

PALLIATIVE PEARLS

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Inhaled Therapy Palliative Pearls: A Review August 2022

This month's Palliative Pearls serves as a refresher, pulling key points from two popular cases, [COPD Inhalation Therapy Conversion Case](#) and [Inhaled Therapy Case: Selecting the Best Device & Mixing Nebbs](#).

PATIENT CASE

JT is a 77-year-old male with a primary diagnosis of COPD and comorbidities of CHF, hypertension, obstructive sleep apnea, depression, and neuropathic pain. Allergies include anaphylactic reaction to bee venom and skin rash with sulfa drugs. JT was admitted to hospice 2 weeks ago. He resides at home with his wife who is primary caregiver.

CURRENT MEDICATIONS PERTINENT IN MANAGING COPD:¹

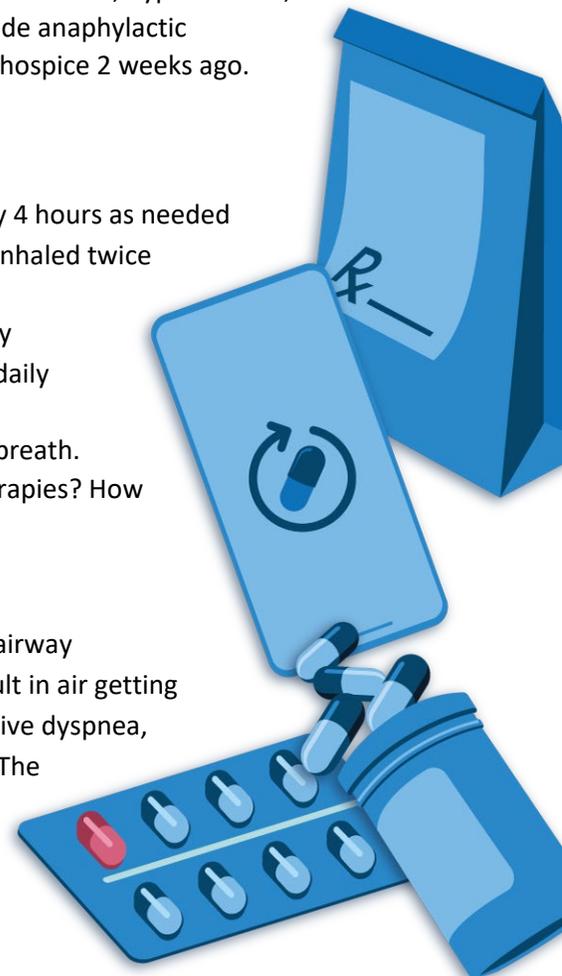
- Albuterol metered-dose inhaler 90mcg/puff; 2 puffs inhaled every 4 hours as needed
- QVAR® RediHaler (beclomethasone diprop.) 40mcg/puff; 2 puffs inhaled twice daily
- Serevent® Diskus (salmeterol) 50mcg/puff; 1 inhalation twice daily
- Spiriva® Respimat (tiotropium) 1.25mcg/puff; 2 inhalations once daily

Despite adherence to his inhaler regimens, JT has increased shortness of breath. How can you assess that JT is effectively administering his respiratory therapies? How would you adjust his therapy?

COPD MANAGEMENT CHALLENGES²⁻⁴

COPD is characterized by progressive persistent airflow limitation due to airway inflammation, fibrosis, and destruction of the air sacs. These changes result in air getting trapped in the lungs and inability to expel air. Symptoms include progressive dyspnea, chronic productive cough, and a feeling of chest tightness and wheezing. The goals of COPD treatment are to reduce these symptoms and to decrease the risk and severity of future exacerbations.

COPD is primarily treated using inhaled medications. The three most important factors affecting drug deposition in the airways are: (1) patient inhalation flow, (2) aerosol velocity and (3) inhaled particle drug size. The ability of the patient to achieve the correct inhalation flow is very important to get the desired benefit from the inhalation device. Chronic inflammation of the airways in COPD reduces airflow and impedes medication distribution. For inhaled medication to be effective, it must be deposited beyond the oropharyngeal



region and distributed in the bronchial tissue. A patient's age and stage of disease affects the extent to which inhaled medications reach the lungs. Advanced age changes the compliance of the chest wall, along with reduced respiratory muscle strength. In addition, age-related physical and cognitive impairment greatly affects treatment outcomes. Product availability, cost, as well as the patient's preference and ability to operate the devices properly are also factors to consider.

There are currently several different inhalation devices and nebulizers available, making it difficult to know which product to choose. Assessment of inhaler administration technique is recommended at baseline and at regular intervals to ensure that the device continues to meet patient needs.

SELECTING THE BEST DEVICE FOR INHALED MEDICATIONS⁵

Handheld Inhalers

Treatment of pulmonary disease should be customized to the patient. Although handheld inhaler devices are the most rapid and convenient way of delivering medication, many hospice patients lack the physical or cognitive ability to use them correctly. For those with advanced pulmonary conditions, successful medication administration from metered-dose inhalers (MDIs), dry-powder inhalers (DPIs) or soft-mist inhalers (i.e., Respimat) are impacted by inspiratory effort and breath control. When patients cannot use inhalers properly, the therapy does not reach the lungs, leading to poorly managed symptoms.

The use of MDIs and SMIs requires dexterity, hand-breath coordination, and the ability to understand the steps for use. DPIs require the ability to understand steps for use and the ability to take a fast, deep breath. With proper inhaler techniques, DPIs and MDIs are equally effective in delivering inhaled medications. However, poor handling of inhaler device and inhalation technique decreases medication delivery and worsens symptom control. Therefore, it is important to check a patient's inhaler technique on a regular basis to ensure proper use of inhaler device.

- **Metered dose inhalers (MDI)**, such as Ventolin HFA[®], Proventil HFA[®], Symbicort[®], Xopenex HFA[®] and QVAR[®], use a pressurized aerosol canister containing medication dissolved or suspended in a liquefied gas propellant. The advantage of these devices is their small size (portable).⁶⁻⁸
- **Dry-powder inhalers (DPIs)**, such as Spiriva Handihaler[®], Advair[®] Diskus, and Serevent[®] Diskus are propellant-free, breath-activated devices for inhaling dry powder. They are small and portable but are complex to use. For example, opening the moisture resistant capsule packets of Spiriva Handihaler[®] are difficult for patients with dexterity issues and it requires an eight-step process to prep the inhaler properly.⁶⁻⁸
- **Soft Mist inhalers**, such as Combivent Respimat[®] and Spiriva Respimat[®], are propellant-free, liquid multi-dosed inhalers. The inhaler forms an aerosol cloud with a higher fraction of fine medication particles than the MDIs and DPIs and inhalation using the Respimat depends less on inspiratory flow. There is less coordination needed than the MDIs, but they still require some degree of hand-breath coordination.⁶⁻⁸

Nebulization

Nebulizers deliver atomized particles of drug to the airways. Most require a power source, but some are battery-operated or have a car plug-in adapter. All types can be used with a mouthpiece and mask - both are considered equally effective. Face masks are useful in children and situations in which the patient is unable to hold the mouthpiece. Mouth pieces are recommended with steroids and anticholinergics to lessen exposure to the face and eyes.

Once set up, nebulizers are easier for patients to use. They do not require patients to coordinate activation of the device with inspiration and are therefore often preferred for patients who have cognitive or physical limitations, such as those with arthritis, stroke, weakness, Parkinson's, or advanced lung disease. There is also no need for patients to hold their breath as nebulizers require only normal tidal respiration for the medication to be deposited in the lungs.

For patients with end-stage COPD, nebulized medications such as DuoNeb® are better tolerated, which generally results in improved symptom relief. Nebulized treatments with albuterol, or albuterol with ipratropium, are good alternatives to handheld inhalers. Furthermore, for those with advanced pulmonary disease, oral corticosteroids such as prednisone are more effective than inhaled corticosteroids and may also help appetite and fatigue.

- **Jet nebulizers** work by compressing gas thru a narrow orifice and creating a low pressure that passes over a narrow tube. This forms small droplets of medication that will become aerosolized.⁹⁻¹¹ They are low cost and easy to use⁹⁻¹¹ but can be noisy enough to disrupt conversations and weigh several pounds, making them cumbersome for travel.
- **The ultrasonic nebulizer** uses a power source to rapidly vibrate an electrically polarized crystal within the reservoir of drug solution or suspension. Small droplets break free from the standing waves on the surface of the liquid and become aerosolized. These nebulizers are silent, smaller, quicker, and perfect for transport but tend to be more expensive.⁹⁻¹¹
- **The mesh nebulizer** forces liquid medications through multiples openings in mesh to form an aerosol. They are battery or electric-powered, small, portable, quiet and provide quicker administration however there is a lack of efficacy data published supporting use.⁹⁻¹¹

ASSESSING INHALATION TECHNIQUE

To assess a person's ability to use a handheld inhaler, consider the following:

- Is the person frail and debilitated with poor inspiratory effort and/or unable to hold their breath for up to 10 seconds?
- Is the person unable to coordinate their breath during inhalation?
- Does the person have inadequate symptom relief with their inhaler?
- Do they have cognitive impairment and/or unable to follow instructions?
- Do they have decreased strength, or presence of arthritis or joint pain in their hands?

If the answer is YES to one or more of the above, switching the patient from their MDI, DPI or SMI to nebulized therapy is recommended to optimize treatment and reduce symptoms.

Remember: The addition of an oral corticosteroid, morphine and/or an anxiolytic such as lorazepam should also be considered to further manage dyspnea.

SAMPLE SCRIPTS FOR COMMUNICATING WITH PATIENTS/CAREGIVERS

“We often find that people with severe lung disease can’t benefit as well from their inhalers like they once did. I’d like to make some suggestions about changing your medications...”

“Let’s begin to address your shortness of breath by adding some low dose morphine to help your breathing before we make any changes to your pulmonary meds.”

“Now that your breathing is easier with the morphine, I’d like you to consider using nebulized medication instead of your Symbicort®, since I think it will work better for you.”

“How do you feel about my recommendation to stop your Symbicort® and use your nebs more often instead?”

PATIENT CASE ASSESSMENT

JT is prescribed three different types of inhalers, including 2 MDIs (Albuterol, QVAR®), 1 DPI (Serevent® Diskus) and 1 SMI (Spiriva® Respimat). Although he uses each medication at the scheduled administration time, he is burdened by remembering the specific administration technique for each. When reviewing the questions suggested above to assess JT’s inhaler technique, a “yes” response was assigned to the following:

- Is the person frail and debilitated with poor inspiratory effort and/or unable to hold their breath for up to 10 seconds?
- Is the person unable to coordinate their breath during inhalation?
- Does the person have inadequate symptom relief with their inhaler?

RECOMMENDATIONS

- Consider the use of a jet nebulizer instead of inhalers since there is no hand-breath coordination required and the amount of inspiratory flow needed to inhale doses is much less.
- Utilize one of the “sample scripts” provided to communicate the benefit of nebulization to JT.
- Discontinue albuterol inhaler. Begin albuterol 0.083% 1 vial via nebulizer inhaled every 4 hours as needed for shortness of breath.
- Discontinue QVAR® RediHaler (beclomethasone). Begin prednisone 20mg 1 tablet by mouth daily or, where formulary restrictions and cost are not factors, consider Pulmicort Respules (budesonide) 0.25mg/2ml 1 vial via nebulizer inhaled twice daily.
- Discontinue Serevent® Diskus (salmeterol) and Spiriva® Respimat (tiotropium). Begin Duoneb® (albuterol-ipratropium) 1 vial via the nebulizer inhaled 4 times daily.

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