More Than Just Breathing: Evaluating Inhaler Use in Patients With COPD

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Disclosure

- I have no relevant financial relationships with manufacturers of any commercial products and/or providers of commercial services discussed in this presentation.
- This discussion will include the use of medications for off-label indications.

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Learning Objectives

- Recognize barriers to effective inhaler use
- Review patient cases discussing alternatives to inhaler use for treatment of COPD

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COPD Prevalence

- Globally, prevalence of COPD is estimated to be 11.7%
  - Around 3 million deaths annually
- Over 10% of the US population age ≥ 75 reports having COPD
- 2012 study found that 21.5% of nursing home residents had a diagnosis of COPD
- 11% of hospice decedents in 2018 had a primary hospice diagnosis of respiratory disease

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GOLD, 2020; Taffet, 2014; Zarowitz, 2012; NHPCO 2020

COPD Risk Factors

- Risk factors for development:
  - Cigarette smoking
  - Environmental factors
  - Genetic Factors
  - Age
  - Gender (female)
  - Socioeconomic status

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GOLD, 2020

COPD Goals of Therapy

- Reduce symptoms
  - Relieve symptoms
  - Improve exercise tolerance
  - Improve health status
- Reduce risk
  - Prevent disease progression
  - Prevent and treat exacerbations
  - Reduce mortality

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GOLD, 2020; Optum 2019

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- Current Medications:
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  - DuoNeb 1 unit dose nebulization QID PRN
  - Lisinopril 20 mg PO once daily
  - Oxygen 2L/min via nasal cannula PRN
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  - Sertraline 50mg po daily
  - Spiriva HandiHaler 18 mcg once daily

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Types of Inhalers

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Medication Classes

Class	Mechanism	Examples
Beta-2 Agonists	Act on β-2 receptors in the lung to dilate the airways	Short-Acting (SABA): albuterol, levalbuterol Long-Acting (LABA): formoterol, salmeterol, vilanterol
Anticholinergics	Block action of acetylcholine in the lungs to dilate the airways	Short-Acting: ipratropium Long-Acting: tiotropium, umeclidinium
Corticosteroids	Inhibit inflammation and mucous secretion; enhance β-adrenergic responses to dilate the airways	Inhaled: fluticasone, budesonide, beclomethasone

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Pharmacist Letter, 2019; Optum, 2019

Available Inhaler Devices

https://use-inhalers.com/

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https://use-inhalers.com/

Metered-Dose Inhalers

1. Follow instructions to prepare specific metered-dose inhaler (MDI)/soft mist inhaler (SMI) device for use
2. Shake inhaler, if appropriate, and hold properly
3. Position for open airway inhalation
4. Exhale slowly and completely
5. Close mouth around device mouthpiece, do not block vents
6. Activate inhaler device timed to start of inspiration
7. Slowly and deeply inhale medication over about 5 seconds
8. Hold breath for 10 seconds to allow medication to deposit into airway
9. Wait 1 minute; repeat steps 2-8 if more than 1 inhalation is ordered
10. If inhaled medication contains a corticosteroid, rinse mouth with water, gargle, and spit out water

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Pharmacist Letter, 2017

Dry-Powder Inhalers

1. Follow instructions to prepare specific DPI device for use
2. Turn head away from device to exhale slowly and completely
3. Close mouth around mouthpiece, do not block vents
4. Inhale forcefully, steadily, and deeply to propel medicated powder into lungs
5. Hold breath for 10 seconds to allow medication to deposit into airway
6. Remove DPI from mouth and exhale slowly
7. Repeat steps 1-6 if more than 1 inhalation is prescribed
8. If inhaled medication contains a corticosteroid, rinse mouth with water, gargle, and spit out water

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Pharmacist Letter, 2017

Self-Assessment Question #1

Which of the following is true about dry-powder inhalers?

A. Most new inhaler products are not dry-powder inhalers
B. In order for the medication to have optimal effects, patients must inhale forcefully, steadily and deeply to deliver medication into lungs
C. Dry-powder inhalers are only for maintenance of respiratory diseases
D. There are low rates of error with the use of dry-powder inhalers

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Self-Assessment Question #1

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Data on Inhaler Use

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Literature Review

Author	Study Type	Inhalers Studied	Comments
Lavorini, et al.	Systematic Review	DPI	• Percentage of patients with incorrect inhalation technique ranged from 0 to 94% in adults • Most common error: no exhalation before activation of device (12-77%)
Wieshammer, et al.	Observational Study	DPI	• Highest rate of error found with Diskus • Error rates increased with age and severity of airway obstruction
Chrystyn, et al.	Systematic Review and Meta-Analysis	DPI and MDI	• 50-100% of patients experience at least one error • MDIs: overall error frequency 86.8% • DPIs: overall error frequency 60.9% • Most common errors: no exhalation before inhalation, not holding breath after inhalation, not using a proper seal around mouthpiece

Literature Review

Author	Study Type	Inhalers Studied	Comments
Cho-Reyes, et al.	Systematic Review and Meta-Analysis	MDIs	• 86.7% of patients made at least 1 inhalation technique error • 76.8% of patients incorrectly performed at least 20% of device steps • Most frequent errors: Failure to attach the inhaler to the spacer when required (78.1%); Failure to exhale fully (65.5%)
Turan, et al.	Cross-sectional study	MDI and DPI	• 90.2% of patients made at least one mistake when using their inhaler device • Patients with cognitive impairment, low socioeconomic status, high number of admissions to ER in the past year, and presence of dyspnea/sputum had lower inhalation device scores

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Determinants of Poor Inhaler Technique

- Older age
- Use of multiple devices
- Lack of previous education on inhaler technique
  - Lack of placebo devices is a limitation and barrier to providing quality inhaler technique instruction

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GOLD, 2020

State Operations Manual- F760

- "The facility must ensure that its— §483.45(f)(2) Residents are free of any significant medication errors."
- Metered-Dose Inhalers (MDI)
  - Ensuring that a device is administered correctly is vital to optimizing inhalation therapy
  - Surveyors may observe administration of MDIs
  - Isolated failure to administer because of patient condition should not be cited as medication error
  - If repeatedly fail to administer device because of patient condition, it would be cited as medication error

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CMS, 2017

Evaluating Inhaler Use

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When To Evaluate Patient's Inhaler Use

- Change in patient status
  - Decline in mental status
  - Recent hospitalization for COPD exacerbation or dyspnea
  - Decline in functional status
  - Worsening visual impairment
- Increase use of PRN medications
- Prior to refilling prescriptions
- Experiencing side effects after use of inhaler

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How To Evaluate Inhaler Use

- Create a checklist for each inhaler type to assist in evaluation
  - National Asthma Council Australia
    - https://www.nps.org.au/assets/319a355375e97608-1a10de79a43a-Inhaler-device-checklists.pdf
  - Review package inserts for guidance on proper use of each specific device
  - National Heart, Lung and Blood Institute Asthma Tip Sheets
    - https://www.nhlbi.nih.gov/files/docs/public/lung/asthma_tipsheets.pdf
- Provide patients information on proper inhaler use
  - Centers for Disease Control and Prevention Inhaler Videos
    - https://www.cdc.gov/asthma/inhaler_video/default.htm

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Sample Checklists

Advair Diskus®

- ❑ Opens device and clicks mouthpiece into place
- ❑ Holds Diskus in a flat level position
- ❑ Slides lever away from mouthpiece
- ❑ Exhales completely while continuing to hold Diskus flat
- ❑ Puts mouthpiece to lips
- ❑ Breathes in quickly and deeply through mouth only
- ❑ Removes device from mouth and holds breath for 10 seconds
- ❑ Breathes out slowly
- ❑ Closes device
- ❑ Rinses mouth with water

Spiriva® HandiHaler ®

- ❑ Opens device to reveal mouthpiece
- ❑ Removes mouthpiece so center chamber is showing
- ❑ Opens Spiriva blister pack and puts capsule into the center chamber
- ❑ Closes mouthpiece firmly until device clicks
- ❑ Holds device with mouthpiece pointed up and pierces button once until it is flat against the base
- ❑ Breaths out completely in one breath
- ❑ Holds head in an upright position
- ❑ Breaths in deeply until lungs are full
- ❑ Holds breath for a few seconds and takes device out of mouth
- ❑ Breaths out completely a second time
- ❑ Breaths in deeply again until lungs are full
- ❑ Holds breath for a few seconds and takes device out of mouth
- ❑ Opens mouthpiece and discards the Spiriva capsule into trash

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Advair Diskus, 2019
Spiriva Hanidhaler, 2018

Sample Checklist

ProAir™ HFA

- ❑ Shakes inhaler well before use
- ❑ Removes the cap from the mouthpiece and checks for foreign objects
- ❑ Breaths out fully through the mouth
- ❑ Places mouthpiece into mouth and holds inhaler in the upright position
- ❑ Closes lips around mouthpiece with tongue placed below mouthpiece
- ❑ While berthing in deeply and slowing through the mouth, fully depresses the metal canister
- ❑ Holds breath as long as possible for up to 10 seconds
- ❑ Removes mouthpiece from mouth and breaths out
- ❑ Repeats as necessary if prescribed additional puffs

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ProAir, 2005

Additional Assessment Questions

- Is the patient using SABA multiple times a day in addition to the LABA?
- Is the patient experiencing any adverse reactions from the medications?
- Does the patient perceive benefit from the medication?
  - Can patient still accomplish reasonable functional goals?

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Additional Assessment Questions

- Are there duplications of therapy with the inhaler regimen?
  - Why are duplications a concern?
    - Polypharmacy
    - Increased risk of adverse effect
    - Administration burden

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Self-Assessment Question #2

What concerns do you have about Paul's medication regimen?

A. Potential for adverse effects with overuse of albuterol
B. Duplication of therapy with Advair and Spiriva
C. Multiple inhaler types could contribute to inhaler use errors
D. Both A and C

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Self-Assessment Question #2

What concerns do you have about Paul's medication regimen?

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C. Multiple inhaler types could contribute to inhaler use errors
D. Both A and C

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How to Manage Inhaler Errors

Education and Training

- When appropriate, use the “teach-back” approach when providing inhaler education
- If placebo devices are unavailable, encourage patient to use their own device when teaching inhaler technique
- Re-check inhaler technique frequently to reinforce proper use
- Evaluate inhaler technique, using a checklist, before concluding that current therapy is insufficient or a treatment failure

GOLD, 2020

Alternatives to Inhalers

- No evidence for superiority of nebulized therapy over hand-held devices *in patients who are able to use devices properly*
- Perceptions and Attitudes Toward the Use of Nebulized Therapy for COPD: Patient and Caregiver Perspectives
  - Survey of patients receiving nebulized therapy as well as their caregivers
  - 80% of patients and caregivers reported that using a nebulizer was better than only using an inhaler
  - 75% of patients believed that their overall quality of life had improved since beginning nebulization

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GOLD, 2020
Sharafkhaneh, 2013

Alternatives to Inhalers

- Nebulizer Advantages:
  - Confidence in medication administration due to visible mist
  - Less steps for use/no special technique
  - Ability to mix more than one medication in a nebulizer
- Nebulizer Disadvantages:
  - More time consuming than MDI or DPI
  - Require equipment maintenance and cleaning for infection control
  - Less portable than inhalers

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Geller, 2005

When to Consider Change to Nebulizers

- Change in patient status
  - Decline in mental status
  - Recent hospitalization for COPD exacerbation or dyspnea
  - Decline in functional status
  - Worsening visual impairment
- Increase use of PRN medications
- Experiencing side effects after use of inhaler

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What is the optimal regimen for hospice patients?

- Patient factors may place hospice patients at a high risk for inhaler use errors
  - Increased age
  - High severity of airway obstruction
  - Advanced dementia
  - Use of multiple devices
- Nebulizer treatments may be preferred to ensure patients are receiving optimal benefit from antiasthmatics

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Optum, 2019

Oral corticosteroids: Patient Selection

- Which patients should be on an oral corticosteroid?

Higher Functioning (non-hospice)	Lower Functioning (hospice)
• ICS is preferred – Less systemic adverse reactions • Oral corticosteroid bursts for exacerbations as needed	• Oral corticosteroids – Added benefits – Improved symptoms (improper inhaler technique)

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Optum, 2019

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What is an optimal regimen for Paul?

- Current Medications:
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  - DuoNeb 1 unit dose nebulization QID PRN
  - Oxygen 2L/min via nasal cannula PRN
  - ProAir 2 puffs q4h PRN shortness of breath
  - Spiriva HandiHaler 18 mcg once daily
- New Medications:
  - DuoNeb (albuterol/ipratropium) 1 unit via nebulizer four times daily
  - DuoNeb 1 unit via nebulizer twice daily as needed for shortness of breath
  - Prednisone 10 mg PO once daily in the morning
  - Oxygen 2L/min via nasal cannula PRN
  - Morphine (20 mg/mL) 5 mg (0.25 mL) PO/SL q4h PRN for shortness of breath or pain

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Patient Case 2: Sasha

- Sasha is a 72 year old female on hospice with lung cancer
  - PMH includes: bone metastases, COPD
- PPS 30%
- Sasha has worsening dyspnea leading to admission to hospice
- Current Medications:
  - Trelegy Ellipta one inhalation once daily
  - Dexamethasone 4 mg PO once daily
  - Nystatin oral suspension four times/day
  - Morphine ER 30 mg PO q12h
  - Morphine (20 mg/mL) 5 mg (0.25 mL) PO/SL q2h PRN for breakthrough pain
  - Albuterol 0.083% nebulized solution q4h PRN for shortness of breath
  - Senna 2 tablets PO once daily at bedtime

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Patient Case 2: Sasha

- Current Medications:
  - Trelegy Ellipta one inhalation once daily
  - Dexamethasone 4 mg PO once daily
  - Nystatin oral suspension four times/day
  - Morphine ER 30 mg PO q12h
  - Morphine (20 mg/mL) 5 mg (0.25 mL) PO/SL q2h PRN for breakthrough pain
  - Albuterol 0.083% nebulized solution q4h PRN for shortness of breath
  - Senna 2 tablets PO once daily at bedtime

- Medication concerns:
  - Duplications of therapy?
  - Adverse effects?
  - Type of inhaler?

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Patient Case 2: Sasha

- Current Medications:
  - Trelegy Ellipta one inhalation once daily
  - Dexamethasone 4 mg PO once daily
  - Nystatin oral suspension four times/day
  - Morphine ER 30 mg PO q12h
  - Morphine (20 mg/mL) 5 mg (0.25 mL) PO/SL q2h PRN for breakthrough pain
  - Albuterol 0.083% nebulized solution q4h PRN for shortness of breath
  - Senna 2 tablets PO once daily at bedtime

- New Medication Regimen:
  - DuoNeb 1 unit via nebulizer four times daily
  - Albuterol 0.083% nebulizer BID PRN for shortness of breath
  - Morphine ER 30 mg PO q12h
  - Morphine (20 mg/mL) 5 mg (0.25 mL) PO/SL q2h PRN for breakthrough pain or shortness of breath
  - Lorazepam 0.5 mg PO q4h PRN for anxiety or shortness of breath
  - Senna 2 tablets PO once daily at bedtime

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Key Points

- Evaluating inhaler use helps to determine patient compliance
- If continuing inhalers, patient's may need frequent re-education on proper use
- Many hospice patients will not be able to use inhalers properly; assess patient response to medications and consider alternative routes of medication delivery

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References

- Advair Diskus (fluticasone propionate and salmeterol inhalation powder) package insert. Research Triangle Park,NC; GlaxoSmithKline, 2019.
- Centers for Medicare & Medicaid Services (CMS). State Operations Manual (SOM) Appendix PP – Guidance to Surveyors for Long Term Care Facilities. Rev 168, 03-08-2017 Available at: https://www.cms.gov/RegulationsandGuidance/Guidance/Manuals/downloads/som107ap_pp_guidelines_ltcf.pdf Accessed August 31, 2020.
- Cho-Reyes S, Celli BR, Dembek C, Yeh K, Navaie M. Inhalation technique errors with metered-dose inhalers among patients with obstructive lung diseases: a systematic review and meta-analysis of U.S. studies. *Chronic Obstr Pulm Dis*. 2019;6(3):267-280.
- Chrystyn H, van der Palen J, Sharma R, et al. Device errors in asthma and COPD: systematic literature review and meta-analysis. *NPJ Prim Care Respire Med*. 2017;27(1):22.
- Clinical Resource*, Correct Use of Inhalers. Pharmacist's Letter/Prescriber's Letter.* January 2017. Accessed August 17, 2020.
- Clinical Resource, *Inhaled Medications for COPD. Pharmacist's Letter/Prescriber's Letter.* April 2019. Accessed August 17, 2020.
- COPD Pocket Toolkit. *Optum Hospice Pharmacy Services*, *LLC.* 2019. For more information contact druginformation@hospiscript.com
- Geller DE. Comparing clinical features of the nebulizer, metered-dose inhaler, and dry powder inhaler. *Respir Care*. 2005;50(10):1313-1322.
- Global Initiative for Chronic Obstructive Lung Disease (GOLD). Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease 2020 report. 2019. Available from: https://goldcopd.org/wp-content/uploads/2019/12/GOLD-2020-FINAL-ver1.2-03Dec19_WMV.pdf

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References

- Lavorini F, Magan A, Dubus JC, et al. Effect of incorrect use of dry powder inhalers on management of patients with asthma and COPD. *Respir Med.* 2008;102:593-604.
- ProAir HFA (albuterol sulfate) package insert. Miami, FL; IVAX Laboratories, Inc, 2005.
- Sharafkhaneh A, Wolf RA, Goodnight S, Hanania NA, Make BJ, Tashkin DP. Perceptions and attitudes toward the use of nebulized therapy for COPD: patient and caregiver perspectives. *COPD*. 2013;10(4): 482-92.
- Spiriva Handihaler (tiotropium bromide inhalation powder) package insert. Ridgefile, CT; Boehringer Ingelheim Pharmaceuticals, Inc., 2018.
- Taffet G, Donohue JF, Altman P. Considerations for managing chronic obstructive pulmonary disease in the elderly. *Clin Interv Aging*. 2014;9:23-30.
- Turan O, Turan PA, Mirici A. Parameters affecting inhalation therapy adherence in elderly patients with chronic obstructive lung disease and asthma. *Geriatr Cerontol Int.* 2016;17(6):999-1005.
- Wieshammer S, Dreyhaupt J. Dry powder inhalers: which factors determine the frequency of handling errors? *Respiration*. 2008;75:18-25.
- Zarowitz B, O'Shea T. Chronic obstructive pulmonary disease: prevalence, characteristics, and pharmacologic treatment in nursing home residents with cognitive impairment. *J Manag Care Pharm*. 2012;18(8):598-6060.

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