are partnered with MDIs. It is surprisingly difficult to coordinate spraying a puff of medication from an MDI and inhaling at the same time. Valved spacers allow patients with coordination difficulties to use an MDI more easily. These patients are often infants, children, and the elderly, but arguably almost any MDI user could benefit from using a valved spacer. In addition to helping with coordination problems, spacers also help the patient to inhale only the smallest of the medication droplets released by the MDI (not the larger nonrespirable particles). The smaller the particle that is inhaled, the deeper the medication will go into the bronchial tree of the lungs. When spacers are used with inhaled corticosteroids, they can also reduce the chance of thrush.

Thrush (also called oral candidiasis) is an

opportunistic fungal infection of the mouth and throat. When a corticosteroid is sprayed against the back of the throat day after day, it can locally suppress the immune system, which can increase the chance of thrush. If the MDI is used with a valved spacer, very little corticosteroid lands on the back of the throat. Although the patient should still rinse his or her mouth out after using an inhaled corticosteroid through a valved spacer, the risk of thrush is reduced by the spacer.

How to use a valved spacer[5]:

1. Remove the cap from the spacer and the MDI.
2. Insert the MDI into the spacer.
3. Shake the MDI/spacer combination
4. Place spacer mouthpiece in mouth and spray MDI into the chamber.
5. Inhale slowly and deeply. With many valved spacers if you inhale too quickly the spacer will whistle as a warning. Tell patients that if their spacer whistles, they are inhaling too quickly. If a patient can't inhale deeply you have options.

a. Infants: Select a spacer with an infant-sized mask. Put the mask over the mouth and nose. Shake and spray the MDI. Watch the valve in the spacer move 5 times. The patient has now inhaled the whole dose.

b. Screaming toddlers: Get a spacer with an appropriate sized mask. Get set up. Shake and spray the MDI. Put the mask over the child's mouth and nose. Even if the toddler screams into the spacer, it is no problem because of the valve. Eventually the screaming toddler will have to inhale and they will inhale the medication.

c. Adults who are very short of breath: Get set up and shake and spray into the spacer. The patient can take 5 inhalations to get the medication in.

d. Arthritic patient: I had a patient who couldn't use her MDI because of the arthritis in her hands. With the valved spacer, her sister could spray into the chamber then hand her the apparatus for inhalation.

6. Hold your breath as long as you can (usually about 10 seconds).
7. Exhale slowly. I tell people to exhale slowly through their nose. This makes them exhale more slowly and if they are using an inhaled steroid then some of the steroid ends up in the nasal cavity. This helps the allergic rhinitis that afflicts many people with asthma.
8. If the patient needs an additional puff, they need to wait 60 seconds, go back to step 2, and shake well. If the patient simply sprays the MDI twice in a row without waiting and shaking, the second puff will be all propellant and no medication.
9. Replace the caps on both the MDI and the spacer.

Valved spacer maintenance. After a while, the spacer will get a white build-up inside. When this happens, remove the end of the spacer (where the MDI fits). Gently rinse out the white build-up with warm water. Allow spacer to air dry completely, then reassemble.

Turbuhaler

Turbuhalers are dry powdered inhalers. Unlike the older dry powder inhalers, Turbuhalers contain only active ingredient. This means the patient will be inhaling a very small amount of powder.

How to use a Turbuhaler[6]:

1. Hold the Turbuhaler vertically. Unscrew the cap and set it aside.
2. Keep holding the Turbuhaler vertically. Turn the bottom dial all the way in one direction and all the way back. You will hear a click. Someone will ask if you should turn the Turbuhaler clockwise or counter-clockwise. It doesn't actually matter, so long as they are turning it a different direction with each puff. So it should be turned all the way one way, then all the way back until you hear a click. You can't load up several doses by clicking several times. Even if you click several times, only one dose will be loaded for inhalation.
3. Exhale. Do not exhale into the Turbuhaler. Moisture from the breath can cause the powder in the Turbuhaler to clump and the Turbuhaler may not deliver medication properly. Don't shake the Turbuhaler as this can dislodge the dose as well.
4. Put the mouthpiece between the lips and inhale quickly. I describe it as "like sucking on a straw."
5. Hold breath as long as possible (usually about 10 seconds).
6. Exhale slowly. I tell people to exhale slowly through their nose. This makes them exhale more slowly, and if they are using an inhaled corticosteroid then some of the corticosteroid ends up in the nasal cavity. This helps the allergic rhinitis that many asthmatics also have.
7. If the patient needs another puff, go back to step 2 and click again. There is no need to wait between inhalations with Turbuhalers.
8. When finished, screw the cap back on.

Note that the Turbuhaler delivers medication as a very fine powder. Patients may or may not taste or feel the powder. Remind patients not to use an extra dose from the Turbuhaler if they don't taste or feel the medicine. If the Turbuhaler is being used to deliver a corticosteroid, remind patients to rinse their mouths after use.

Turbuhalers have a dose indicator window. The Turbuhaler that contains budesonide has an indicator window that turns red when there are about 20 doses left. The Turbuhaler that contains formoterol and budesonide has a window that counts down each puff and shows the number of puffs left in the dose indicator window.

Turbuhaler maintenance. Patients shouldn't try to do any maintenance on their Turbuhalers, due to the risk—if they get any water into the Turbuhaler, the powder will clump and the Turbuhaler won't work anymore. If someone insists on cleaning their Turbuhaler, they can wipe it gently with a completely dry cloth, and can pop off the mouthpiece and wipe it out as well. But I would discourage people from cleaning their Turbuhalers.

HandiHaler

The HandiHaler allows a capsule of powdered medication to be properly punctured and the contents inhaled. At the moment, only the long-acting anticholinergic medication tiotropium is available in a HandiHaler (although the recently released glycopyrronium system seems to be similar). Please make sure you explain the capsules of tiotropium in the HandiHaler box are not to be swallowed. They are to be put in the HandiHaler and their contents are to be inhaled.

How to use a HandiHaler[7]:

1. Open the dust cover on the HandiHaler.
2. Open the mouthpiece and insert

one capsule.
3. Close the mouthpiece and push the green piercing button completely. If you are watching the window you will see two metal spikes pierce the capsule.
4. Breathe out completely. Never breathe into the device. Seal lips on mouthpiece and inhale slowly and deeply until lungs are full. You will feel and hear the capsule spin and rattle as you are inhaling. Exhale slowly (never exhale into the device).
5. With the same capsule in the HandiHaler, inhale a second time. This second inhalation is to make sure you get all the medication out of the capsule.
6. Open mouthpiece and discard the empty capsule.

HandiHaler maintenance. Like the Turbuhaler, it is preferable if patients did not try to clean their HandiHaler. As it is a powder delivery device, any moisture will stop the device from working. As this device is only used once per day for a month then discarded, the chance of it needing cleaning is low. Patients can purchase tiotropium capsules only, without a new HandiHaler each month, but I don't recommend it as the capsules alone are the same price as the capsules with a new HandiHaler.

Do not use detergents on your HandiHaler or place it in the dishwasher. Open the dust cap and the mouthpiece as you would to put in a capsule and push upward on the green piercing button. This will expose the chamber the capsule goes in. Rinse under warm water while pushing the green piercing button a few times. This should clear out any stray powder. Stand the HandiHaler upside down with the dust cap, mouthpiece and inhaler base completely open on a paper towel. Let the HandiHaler air dry (it takes 24 hours to air dry completely).

Diskus

The Diskus has powdered medication rolled up inside it in foil packages (picture a toy cap gun with each little cap on the strip being full of medication). The Diskus is a breath-activated device.

How to use the Diskus[8]:
1. Put your thumb in the thumb notch and slide the cover open. When you have opened the cover all the way the mouthpiece will appear.
2. Holding the Diskus level, pinch the lever towards the thumb notch to load a dose. To avoid releasing or wasting doses once the Diskus is ready, do not close the Diskus, do not tilt the Diskus, do not play with the lever, and do not move the lever more than once.
3. Before inhaling your dose from the Diskus, breathe out fully while holding the Diskus level and away from your mouth. Never exhale into the Diskus.
4. Put the mouthpiece to your lips. Breathe in quickly and deeply through the Diskus.
5. Hold your breath for about 10 seconds, or for as long as is comfortable. Breathe out slowly.

Note that like the Turbuhaler, the Diskus delivers its medication as a very fine powder. Patients may or may not taste or feel the powder. Remind patients not to use an extra dose from the Diskus if they don't taste or feel the medicine. The Diskus has an indicator window to indicate the number of doses left. If the Diskus is used for corticosteroids, the patient should rinse their mouth out after using it to prevent thrush.

Nebulizers

Nebulizers are becoming less and less popular in the community and in many

TABLE 2 - A summary of different asthma devices

Device	Medications	Advantages	Disadvantages
MDI	Salbutamol, fluticasone, salmeterol, fluticasone/salmeterol combo, beclomethasone, ipratropium, ciclesonide	Least expensive, small, light, portable, many medications available, can be used with spacer	Most difficult inhalation device to use properly, most do not have a "doses left" indicator
Valved spacer	Can be used with any medications available in MDI format	Makes MDIs easier to use, allows MDIs to be used in the very old and very young, medication delivery to the lungs is similar with an MDI-spacer compared with a nebulizer	Large and inconvenient to carry around, another item to purchase
Turbuhaler	Budesonide, formoterol, budesonide/formoterol combo, terbutaline	Easy to use, only inhaling small amounts of powder	More expensive than MDIs, can't use with spacer
HandiHaler	Tiotropium	Only device available for tiotropium inhalation	Complicated to use, must inhale large amounts of powder, expensive, can't use with spacer
Diskus	Salmeterol, salmeterol/fluticasone combo, salbutamol	Easy to use, only inhale small amounts of powder	More expensive than MDI, can't use with spacer
Nebulizer	Salbutamol, budesonide, ipratropium, hypertonic saline, sodium cromoglycate	Same method of drug delivery as patient may have used in hospital; therefore, patients may prefer	Expensive, complicated, each treatment takes a long time (8-10 min), cleaning required, not very portable, power supply required
Peak flow meter	Used to monitor drug efficacy, not for drug delivery	Patient can track their PEF at home and, based on their asthma action plan, adjust their treatment or seek medical attention	Takes some training to use properly, only really useful in combination with an asthma action plan

MDI—metered dose inhaler, PEF–peak expiratory flow.

hospitals. The machines are expensive, complicated to use, and not very portable. They need to be cleaned and each treatment takes a long time (8–10 min). If an MDI and spacer are used together, medication delivery is as good as that provided by a nebulizer. However, psychologically, some patients will always be convinced the nebulizer is better as it is "the machine they used in the hospital."

How to use a nebulizer[9]:

(Note—all nebulizers are a little different. Please refer to the documentation for the brand of nebulizer machine you are using and follow those instructions for use and cleaning. The following are general instructions only.)

1. Wash hands with soap and water.
2. Put nebulizer machine on a flat surface like a table and plug it in. (Battery powered nebulizers do exist. Please refer to manufacturer's directions for how to use.)
3. Check if air filter is clean. If not, clean as per manufacturer's instructions. This usually involves rinsing with cold water and air drying.
4. Measure liquid medication into medication cup using appropriate device. Add saline if instructed to do so.
5. Connect medicine cup to the nebulizer machine.
6. Connect the mouthpiece or mask to the machine and the patient. Instruct patient to breathe in and out slowly during the treatment.
7. Take care to avoid the tubing getting pinched or kinked.
8. Turn on the nebulizer. The whole treatment may take 8 to 10 minutes. You may have to tap the sides of the medicine cup to get the last drops to form a mist. Have patient keep breathing through machine until all medicine is gone and no more mist is coming out.

Peak flow meter

The peak flow meter is used to determine how much air patients can expel from their lungs. Peak expiratory flow (PEF) doesn't replace the spirometry that a doctor or respiratory therapist can do to diagnose breathing disorders. However, with an action plan drawn up by a trained healthcare professional, PEF can help patients determine if their breathing is getting better or worse and hopefully act on that information before a trip to the doctor or emergency room is required.

How to use the peak flow meter[10]:

1. Stand up straight.
2. Manually move the pointer to zero.
3. Take a deep breath.
4. Seal lips around mouthpiece.
5. Blow out as fast as possible into peak flow meter.
6. Note the reading.
7. Repeat 3 times and record the highest reading.

A peak flow meter is usually used in the morning and at bedtime. It is also usually used before taking inhaled medications.

PROBLEMS WITH ASTHMA AND COPD DEVICES

Metered-dose inhalers are arguably the most difficult devices in the pharmacy for patients to use properly. Although, dry-powdered inhalers also have their potential problems. In the January 2013 issue of *Respiratory Medicine,* the Inhaler Error Steering Committee outlined just how large the problem of incorrect inhaler use is and gave suggestions on how to improve the situation.[11] Problems with MDIs included failure to remove cap, inhaling through the nose and not the mouth, and not actuating the MDI. Problems with dry powder inhalers included breathing into the device, shaking the device, and failing to remove the cap. From the 21 studies examined, they estimated that 14%–90% (average 50%) of patients misused their MDIs. They also found that only 5% of medical interns could use an MDI properly. The same study found a substantial increase in correct MDI use with one-on-one training sessions.[11] One potential solution that wasn't mentioned was having qualified pharmacy technicians teach proper inhaler technique and review inhaler technique during every inhaler refill.

ROLE OF THE PHARMACY TECHNICIAN

The technician should have a general understanding of asthma and COPD and which medications are used to treat these conditions. The technician should be very familiar with the devices used to treat and monitor these conditions. This will allow technicians to teach the patient how to use these devices properly. Without proper training, the incorrect use of these devices can lead to treatment failure. Start teaching by demonstrating the device for the patient, then have the patient demonstrate the device back to you. Finish with one or two open-ended questions like, "What was the most difficult part of using the inhaler for you?" (Note that open-ended questions are ones that can't be answered with a "yes" or "no.") A patient should always be taught how to use his or her device the first time it is prescribed. This is already standard policy in most pharmacies. However, this misses some important teaching opportunities. It is very rare for any other healthcare professional to review asthma/COPD device use after the initial prescription. Ideally, one should ask the patient to demonstrate how they use their device on each refill. This will take some tact. Many patients with asthma or COPD falsely believe they are breathing device experts. Many patients will be short on time when they run into the pharmacy for a refill. If you feel the patient is receptive, ask them to show you how they use their device. Gently correct any misuse.

If you or the patient has trouble using the devices, there are excellent resources online. My favourite is put together by the Children's Asthma Education Centre in Winnipeg at www.asthma-education.com. It has videos, information sheets, and checklists on most breathing devices. A review article on asthma devices, written by pharmacist Simon Lessard, is available in the April/May 2012 issue of *Pharmacy Practice,* which is available online at www.canadian healthcarenetwork.ca. Finally, the device manufacturer is usually an excellent resource on how to use their device.

When to refer to pharmacist

A properly trained technician should be very capable of teaching a patient how to use a breathing device. However, don't try to teach patients about a device with which you are unfamiliar. In these situations, refer patients to a pharmacist. The pharmacist should also be called when the patient's questions start entering the clinical sphere of the disease process. These clinical questions can include

patients asking what it means to have their breathing condition, how the medications work, and whether they interact with other medications they are taking. A pharmacist should also be included in the discussion if a patient seems unsure about the purpose of the medication or device, or the overall goal of therapy in their disease process. If they mention any adverse effects, they should be referred to the pharmacist.

Disclaimer on scope of practice

Knowledge is a wonderful thing. All technicians can benefit from knowing more about the medications and devices they dispense. However, at the time of writing this article, technician regulation across Canada was in a period of flux. Having a technician train a patient on a drug delivery device may not be permitted in every jurisdiction or every pharmacy across Canada. Please adhere to your local provincial regulations and your pharmacy's policies and procedures in reference to your scope of practice.

CONCLUSION

Getting medications into the lungs of patients with asthma and COPD is more complicated than simply swallowing a pill. Asthma and COPD medications are often delivered with devices that require significant patient education to ensure proper use. Improper use of these devices can lead to treatment failure. With proper training, a technician can play an important role teaching patients how to use these breathing devices when first prescribed and reviewing their use upon refill.

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QUESTIONS

Please select the best answer for each question or answer online at www.CanadianHealthcareNetwork.ca for instant results.

1. Asthma is defined as follows:
a) A condition characterized by paroxysmal or persistent symptoms, such as dyspnea, chest tightness, wheezing, sputum production, and cough, associated with variable airflow limitation and airway hyper-responsiveness to endogenous or exogenous stimuli.
b) A condition characterized largely by a history of smoking, hallmarked by partially reversible airway obstruction and lung hyperinflation, systemic manifestations, and increasing frequency and severity of exacerbations.
c) A condition characterized by repeated viral infections causing progressive alveolar destruction and lung deterioration.
d) A condition characterized by an enzyme deficiency, which over time increases mucus viscosity.

2. COPD is defined as follows:
a) A condition characterized by paroxysmal or persistent symptoms such as dyspnea, chest tightness, wheezing, sputum production, and cough, associated with variable airflow limitation and airway hyper-responsiveness to endogenous or exogenous stimuli.
b) A condition characterized largely by a history of smoking, hallmarked by partially reversible airway obstruction and lung hyperinflation, systemic manifestations, and increasing frequency and severity of exacerbations.
c) A condition characterized by repeated viral infections causing progressive alveolar destruction and lung deterioration.
d) A condition characterized by an enzyme deficiency, which over time increases mucus viscosity.

3. Differences between asthma and COPD include all the following EXCEPT
a) Asthma usually begins before the age of 40 and COPD begins after the age of 40.
b) Smoking may make asthma symptoms worse but doesn't cause the disease. In COPD the person usually has a >10 pack-year smoking history.
c) Allergies occur at the same rate in people with asthma or COPD.
d) In asthma the patient's symptoms are relatively stable over time, with some exacerbations. In COPD the patient's symptoms get worse over time with some exacerbations.

4. An example of an anticholinergic medication used for asthma or COPD is
a) Salbutamol
b) Fluticasone
c) Formoterol
d) Tiotropium

5. Metered dose inhalers (MDIs) are
a) Asthma or COPD inhalation devices with a propellant that sprays the medication out of an actuator.
b) Asthma or COPD inhalation devices that deliver powdered medication in a breath-activated fashion.
c) Devices that cannot be used with a valved spacer.
d) Considered to be the easiest asthma or COPD device for patients to use properly.

6. All the following are steps in proper MDI use EXCEPT
a) Remove the cap and look inside the MDI.
b) Be careful not to shake or the powdered medication dose will be lost.
c) Hold index finger on top of the canister and thumb on bottom of mouthpiece. Breathe all the air out of the lungs.
d) Start inhaling and push down once on canister to spray. Keep inhaling

slowly and deeply.

7. Turbuhalers are
a) Asthma or COPD inhalation devices with a propellant that sprays the medication out of an actuator.
b) Asthma or COPD inhalation devices that deliver powdered medication in a breath-activated fashion.
c) Very important to shake before every puff.
d) Devices that, when combined with valved spacer, deliver medication very deep into the lungs.

8. Turbuhaler maintenance
a) Includes thoroughly submerging the device in water.
b) Includes proper air drying after rinsing the device.
c) Should be avoided. If absolutely necessary, careful wiping of the mouthpiece with a dry cloth should be all that is done.
d) Includes letting the device air dry in its component pieces for at least 24 hours before reassembly.

9. HandiHalers are used to deliver a variety of medications to people with asthma or COPD.
a) True
b) False

10. All the following are steps in using a HandiHaler EXCEPT
a) Open dust cover.
b) Open mouthpiece and insert one capsule.
c) Push green piercing button.
d) Blow into the HandiHaler twice before each inhalation.

11. Which of the following is part of the instructions for using a Diskus?
a) Holding the Diskus level, pinch the lever towards the thumb notch to load up a dose.
b) Shake the Diskus before use.
c) Blow into the device.
d) Using a valved spacer will improve the performance of the Diskus.

12. The Diskus is a breath-activated device.
a) True
b) False

13. All the following are steps in proper peak flow meter use EXCEPT
a) Stand up straight.
b) Plug in machine.
c) Blow out as fast as possible into peak flow meter.
d) Note the reading.

14. Which of the following is true about valved spacers?
a) They can be used with Turbuhalers, Diskuses, and HandiHalers.
b) They should be kept completely dry when cleaning.
c) They can never be used with screaming toddlers.
d) A patient can wait several seconds after spraying an MDI into the chamber before they have to inhale the medication.

15. Nebulizers are
a) The least expensive asthma or COPD device.
b) The easiest-to-use asthma or COPD device.
c) Machines that take 8–10 minutes to deliver medication.
d) Very portable devices that can be used anywhere, indoors or outdoors.

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❑ Other (specify): _____

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❑ Yes ❑ No

Please help ensure this program continues to be useful to you by answering these questions.

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❑ Yes ❑ No
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