HELPING OUR PATIENTS BREATHE: ASTHMA/COPD PRIMER FOR THE PHARMACY TEAM

Christopher Chong, Pharm.D., BCPS, NCPS, AE-C
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BEFORE WE BEGIN...

- **Disclaimer**: I do not have (nor does any immediate family member have) a vested interest in or affiliation with any corporate organization offering financial support or grant monies for this continuing education activity, or any affiliation with an organization whose philosophy could potentially bias my presentation.

- **Special thanks**:  
  - Kendra Procacci, Pharm.D., BCPS, AE-C
TODAY’S OBJECTIVES

- **Review** similarities and differences between asthma/COPD and inhaled pharmacotherapies based on guidelines (GINA and NHLBI)

- **Discuss** differences between inhalers and review the most commonly seen errors

- **Identify** appropriate inhaler utilization and provide guidance for the pharmacy team in positively impacting care for patients with asthma and/or COPD

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EPIDEMIOLOGY

- **346,000 deaths** attributed to asthma (WHO 2016).
  - Risk factors for **asthma related death** (NHLBI 2007):
    - Previous severe exacerbation (e.g., intubation or ICU admission for asthma)
    - ≥2 hospitalizations or >3 ED visits in the past year
    - Use of >2 canisters of SABA per month
    - Difficulty perceiving airway obstruction or the severity of worsening asthma

- **$56 billion** in 2007 due to asthma related costs to US.

- COPD, **third** leading causes of death in 2014. (CDC)
  - Direct and indirect costs of COPD: $50 billion
**ASTHMA**

- **What is asthma?**
  - Chronic airway inflammatory disorder, usually diagnosed in children.
  - Involves bronchospasms resulting from hyperresponsiveness to a variety of stimuli (e.g. allergens, dust, chemicals, cold air, exercise)
    - “twitchy” airways
  - **Reversible** (responsive to bronchodilators)
  - **Inflammation** plays a central role in the pathogenesis of asthma
    - **Persistent inflammation**, even though symptoms may wax and wane.

**CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)**

- Generally **progressive** chronic airflow obstruction but may be accompanied by airway hyper-reactivity and irreversible.
- Usually diagnosed as adults
  - Primarily caused by **cigarette smoking (90%)**. Also from other environmental/occupational exposures.
**SYMPTOMS**

- **Signs and Symptoms**
  - cough (throughout the day)
  - wheezing
  - chest tightness
  - shortness of breath (especially with physical activity)
  - sputum production

**GOALS OF THERAPY**

- **Asthma**
  - ↓ impairment – the frequency/intensity of symptoms, functional limitations
  - ↓ risk of exacerbations – likelihood of future asthma attacks, lung function decline, side effects from medications
  - **Failure to control symptoms may lead to** airway remodeling.

- **COPD**
  - ↓ symptoms
  - Improve exercise tolerance and health status
  - Relieve symptoms
  - ↓ risk
  - Prevent disease progression and exacerbations
  - Reduce mortality
  - **Smoking cessation** – recommend at ANY stage of COPD
WHAT ABOUT ACOS?

- Asthma/COPD Overlap Syndrome

WHAT IS REVERSIBILITY?

- Spirometry is necessary to confirm diagnosis for both asthma and COPD (GINA asthma/COPD guidelines, EPR-3).
- Reversibility is measured through spirometry
  - Machine that measures how much air is expired in one forced breath.
  - E.g. Pulmonary Function Test
  - Forced Expiratory Volume (FEV)₁ = max amount of air you can forcefully expire in one second.
    - Value based on height, weight, ethnicity
    - Marker for obstruction
  - Forced Vital Capacity (FVC) = total amount of air exhaled during test
**WHAT IS REVERSIBILITY?**

- **Reversibility** is defined as:
  - an increase in post-bronchodilator FEV1 and/or FVC ≥12 percent over baseline and ≥200 mLs (0.2 L)
  - Post-bronchodilator FEV1/FVC ratio of ≤0.7 confirms presence of persistent airflow limitation (GOLD COPD 2018).

<table>
<thead>
<tr>
<th>Spirometry</th>
<th>Prebronchodilators</th>
<th>Postbronchodilators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Predicted</td>
<td>LLN</td>
</tr>
<tr>
<td>FVC (L)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEV1 (L)</td>
<td>5.20</td>
<td>4.34</td>
</tr>
<tr>
<td>FEV1/FVC (%)</td>
<td>84%</td>
<td>75%</td>
</tr>
<tr>
<td>FEF25-75% (L/s)</td>
<td>4.74</td>
<td>3.11</td>
</tr>
</tbody>
</table>

**IMPORTANCE OF ESTABLISHING DIAGNOSIS**

<table>
<thead>
<tr>
<th>Top Diagnoses (N=203)</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic</td>
<td>61    (28.6)</td>
</tr>
<tr>
<td>Allergic or non-allergic rhinitis</td>
<td>54 (25.3)</td>
</tr>
<tr>
<td>GERD</td>
<td>18    (8.5)</td>
</tr>
<tr>
<td>Anxiety or hyperventilation</td>
<td>8 (3.6)</td>
</tr>
<tr>
<td>Deconditioning</td>
<td>7     (3.3)</td>
</tr>
<tr>
<td>Obesity or Eosinophilic bronchitis</td>
<td>6 (2.8)</td>
</tr>
<tr>
<td>Ischemic heart disease</td>
<td>4     (1.9)</td>
</tr>
<tr>
<td>COPD</td>
<td>4     (1.9)</td>
</tr>
<tr>
<td>Chronic cough due to ACE inhibitors</td>
<td>4 (1.9)</td>
</tr>
<tr>
<td>Post-viral cough</td>
<td>4     (1.9)</td>
</tr>
<tr>
<td><strong>Serious Cardiorespiratory Conditions</strong></td>
<td>12 (5.9)</td>
</tr>
</tbody>
</table>

*4 ischemic heart disease, 2 subligotic stenosis, 2 bronchiectasis, 1 interstitial lung disease, 1 pulmonary hypertension, 1 sarcoidosis, 1 tracheobronchomalacia

*Image from Kaiser presentation*
WITH-HOLDING INHALED MEDICATIONS BEFORE SPIROMETRY

<table>
<thead>
<tr>
<th>Medication</th>
<th>Minimum time to omit medication before spirometry</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inhaled beta-adrenergic agents</strong></td>
<td></td>
</tr>
<tr>
<td>Albuterol</td>
<td>4 to 8 hours (or overnight)</td>
</tr>
<tr>
<td>Salmeterol</td>
<td>12 hours</td>
</tr>
<tr>
<td>Formoterol</td>
<td>12 hours</td>
</tr>
<tr>
<td>Indacaterol</td>
<td>24 hours</td>
</tr>
<tr>
<td>Vilaoterol</td>
<td>24 hours</td>
</tr>
<tr>
<td><strong>Inhaled anticholinergic agents</strong></td>
<td></td>
</tr>
<tr>
<td>Ipratropium</td>
<td>4 to 8 hours</td>
</tr>
<tr>
<td>Aclidinium</td>
<td>12 hours</td>
</tr>
<tr>
<td>Glycopyrrolate</td>
<td>24 hours</td>
</tr>
<tr>
<td>Tiotropium</td>
<td>24 hours</td>
</tr>
<tr>
<td>Umeclidinium</td>
<td>24 hours</td>
</tr>
<tr>
<td><strong>Oral bronchodilators</strong></td>
<td></td>
</tr>
<tr>
<td>Albuterol tablet</td>
<td>12 hours</td>
</tr>
<tr>
<td>Roflumilast</td>
<td>24 hours</td>
</tr>
<tr>
<td>Long-acting theophylline</td>
<td>48 hours</td>
</tr>
</tbody>
</table>

TREATMENT GUIDELINES

Asthma
- Expert Panel Report-3 (EPR-3) from National Heart Lung and Blood Institute
  - Last released 2007
- Global Initiative for Asthma (GINA)
  - Released annually
## TREATMENT GUIDELINES

### COPD

- **Global Initiative for Chronic Obstructive Lung Disease (GOLD)**
  - Released annually
- **American Thoracic Society (ATS)/European Thoracic Society (ETS), American College of Physicians, CHEST**
  - Last released 2011

### COMPARATIVE STEREOID DOSING

#### ESTIMATED COMPARATIVE DAILY DOSAGES: INHALED CORTICOSTEROIDS FOR LONG-TERM ASTHMA CONTROL (continued)

<table>
<thead>
<tr>
<th>MEDICATION</th>
<th>0-4 years of age</th>
<th>5-11 years of age</th>
<th>≥12 years of age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>44 mcg/vial</td>
<td>2 puffs 1x/day</td>
<td>3-4 puffs 1x/day</td>
<td>5-2 puffs 1x/day</td>
</tr>
<tr>
<td>110 mcg/puff</td>
<td>1 puff 1x/day</td>
<td>2 puffs 1x/day</td>
<td>1 puffs 1x/day</td>
</tr>
<tr>
<td>220 mcg/puff</td>
<td>1 puff 1x/day</td>
<td>2 puffs 1x/day</td>
<td>1 puff 1x/day</td>
</tr>
<tr>
<td>Fluticasone DPI¹</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>50 mcg/inhaler</td>
<td>1-2 inh. 1x/day</td>
<td>3-4 inh. 1x/day</td>
<td>1 inh. 1x/day</td>
</tr>
<tr>
<td>100 mcg/inhaler</td>
<td>1 inh. 1x/day</td>
<td>2 inh. 1x/day</td>
<td>1 inh. 1x/day</td>
</tr>
<tr>
<td>250 mcg/inhaler</td>
<td>1 inh. 1x/day</td>
<td>2 inh. 1x/day</td>
<td>1 inh. 1x/day</td>
</tr>
<tr>
<td>Mometasone DPI¹</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>80 mcg/inhaler</td>
<td>1 inh. 1x/day</td>
<td>1-2 inh. 1x/day</td>
<td>1-2 inh. 1x/day</td>
</tr>
<tr>
<td>220 mcg/inhaler</td>
<td>1 inh. 1x/day</td>
<td>1-2 inh. 1x/day</td>
<td>1-2 inh. 1x/day</td>
</tr>
</tbody>
</table>

*As per Asthma Quick Care Reference*
MEDICATION THERAPIES

Asthma
- Beta-Agonists (short/long acting)
  - LABAs are NEVER used as monotherapy
- Corticosteroids
- Leukotriene Modifiers
- Biologics
- Anticholinergics (new)

COPD
- Beta agonists (short/long acting)
  - LABAs can be used as monotherapy
- Anticholinergics
- Corticosteroids
- Roflumilast

QUESTION
- An albuterol inhaler (200 puffs) should last almost a year, if asthma is well controlled.
  - True
  - False
**KEY POINTS IN ASTHMA DRUG THERAPY**

- **Initiate therapy based on asthma severity**
  - Experts recommend initial aggressive therapy to gain quicker control of symptoms.
  - Classification of risk and impairment are based on age.
    - 0 to 4 years old
    - 5 to 11 years old
    - ≥12 years old

- **Use stepwise approach (step up/step down therapy)**

- **Adjust therapy based on asthma control**
  - Follow up 1 to 6 months
  - Assess stepping down every 3 months AFTER control of symptoms

### INITIAL VISIT: CLASSIFYING ASTHMA SEVERITY AND INITIATING THERAPY

<table>
<thead>
<tr>
<th>Component of Severity</th>
<th>Intermittent</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms</td>
<td>Ages 0-4 years</td>
<td>Ages 5-11 years</td>
<td>Ages ≥12 years</td>
<td>Ages 0-4 years</td>
</tr>
<tr>
<td>Respiratory</td>
<td>None</td>
<td>Minor limitations</td>
<td>Severe limitations</td>
<td>Extremely limited</td>
</tr>
<tr>
<td>Exacerbations</td>
<td>Not applicable</td>
<td>Normal FEV1, normal exacerbations</td>
<td>Normal FEV1, moderate exacerbations</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

#### Risk Classifications

- **Normal FEV1 % predicted**
  - All exacerbations and interventions in the past year led to major asthma-related events.
  - No exacerbations in the past year.

#### Recommended Step for Initial Therapy

<table>
<thead>
<tr>
<th>Step</th>
<th>Intensive Inhaled Corticosteroid</th>
<th>Oral Steroid</th>
<th>Other AA, Long-Acting β2 Agonist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Step 2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Step 3</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Step 4</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

### Example Table

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4 years</td>
<td>Intensive</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>5-11 years</td>
<td>Intensive</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>≥12 years</td>
<td>Intensive</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

### Example Diagram

- Use a stepwise approach (step up/step down therapy).
- Adjust therapy based on asthma control.
- Follow up 1 to 6 months.
- Assess stepping down every 3 months AFTER control of symptoms.

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2/20/2019
ICSs are the most effective medications for long-term control of persistent asthma.

The potential risks of ICSs are well balanced by their benefits.
- Rinsing out mouth after ICS use or spacer use greatly reduces risk of developing oral fungal infection.

ICS use may slow a child’s growth rate slightly (~1 cm); however, clinical significance is undetermined.

Poorly controlled asthma can slow a child’s growth.

Oral vs. Inhaled Steroid
- Typical pediatric oral burst for 15 kg child at 2 mg/kg
  - Prednisolone 15 mg po bid for 5 days =150 mg/burst
  - 150 mg = 150,000 mcg
- Low dose ICS Fluticasone 44 mcg 2 puffs bid=176 mcg/day
  - Adjusted for ~15% bioavailability=26.4 mcg/day (176 x 0.15=26.4)
  - 150,000 mcg / 26.4 mcg/day = 5,681 days
- One 5 day burst of oral prednisolone = ~16 years of daily inhaled corticosteroid use

Excerpted from Asthma Care Quick Reference
Categorizing control is based on the worst symptom.

- Inhaled steroid potency (low, medium, high) and starting doses also dependent on age.
  - Charts listed in the Asthma Quick Care Reference
  - Review the Rule of Twos

Possible uncontrolled asthma: consider stepping up therapy

Using albuterol more than TWO times a week

Filling albuterol more than TWO times/year

Waking up with symptoms TWO times a month

TWO or more steroid bursts a year

**Do NOT include albuterol use before exercise

RULE OF TWOS (AGES 12 AND UP) - ASTHMA

** An albuterol inhaler (200 puffs) should last almost a year, if asthma is well controlled.

- True
- False
STEPWISE APPROACH TO COPD TREATMENT – GOLD 2018

Confirm diagnosis with spirometry
FEV1/FVC < 0.70

Assess airflow limitation
GOLD Classification

Review exacerbation history

Assess symptoms / risk of exacerbations

ASSESS AIRFLOW LIMITATION – GOLD CLASSIFICATION

<table>
<thead>
<tr>
<th>Stage</th>
<th>FEV1</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>GOLD 1</td>
<td>≥ 80%</td>
<td>Mild</td>
</tr>
<tr>
<td>GOLD 2</td>
<td>50 – 79%</td>
<td>Moderate</td>
</tr>
<tr>
<td>GOLD 3</td>
<td>30 – 49%</td>
<td>Severe</td>
</tr>
<tr>
<td>GOLD 4</td>
<td>&lt; 30%</td>
<td>Very Severe</td>
</tr>
</tbody>
</table>

*Based on POST-bronchodilator FEV1
REVIEW EXACERBATION HISTORY

<table>
<thead>
<tr>
<th>(C)</th>
<th>(D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 2 or ≥ 1 leading to hospital admission</td>
<td></td>
</tr>
<tr>
<td>(A)</td>
<td>(B)</td>
</tr>
<tr>
<td>1 (not leading to hospital admission)</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

CAT < 10 Symptoms
mMRC 0–1 Breathlessness

CAT ≥ 10 Symptoms
mMRC ≥2 Breathlessness

| ≥ 2 or ≥ 1 leading to hospital admission |
| 1 (not leading to hospital admission) |
| 0 |
All LAMA DPIs have lactose – consider soft mist inhaler version of tiotropium or tiotropium/olotaderol for severe milk allergy.

LAMAs have greater effect on reducing exacerbations rates vs. LABAs.

Consider ICS therapy (+ LABA) in Group C/D (more severe COPD).
   - ICS therapy associated with higher risks of pneumonia in COPD.
   - No benefit of adding ICS to LAMA/LABA on exacerbations; primarily for symptom management.
   - Does not reduce mortality (TORCH trial)
   - Long term monotherapy with ICS for COPD not recommended.
IMPORTANT POINTS TO REMEMBER FOR COPD

- LAMA and LABA combinations reduces exacerbations vs. monotherapy or ICS/LABA combination.
  - Recommend starting with a LAMA first, then stepping up to LAMA/LABA vs. ICS/LABA.
  - If planning to use LAMA/LABA for COPD, ensure asthma dx ruled out through spirometry.
  - ACOS presentation (both asthma/COPD presentation), treat with ICS therapy if LAMA/LABA or LABA monotherapy started.

IMMUNIZATIONS

- Asthma and COPD
  - Pneumococcal – adults ages 19 to 64 years old
    - PPSV23 at 19 to 64 years of age
    - PCV13 at ≥65 years
    - PPSV23 at least 1 year after PCV13 and 5 years apart from last PPSV23
  - Annual influenza

Pneumococcal vaccine timing for adults with certain medical conditions

- Indicates to receive 1 dose of PPSV23 at 19 through 64 years
- Includes adults with:
  - Chronic heart or lung disease
  - Diabetes mellitus
  - Alcoholism
  - Chronic liver disease
  - Also includes adults who smoke cigarettes

For those who have not received any pneumococcal vaccines, or those with unknown vaccination history:
- Administer 1 dose of PPSV23 at 19 through 64 years.
- Administer 1 dose of PCV13 at 65 years or older. This dose should be given at least 1 year after PPSV23.
- Administer 1 final dose of PPSV23 at 65 years or older. This dose should be given at least 1 year after PCV13 and at least 5 years after the most recent dose of PPSV23.
DELIVERY DEVICES
AND
INHALER TECHNIQUES

Optional Reference

WHY IS INHALER TECHNIQUE SO IMPORTANT?

- Poor technique can result in poor outcomes and increased costs.
WHY IS INHALER TECHNIQUE SO IMPORTANT?

- Proper inhaler technique: often done *incorrectly*
  - 94% of patients reported to have incorrect technique.
- One or more critical errors in inhaler technique = associated with a 50% increase in corticosteroid course, hospitalization, or ED visit. (Melani)
- Per 2018 GINA guidelines, “check inhaler technique at every opportunity.”


INHALED MEDICATION DELIVERY FACTORS

- Inspiratory Rate
- Device Resistance
- Particle Size

Adapted from George M. presentation
Particle Size and Airway Deposition

<table>
<thead>
<tr>
<th>Particle Size</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 5 microns</td>
<td>No clinical benefit Systemic absorption if swallowed</td>
</tr>
<tr>
<td>2-5 microns</td>
<td>Optimal size for clinical benefit</td>
</tr>
<tr>
<td>&lt; 2 microns</td>
<td>Clinical benefit debated Potential for systemic absorption</td>
</tr>
</tbody>
</table>

Adapted from George M. presentation

INSPIRATORY FLOW

<table>
<thead>
<tr>
<th>Inspiratory Flow</th>
<th>Drug Deposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too Slow</td>
<td>Mouth</td>
</tr>
<tr>
<td>Too Fast</td>
<td>Throat</td>
</tr>
<tr>
<td>Correct Speed</td>
<td>Lungs</td>
</tr>
</tbody>
</table>

Adapted from George M. presentation
Pressurized Metered Dose Inhalers (pMDI)

- Conventional
- Soft-mist (e.g. Respimat®)

Dry Powder Inhalers (DPI)

INHALER TYPES
### PRESSURIZED METERED DOSE INHALERS

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Portable, light, compact</td>
<td>• Coordination of breathing and actuation needed</td>
</tr>
<tr>
<td>• Multiple-doses</td>
<td>• Not all medications available as MDI</td>
</tr>
<tr>
<td>• Short treatment time</td>
<td>• High pharyngeal deposition if fast inspiratory rate</td>
</tr>
<tr>
<td>• No drug preparation</td>
<td>• Remaining doses difficult to determine</td>
</tr>
<tr>
<td>• Dose-to-dose reproducibility high</td>
<td></td>
</tr>
</tbody>
</table>

![Image of pressurized metered dose inhaler]

### DRY POWDER INHALERS

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Small, portable</td>
<td>• Inspiratory flow dependent</td>
</tr>
<tr>
<td>• Propellant-free</td>
<td>• Inadequate inspiratory flow → high oropharyngeal deposition</td>
</tr>
<tr>
<td>• Breath-actuated</td>
<td>• Humidity problems</td>
</tr>
<tr>
<td>• Short preparation/delivery time</td>
<td>• Device specific to particular brand</td>
</tr>
</tbody>
</table>

![Image of dry powder inhaler]
MOST COMMONLY SEEN ERRORS

- **pMDI**
  - Inspiratory effort not slow and deep (47.2%)
  - Did not have head tilted such that chin is slightly upward (34.1%)
  - Lack of device knowledge, or incorrect second dose preparation, timing, or inhalation (34.7%)
  - No breath hold following inhalation or holding breath <3s (33.4%)
  - Did not breathe out to empty lungs before inhalation (24.9%)

- **DPI (Diskus)**
  - Insufficient inspiratory effort (38.4%)
  - Did not have head tilted such that chin is slightly upward (34.6%)
  - Did not breathe out to empty lungs before inhalation (32.4%)
  - No breath hold following inhalation or holding breath <3s (24.7%)
  - Compromised dose after preparation because of holding downward (11.9%)

Price et al. 2017

QUESTION

- For spacers that do NOT have anti-static properties, you would instruct patients to clean with warm soapy water and then rinse.
  - True
  - False
QUESTION

- Nebulizers are more effective than using a spacer + MDI for medication delivery.
  - True
  - False

IMPORTANCE OF USING SPACER

FIGURE 4. PET images of TAA deposition without (A) and with (B) use of spacer during inhalation.

SPACER ADVANTAGES

- Slows down aerosol cloud from the pMDI
- More portable, less administration time than nebulizer
- Reduces impact of hand-breath (activation/inhalation) coordination issues
- Can train patient to utilize correct inspiratory rate
  - Some spacers “whistle” when exceeding max inspiratory rate
- Filters out larger aerosol particles
  - Reduces oropharyngeal impaction and deposition
  - Reduces local side effects (inhaled corticosteroids)

Vincken et al. ERJ Open Res. 2018

SPACER VS. NEBULIZER

- Cochrane study
  - No difference in beta agonists administered through spacer in the ED setting; did not make difference in outcomes.
  - Spacers may have some advantages over nebulizer.
  - Study excluded patients with life-threatening asthma, unknown outcomes in this population.

Cates et al. Cochrane Database Syst Rev. 2013 Sep 13;(9)
Recommend spacers for ALL ages, especially children and elderly

0 to 3 years
- pMDI + spacer with face mask
- alternative: nebulizer with face mask

4 to 5 years
- pMDI + dedicated spacer with mouthpiece
- alternative: pMDI + face mask or nebulizer with mouthpiece or face mask

Masks
- Ensure a good fit and seal.
- If child using ICS, wipe face with wet cloth after use.

Valved Holding Chambers should be cleaned WEEKLY.
Wash all parts of spacer with warm soapy water and let air-dry.

Not all spacers are created equal! Some do not have “anti-static” properties.
- If a patient has a spacer that is does not have anti-static properties, DO NOT rinse off soapy water, just let spacer air dry.
- The soapy film creates a barrier and reduces static buildup.
- Static buildup can attract aerolized medication and reduce lung deposition.
QUESTION

For spacers that do **NOT** have anti-static properties, you would instruct patients to clean with warm soapy water and then rinse.
- True
- False

QUESTION

Nebulizers are more effective than using a spacer for medication delivery.
- True
- False
SELF MONITORING - ASTHMA ACTION PLAN

- Atrium Health’s Asthma Action Plan online generator (based on EPR-3 guidelines):
  - https://asthma.atriumhealth.org/
- Give copies to school, grandparents, daycare, etc.

COMMUNITY PHARMACY SETTING WORKFLOW

- **Pharmacy technicians**
  - Screen for albuterol overutilization, controller inhaler underutilization → notify pharmacist
  - Children <8 years of age, not currently using spacer? → notify pharmacist
- **Pharmacists**
  - Overuse of albuterol, identify issues (e.g., adverse effects, costs) with controller inhaler → notify provider
  - Identify barriers to daily controller use → notify provider
  - Long acting beta agonist monotherapy → notify provider
  - Drug-drug and drug-disease interactions → notify provider
  - Evaluate inhaler technique at counseling window
**PRIMARY CARE CLINIC SETTING WORKFLOW**

- **Prospectively review customers** being seen for asthma/COPD follow up at primary care and pediatric clinics.
- Review when last **spirometry** test performed.
- Meet with customer and **assess inhaler technique, adherence**, review side effects, disease state **control**.
  - Inhaler technique checklists
  - Visual handouts

**ASSESSMENT**

- Utilize **In-Check DIAL™** to objectively assess inspiratory ability.
- Manufacturers have recommended inspiratory rates depending on inhaler type.
- Some customers **may not** achieve minimum recommended inspiratory rates.
If customer is unable:
- to achieve minimum inspiratory rates OR
- unable to prepare inhaler for use (e.g., dexterity issues)
- Discuss starting different inhaler and propose new order to provider through EHR if customer is in agreement.
- If overdue for spirometry/no spirometry on file, recommend referral to Pulmonology.
## QUICK CODES

- **Create quick codes for more detailed instructions.**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>icsdpi1 icsdpi2 (Asmanex, Advair Diskus)</td>
<td>(\text{Inhale quickly and deeply. Rinse mouth with water and spit out after use (maintenance inhaler).})</td>
<td></td>
</tr>
</tbody>
</table>
| rescue1 rescue2 (albuterol) | \(\text{Shake well & inhale 2 puff (1 minute apart) 4 times daily as needed for breathing.}\)  
\(\text{Inhale slowly and deeply over 3 to 5 seconds; wait 1 minute before second puff (rescue inhaler).}\) |
| icsmdi1 icsmdi2 icsmdi3 (Advair HFA, Flovent HFA, Dulera) | \(\text{Inhale slowly and deeply over 3 to 5 seconds; wait 1 minute before second puff.}\)  
\(\text{After use, rinse mouth with water and spit out (maintenance inhaler).}\) |
| spiriva1 spiriva2 spiriva3 (Spiriva Handihaler) | \(\text{Inhale contents of 1 capsule once daily using Handihaler device. To ensure all medication is inhaled, use 2 inhalations for each capsule (maintenance inhaler).}\) |

## VISUAL HANDOUTS

- **Visual handouts for inhalers available online.**

![Visual Handouts](image-url)
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RESOURCES LINKS

- Asthma Care Quick Reference:
  - [https://www.nhlbi.nih.gov/files/docs/guidelines/asthma_qrg.pdf](https://www.nhlbi.nih.gov/files/docs/guidelines/asthma_qrg.pdf)
- COPD GOLD guidelines (2019 update)
- mMRC questionnaire for COPD
- CAT questionnaire for COPD
- CHEST inhaler visual guides
  - [https://www.med.umich.edu/1info/FHP/practiceguides/asthma/various.pdf](https://www.med.umich.edu/1info/FHP/practiceguides/asthma/various.pdf)