Welcome!

As you join, please turn on cameras and mic or unmute your phone and say hello to your Virginia colleagues. We all have a common bond: the choice to serve in a unique area of health care. During the presentation we can mute ourselves until it is time for more interaction.
Let’s Network!

Please use the chat box:

- Your name and region/city/town
- Is your facility masking everywhere or just in required rooms?

Thank you for taking care of Virginia’s residents of PACE, assisted living and nursing homes!
To find us, resources or archived Forum presentations, come to our website.
Welcome New Members!

Brad Murray, MD - NW Region
Emily Johnson, NP - NW Region
Ja’Nay Crippen-Derry, DHA MSN RN - Central Region
Kimberley Richards, FNP-BC - Central Region
Lindsey Price, Allied Health - NW Region
Michael Saval, DO - Central & SW Region
Our Network is 234 members strong!
Answer in chat, but do not press send until we count down:

As we move through state budget time, which is scheduled to adjourn March 9, if you had a hand in the bills and budget, how would you improve LTC?
COPD in LTC: an Update

Christian Bergman, MD, CMD, FACP
Assistant Professor, Division of Geriatric Medicine, VCU
Learning Objectives

1. Provide an overview of the latest 2023/2024 GOLD guidelines
2. Discuss LTC specific issues in regards to COPD clinical management
3. Review management of acute exacerbation of COPD
Clinical Indicators for Considering a Diagnosis of COPD

Consider the diagnosis of COPD, and perform spirometry, if any of these clinical indicators are present: (these indicators are not diagnostic themselves, but the presence of multiple key indicators increases the probability of the presence of COPD; in any case, spirometry is required to establish a diagnosis of COPD)

Dyspnea that is

Recurrent wheeze

Chronic cough

Recurrent lower respiratory tract infections

History of risk factors

Other Causes of Chronic Cough

<table>
<thead>
<tr>
<th>INTRATHORACIC</th>
<th>EXTRATHORACIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Asthma</td>
<td>• Chronic Allergic Rhinitis</td>
</tr>
<tr>
<td>• Lung Cancer</td>
<td>• Post Nasal Drip Syndrome (PNDS)</td>
</tr>
<tr>
<td>• Tuberculosis</td>
<td>• Upper Airway Cough Syndrome (UACS)</td>
</tr>
<tr>
<td>• Bronchiectasis</td>
<td>• Gastroesophageal Reflux</td>
</tr>
<tr>
<td>• Left Heart Failure</td>
<td>• Medication (e.g., ACE Inhibitors)</td>
</tr>
<tr>
<td>• Interstitial Lung Disease</td>
<td></td>
</tr>
<tr>
<td>• Cystic Fibrosis</td>
<td></td>
</tr>
<tr>
<td>• Idiopathic Cough</td>
<td></td>
</tr>
</tbody>
</table>
### Differential Diagnosis of COPD

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Suggestive Features</th>
</tr>
</thead>
</table>
| COPD                 | Symptoms slowly progressive  
|                      | History of tobacco smoking or other risk factors                                     |
| Asthma               | Variable airflow obstruction  
|                      | Symptoms vary widely from day to day  
|                      | Symptoms worse at night/early morning  
|                      | Allergy, rhinitis, and/or eczema also present  
|                      | Often occurs in children  
|                      | Family history of asthma                                                           |
| Congestive heart failure | Chest X-ray shows dilated heart, pulmonary edema  
|                      | Pulmonary function tests indicate volume restriction, not airflow obstruction      |
| Bronchiectasis       | Large volumes of purulent sputum  
|                      | Commonly associated with bacterial infection  
|                      | Chest X-ray/HRCT shows bronchial dilation                                            |
| Tuberculosis         | Onset at all ages  
|                      | Chest X-ray shows lung infiltrate  
|                      | Microbiological confirmation  
|                      | High local prevalence of tuberculosis                                               |
| Obstructive bronchiolitis | Can occur in children  
|                      | Seen after lung or bone marrow transplantation  
|                      | HRCT on expiration shows hypodense areas                                              |
| Diffuse panbronchiolitis | Predominantly seen in patients of Asian descent  
|                      | Most patients are male and nonsmokers  
|                      | Almost all have chronic sinusitis  
|                      | Chest X-ray & HRCT show diffuse small centrilobular nodular opacities & hyperinflation |

These features tend to be characteristic of the respective diseases, but are not mandatory. For example, a person who has never smoked may develop COPD (especially in LMICs where other risk factors may be more important than cigarette smoking).

### GOLD Grades and Severity of Airflow Obstruction in COPD

(based on post-bronchodilator FEV1)

**In COPD patients (FEV1/FVC < 0.7):**

<table>
<thead>
<tr>
<th>GOLD 1:</th>
<th>Mild</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FEV1 ≥ 80% predicted</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GOLD 2:</th>
<th>Moderate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50% ≤ FEV1 &lt; 80% predicted</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GOLD 3:</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30% ≤ FEV1 &lt; 50% predicted</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GOLD 4:</th>
<th>Very Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FEV1 &lt; 30% predicted</td>
</tr>
</tbody>
</table>
Case 1  (*Source: UNT Health– 2011*)

Your patient is a 67-year-old male who complains of progressively worsening shortness of breath with exertion over the last year. He currently smokes half a pack of cigarettes daily and has accumulated 45 pack years. He uses a short acting beta agonist 3-4 times a day with limited relief. He is no longer able to ride a bike with his grandchildren.

His last hospitalization was 4 months ago secondary to right lower lobe pneumonia. He does not complain of weight loss or loss of appetite. He has a past medical history of dietary controlled diabetes and mild osteoarthritis.

Medications include Albuterol and Celecoxib.

On exam respiratory rate is 22 per minute; chest exam reveals mild end expiratory wheezing without use of accessory muscles of respiration and no retractions. No clubbing, cyanosis or lower extremity edema is noted. Spirometry reveals an FVC of 78% predicted, FEV1 of 62% predicted and FEV1/FVC of 68%, post bronchodilator.
Case 1 (Source: UNT Health – 2011)

Your patient is a 67-year-old male who complains of progressively worsening shortness of breath with exertion over the last year. He currently smokes half a pack of cigarettes daily and has accumulated 45 pack years. He uses a short acting beta agonist 3-4 times a day with limited relief. He is no longer able to ride a bike with his grandchildren.

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**Question 1: Based on GOLD guidelines your patient:**

A. Has mild COPD.
B. Has moderate COPD.
C. Has severe COPD.
D. Has very severe COPD.
E. Is at risk of developing COPD.
Case 1 *(Source: UNT Health– 2011)*

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**Question One**

It is important to determine the severity of COPD as this impacts treatment. Based on GOLD guidelines spirometry is indicated in patients with COPD to facilitate a diagnosis and determine severity. An FEV1/ FVC ratio less than 70% is diagnostic of obstruction. The severity of obstruction is based on the FEV1. If the FEV1 is above or equal to 80% of predicted, the patient has mild COPD. If the FEV1 is between 50-80% of predicted the patient has moderate COPD making answer B correct. Severe COPD is diagnosed if the FEV1 is between 30-50% of predicted and very severe COPD is diagnosed when the FEV1 is less than 30% of predicted (below 50% with evidence of respiratory failure). The “at risk” category is no longer used.
Case 1  (Source: UNT Health– 2011)

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Question 2: Based on GOLD guidelines the most appropriate next step would be to initiate:

A. An inhaled corticosteroid.
B. A Leukotriene inhibitor.
C. Daily oral steroid.
D. Long acting anticholinergic agent.
E. Nebulized short acting beta 2 agonist.
Case 1 (Source: UNT Health–2011)

Your patient is a 67-year-old male who complains of progressively worsening shortness of breath with exertion over the last year. He currently smokes half a pack of cigarettes daily and has accumulated 45 pack years. He uses a short acting beta agonist 3-4 times a day with limited relief. He is no longer able to ride a bike with his grandchildren.

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Question Two

Our patient has moderate COPD based on an FEV1/FVC ratio less than 70% and an FEV1 between 50%-80%. GOLD guidelines recommend the use of a long acting bronchodilator for patients with moderate COPD. A long acting cholinergic (answer D) such as tiotropium should be considered in our patient. An inhaled corticosteroid may be indicated in patients with severe or very severe disease in combination with a long acting bronchodilator. Leukotriene inhibitors are indicated in asthma but are not routinely used in patients with COPD. Daily oral steroids may be utilized in some patients with very severe debilitating COPD when the perceived benefits outweigh potential side effects. Short acting beta 2 agonists may be used on an as needed basis to supplement long acting bronchodilators.
Management of COPD

**Diagnosis**
- Symptoms
- Risk factors
- Spirometry (repeat if borderline)

**Adjust**
- Pharmacotherapy
- Non-pharmacological therapy

**Review**
- Symptoms (CAT or mMRC)
- Exacerbations
- Smoking status
- Exposure to other risk factors
- Inhaler technique & adherence
- Physical activity and exercise
- Need for pulmonary rehabilitation
- Self management skills
  - breathlessness
  - written action plan
- Need for oxygen, NIV, lung volume reduction, palliative approaches
- Vaccination
- Management of comorbidities
- Spirometry (at least annually)

**Initial Assessment**
- FEV1 – **GOLD 1 - 4**
- Symptoms (CAT or mMRC)
- Exacerbation history
- Smoking status
- Blood eosinophil count
- α1- antitrypsin
- Comorbidities

**GOLD**
- ABE

**Initial Management**
- Smoking cessation
- Vaccination
- Active lifestyle and exercise
- Initial pharmacotherapy
- Self management education
  - risk factor management
  - inhaler technique
  - breathlessness
  - written action plan
- Manage comorbidities

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**Teaching Slide Set**

**2024**

**Figure 3.2**

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**Figure 2.11**

**Differential Diagnosis**
- Frequent exacerbations with excessive cough with sputum production, raising concern for bronchiectasis or atypical infection

**Lung Volume Reduction**
- Endobronchial valve therapy may be a therapeutic option for patients if they demonstrate postbronchodilator FEV1 between 15% to 45% and evidence of hyperinflation
- Lung volume reduction surgery may be a therapeutic option for patients with hyperinflation, severe upper lobe predominant emphysema and low exercise capacity after pulmonary rehabilitation

**Lung Cancer Screening**
- Annual low-dose CT scan is recommended for lung cancer screening in patients with COPD due to smoking according to recommendations for the general population
**Initial Pharmacological Treatment**

**GROUP A**

A bronchodilator

mMRC 0-1, CAT < 10

**GROUP B**

LABA + LAMA*

mMRC ≥ 2, CAT ≥ 10

**GROUP E**

LABA + LAMA*

consider LABA+LAMA+ICS* if blood eos ≥ 300

≥ 2 moderate exacerbations or ≥ 1 leading to hospitalization

0 or 1 moderate exacerbations (not leading to hospital admission)

---

*Single inhaler therapy may be more convenient and effective than multiple inhalers; single inhalers improve adherence to treatment

Exacerbations refers to the number of exacerbations per year; eos: blood eosinophil count in cells per microliter; mMRC: modified Medical Research Council dyspnea questionnaire; CAT™: COPD Assessment Test™.
**Respiratory Treatments**

### SHORT-ACTING BETAgONIST BRONCHODILATORS

- SABA: albuterol, levoalbuterol
- LABA: salmeterol, formoterol
- ICS: fluticasone, mometasone, budesonide, beclomethasone
- SAMA: ipratropium
- LAMA: umeclidinium, tiotropium, aclidinium
- COMBOs
  - LABA/ICS: Advair, Breo, Dulera, Symbicort, Wixela
  - LABA/LAMA: Anoro, Stiolto
  - LABA/LAMA/ICS: Trelegy
  - SABA/ICS: Combivent, Duoneb

### INHALED CORTICOSTEROIDS

### MUSCARINIC ANTAGONISTS (ANTICHOLINERGIC)

### COMBINATION MEDICATIONS

### BIOLOGICS

### LEUKOTRIENE MODIFIERS
Follow-up Pharmacological Treatment

1. **IF RESPONSE TO INITIAL TREATMENT IS APPROPRIATE, MAINTAIN IT.**
2. **IF NOT:**
   - Check adherence, inhaler technique and possible interfering comorbidities
   - Consider the predominant treatable trait to target (dyspnea or exacerbations)
     - Use exacerbation pathway if both exacerbations and dyspnea need to be targeted
   - Place patient in box corresponding to current treatment & follow indications
   - Assess response, adjust and review
   - These recommendations do not depend on the ABE assessment at diagnosis

**DYSPNEA**

- LABA or LAMA
- LABA + LAMA*

- Consider switching inhaler device or molecules
- Implement or escalate non-pharmacological treatment(s)
- Investigate (and treat) other causes of dyspnea

**EXACERBATIONS**

- LABA or LAMA
  - If blood eos ≥ 300
- LABA + LAMA*
  - If blood eos < 100
    - If blood eos ≥ 200
- LABA + LAMA + ICS*
  - Rofamilast
    - FEV1 < 50% & chronic bronchitis
  - Azithromycin
    - Preferentially in former smokers

*Single inhaler therapy may be more convenient and effective than multiple inhalers; single inhalers improve adherence to treatment

**Consider de-escalation of ICS if pneumonia or other considerable side-effects. In case of blood eos ≥ 300 cells/μl de-escalation is more likely to be associated with the development of exacerbations

Exacerbations refers to the number of exacerbations per year
<table>
<thead>
<tr>
<th>Device</th>
<th>Correct technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Press and breathe&quot; pMDI</td>
<td>Remove mouthpiece cap  &lt;br&gt; Shake inhaler (suspensions only)  &lt;br&gt; Hold inhaler upright &lt;br&gt; Breathe out &lt;br&gt; Place mouthpiece between lips  &lt;br&gt; Fire while breathing in deeply and slowly  &lt;br&gt; Continue to inhale after firing &lt;br&gt; Hold breath (10 s)</td>
</tr>
<tr>
<td>Breath-actuated pMDI</td>
<td>Remove mouthpiece cap  &lt;br&gt; Shake inhaler (suspensions only)  &lt;br&gt; Hold inhaler upright &lt;br&gt; Prepare device (e.g. lift lever)  &lt;br&gt; Breathe out  &lt;br&gt; Place mouthpiece between lips  &lt;br&gt; Breathe in deeply and slowly  &lt;br&gt; Continue to inhale after firing &lt;br&gt; Hold breath (10 s)</td>
</tr>
<tr>
<td>&quot;Press and breathe&quot; pMDI plus spacer</td>
<td>Remove mouthpiece cap  &lt;br&gt; Shake inhaler (suspensions only)  &lt;br&gt; Hold inhaler upright &lt;br&gt; Insert pMDI into spacer  &lt;br&gt; Breathe out  &lt;br&gt; Fire while breathing in deeply and slowly  &lt;br&gt; Continue to inhale after firing &lt;br&gt; Hold breath (10 s)</td>
</tr>
<tr>
<td>DPIs</td>
<td>Remove cover (device specific)  &lt;br&gt; Load dose (device specific)  &lt;br&gt; Pierce capsule (single-dose devices)  &lt;br&gt; Breathe out  &lt;br&gt; Place mouthpiece between lips  &lt;br&gt; Inhale deeply and quickly  &lt;br&gt; Hold breath (10 s)  &lt;br&gt; Store in cool dry place</td>
</tr>
</tbody>
</table>

pMDI: pressurised metered-dose inhaler; DPI: dry powder inhaler. *: crucial error, likely to result in zero lung deposition of drug; #: manufactured by Boehringer Ingelheim GmbH & Co. KG, Ingelheim, Germany; #: error that may be crucial.

https://err.ersjournals.com/content/14/96/102 2005
### TABLE 2  Advantages and disadvantages of different inhaler devices

<table>
<thead>
<tr>
<th>Device</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>“Press and breathe” pMDI</strong></td>
<td>Compact</td>
<td>Contains propellants</td>
</tr>
<tr>
<td></td>
<td>Portable</td>
<td>Not breath-actuated</td>
</tr>
<tr>
<td></td>
<td>190+ doses</td>
<td>Many patients cannot use it correctly (e.g. coordination difficulties, “cold feet” effect)</td>
</tr>
<tr>
<td></td>
<td>Convenient</td>
<td>Usually low lung deposition/high oropharyngeal deposition</td>
</tr>
<tr>
<td></td>
<td>Quick to use</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relatively cheap</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cannot contaminate contents</td>
<td></td>
</tr>
<tr>
<td><strong>Breath-actuated pMDI</strong></td>
<td>Compact</td>
<td>Contains propellants</td>
</tr>
<tr>
<td></td>
<td>Portable</td>
<td>“Cold feet” effect</td>
</tr>
<tr>
<td></td>
<td>190+ doses</td>
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</tr>
<tr>
<td></td>
<td>Convenient</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quick to use</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Breath-actuated (no coordination needed)</td>
<td>Cannot contaminate contents</td>
</tr>
<tr>
<td><strong>“Press and breathe” pMDI plus spacer</strong></td>
<td>190+ doses</td>
<td>Contains propellants</td>
</tr>
<tr>
<td></td>
<td>Quick to use</td>
<td>Not very portable or convenient</td>
</tr>
<tr>
<td></td>
<td>Easier to coordinate</td>
<td>Not breath-actuated</td>
</tr>
<tr>
<td></td>
<td>Tidal breathing often OK</td>
<td>Plastic spacers may acquire static charge</td>
</tr>
<tr>
<td></td>
<td>Last oropharyngeal deposition</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Usually higher lung deposition than a pMDI</td>
<td></td>
</tr>
<tr>
<td><strong>DPI</strong></td>
<td>Compact</td>
<td>Work poorly if inhalation is not forceful enough</td>
</tr>
<tr>
<td></td>
<td>Portable</td>
<td>Many patients cannot use them correctly (e.g. capsule handling problems for elderly)</td>
</tr>
<tr>
<td></td>
<td>Convenient (multi-dose devices)</td>
<td>Most types are moisture sensitive</td>
</tr>
<tr>
<td></td>
<td>Quick to use</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Breath-actuated (no coordination needed)</td>
<td>Do not contain propellants</td>
</tr>
<tr>
<td></td>
<td>Usually higher lung deposition than a pMDI</td>
<td></td>
</tr>
<tr>
<td><strong>Respimat: Soft Mist™ Inhaler</strong></td>
<td>Compact</td>
<td>Not breath-actuated</td>
</tr>
<tr>
<td></td>
<td>Portable</td>
<td>Not currently available in most countries</td>
</tr>
<tr>
<td></td>
<td>Multi-dose device (1 month’s supply)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Convenient</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Probably easier to use correctly than pMDI</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High lung deposition</td>
<td>Does not contain propellants</td>
</tr>
</tbody>
</table>

pMDI: pressurized metered-dose inhaler; DPI: dry powder inhaler. * Manufactured by Boehringer Ingelheim GmbH & Co. KG, Ingelheim, Germany.
### TABLE 3 Crucial errors in inhaler use

<table>
<thead>
<tr>
<th>Error</th>
<th>Devices affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to remove mouthpiece cap or device cover</td>
<td>pMDI, BA pMDI, pMDI + spacer, DPI, Respimat®, Soft Mist® inhaler®</td>
</tr>
<tr>
<td>Incorrect preparation, priming of device or loading of dose*</td>
<td>pMDI, BA pMDI, pMDI + spacer, DPI, Respimat®, Soft Mist® inhaler®</td>
</tr>
<tr>
<td>Failure to pierce capsule</td>
<td>pMDI, BA pMDI, pMDI + spacer, DPI, Respimat®, Soft Mist® inhaler®</td>
</tr>
<tr>
<td>Inhaler upside down</td>
<td>pMDI, BA pMDI, pMDI + spacer, DPI, Respimat®, Soft Mist® inhaler®</td>
</tr>
<tr>
<td>Breathing out into device*</td>
<td>pMDI, BA pMDI, DPI, Respimat®, Soft Mist® inhaler®</td>
</tr>
<tr>
<td>Firing device at or after end of inhalation*</td>
<td>pMDI, BA pMDI, DPI, Respimat®, Soft Mist® inhaler®</td>
</tr>
<tr>
<td>Open-mouth inhalation technique</td>
<td>pMDI, BA pMDI, DPI, Respimat®, Soft Mist® inhaler®</td>
</tr>
<tr>
<td>Weak or very slow inhalation*</td>
<td>pMDI, BA pMDI, pMDI + spacer, DPI, Respimat®, Soft Mist® inhaler®</td>
</tr>
<tr>
<td>Inhaling through nose</td>
<td>pMDI, BA pMDI, pMDI + spacer, DPI, Respimat®, Soft Mist® inhaler®</td>
</tr>
<tr>
<td>Stopping inhalation as device is fired*</td>
<td>pMDI, BA pMDI, pMDI + spacer, DPI, Respimat®, Soft Mist® inhaler®</td>
</tr>
</tbody>
</table>

pMDI: pressurised metered-dose inhaler; BA pMDI: breath-actuated pMDI; DPI: dry powder inhaler. *: common errors; #: single-dose devices; †: failure to trigger device; ‡: failure to open spacer valve; †: too slow to aerosolise the dose; ©: manufactured by Boehringer Ingelheim GmbH & Co. KG, Ingelheim, Germany.

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Basic Principles for Appropriate Inhalation Device Choice

- Availability of the drug in the device
- Patients’ beliefs, satisfaction with current and previous devices and preferences need to be assessed and considered
- The number of different device types should be minimized for each patient. Ideally, only one device type should be used
- Device type should not be switched in the absence of clinical justification nor without proper information, education and medical follow-up
- Shared decision-making is the most appropriate strategy for inhalation device choice
- Patient’s cognition, dexterity and strength must be taken into account
- Patient’s ability to perform the correct specific inhalation maneuver for the device must be assessed:
  - Dry powder inhalers are appropriate only if the patient can make a forceful and deep inhalation. Check visually that the patient can inhale forcefully through the device - if there is doubt assess objectively or choose alternative device
  - Metered-dose inhalers and, to a lesser extent, soft mist inhalers require coordination between device triggering and inhalation and patients need to be able to perform a slow and deep inhalation. Check visually that the patient can inhale slowly and deeply from the device - if there is doubt consider adding a spacer/VHC or choose an alternative device
  - For patients unable to use an MDI (with or without spacer/VHC), SMI or DPI a nebulizer should be considered
- Other factors to consider include size, portability, cost
- Smart inhalers may be useful if there are issues with adherence/persistence or inhalation technique (for devices that can check it)
- Physicians should prescribe only devices they (and the other members of the caring team) know how to use
Oxygen Therapy and Ventilatory Support in Stable COPD

**Oxygen Therapy**

- The long-term administration of oxygen increases survival in patients with severe chronic resting arterial hypoxemia *(Evidence A)*

- In patients with stable COPD and moderate resting or exercise-induced arterial desaturation, prescription of long-term oxygen does not lengthen time to death or first hospitalization or provide sustained benefit in health status, lung function and 6-minute walk distance *(Evidence A)*

- Resting oxygenation at sea level does not exclude the development of severe hypoxemia when traveling by air *(Evidence C)*

**Ventilatory Support**

- NPPV may improve hospitalization-free survival in selected patients after recent hospitalization, particularly in those with pronounced daytime persistent hypercapnia *(PaCO₂ > 53 mmHg)* *(Evidence B)*

- In patients with severe chronic hypercapnia and a history of hospitalization for acute respiratory failure, long-term noninvasive ventilation may be considered *(Evidence B)*

---

**Arterial hypoxemia defined as:**

- \( \text{PaO}_2 \leq 55 \text{ mmHg (7.3 kPa)} \) or \( \text{SaO}_2 < 88\% \)

- \( \text{PaO}_2 > 55 \text{ but } < 60 \text{ mmHg (> 7.3 kPa but < 8 kPa)} \)

  with right heart failure or erythrocytosis

---

Prescribe supplemental oxygen and titrate to keep \( \text{SaO}_2 \geq 90\% \)

---

Recheck in 60 to 90 days to assess:

- If supplemental oxygen is still indicated
- If prescribed supplemental oxygen is effective
### Evidence Supporting a Reduction in Mortality with Pharmacotherapy and Non-pharmacotherapy in COPD Patients

**Figure 3.17**

<table>
<thead>
<tr>
<th>Therapy</th>
<th>RCT*</th>
<th>Treatment effect on mortality</th>
<th>Patient characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pharmacotherapy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LABA+LAMA+ICS³</td>
<td>Yes</td>
<td>Single inhaler triple therapy compared to dual LABD therapy relative risk reduction: IMPACT: HR 0.72 (95% CI: 0.53, 0.99)¹⁰ ETHOS: HR 0.51 (95% CI: 0.33, 0.80)¹⁰</td>
<td>Symptomatic people with a history of frequent and/or severe exacerbations</td>
</tr>
<tr>
<td><strong>Non-pharmacological Therapy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking cessation²</td>
<td>Yes</td>
<td>HR for usual care group compared to intervention group (smoking cessation): HR 1.18 (95% CI: 1.02, 1.37)²</td>
<td>Asymptomatic or mildly symptomatic</td>
</tr>
<tr>
<td>Pulmonary rehabilitation³¹</td>
<td>Yes</td>
<td>Old trials: RR 0.28 (95% CI 0.10, 0.84)³⁴ New trials: RR 0.68 (95% CI 0.28, 1.67)³⁴</td>
<td>Hospitalized for exacerbations of COPD (during or ≤ 4 weeks after discharge)</td>
</tr>
<tr>
<td>Long-term oxygen therapy³¹</td>
<td>Yes</td>
<td>NOTT: ≥ 19 hours of continuous oxygen vs ≤ 13 hours: 50% reduction³⁴ MRC: ≥ 15 hours vs no oxygen: 50% reduction³⁴</td>
<td>PaO₂ ≤ 55 mmHg or &lt; 60 mmHg with cor pulmonale or secondary polycythemia</td>
</tr>
<tr>
<td>Noninvasive positive pressure ventilation³¹</td>
<td>Yes</td>
<td>12% in NPPV (high IPAP level) and 33% in control HR 0.24 (95% CI 0.11, 0.49)³</td>
<td>Stable COPD with marked hypercapnia</td>
</tr>
<tr>
<td>Lung volume reduction surgery²</td>
<td>Yes</td>
<td>0.07 deaths/person-year (LVRS) vs 0.15 deaths/person-year (UC) RR for death 0.47 (p = 0.005)⁵</td>
<td>Upper lobe emphysema and low exercise capacity</td>
</tr>
</tbody>
</table>

*RCT with pre-specified analysis of the mortality outcome (primary or secondary outcome); ¹Inconclusive results likely due to differences in pulmonary rehabilitation across a wide range of participants and settings.

1. IMPACT trial (Lipson et al. 2020) and ETHOS trials (Martinez et al. 2021); 2. Lung Health Study (Anthonisen et al. 2005); 3) a) Puhan et al. (2011) and b) Puhan et al. (2016); 4) a) NOTT (NOTT, 1980) and b) MRC (MRC, 1981); 5. Kohlein trial (Kohlein et al. 2014); 6. NETT trial (Fishman et al. 2003)

ICS: inhaled corticosteroid; IPAP: inspiratory positive airway pressure; LABA: long-acting beta-agonist; LABD: long-acting bronchodilator; LAMA: long-acting anti-muscarinic; LTOT: long-term oxygen therapy; NPPV: noninvasive positive pressure ventilation; LVRS: lung volume reduction surgery; UC: usual treatment control group.
Key Points

- Combinations of SABA and SAMA are superior compared to either medication alone in improving FEV1 and symptoms *(Evidence A)*

- LAMAs have a greater effect on exacerbation reduction compared with LABAs *(Evidence A)* and decrease hospitalizations *(Evidence B)*

- Combinations can be given as single inhaler or multiple inhaler treatment. Single inhaler therapy may be more convenient and effective than multiple inhalers

<table>
<thead>
<tr>
<th>Oral Glucocorticoids</th>
<th>Long-term use of oral glucocorticoids has numerous side effects <em>(Evidence A)</em> with no evidence of benefits <em>(Evidence C)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>PDE4 Inhibitors</td>
<td>In patients with chronic bronchitis, severe to very severe COPD and a history of exacerbations:</td>
</tr>
<tr>
<td></td>
<td>- Roflumilast improves lung function and reduces moderate and severe exacerbations <em>(Evidence A)</em></td>
</tr>
<tr>
<td>Antibiotics</td>
<td>Long-term azithromycin and erythromycin therapy reduces exacerbations over one year <em>(Evidence A)</em></td>
</tr>
<tr>
<td></td>
<td>- Preferentially, but not only in former smokers with exacerbations despite appropriate therapy, azithromycin can be considered <em>(Evidence B)</em></td>
</tr>
<tr>
<td></td>
<td>- Treatment with azithromycin is associated with an increased incidence of bacterial resistance <em>(Evidence A)</em> and hearing test impairments <em>(Evidence B)</em></td>
</tr>
</tbody>
</table>
**Key Points**

- Regular treatment with ICS increases the risk of pneumonia especially in those with severe disease (Evidence A)
- An ICS combined with a LABA is more effective than the individual components in improving lung function and health status and reducing exacerbations in patients with exacerbations and moderate to very severe COPD (Evidence A)
- We do not encourage the use of a LABA+ICS combination in COPD. If there is an indication for an ICS the combination LABA+LAMA+ICS has been shown to be superior to LABA+ICS and is therefore the preferred choice.
- Triple inhaled therapy of LABA+LAMA+ICS improves lung function, symptoms and health status, and reduces exacerbations, compared to LABA+ICS, LABA+LAMA or LAMA monotherapy (Evidence A). Recent data suggest beneficial effect of triple inhaled therapy versus fixed-dose LABA+LAMA combinations on mortality in symptomatic COPD patients with a history of frequent and/or severe exacerbations.
- If patients with COPD have features of asthma, treatment should always contain an ICS.
- Independent of ICS use, there is evidence that a blood eosinophil count < 2% increases the risk of pneumonia (Evidence C)
- Combinations can be given as single or multiple inhaler therapy. Single inhaler therapy may be more convenient and effective than multiple inhalers.

**Factors to consider when adding ICS to long-acting bronchodilators:**
(note the scenario is different when considering ICS withdrawal)

<table>
<thead>
<tr>
<th>STRONGLY FAVORS USE</th>
<th>FAVORS USE</th>
<th>AGAINST USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of hospitalization(s) for exacerbations of COPD*</td>
<td>1 moderate exacerbation of COPD per year*</td>
<td>Repeated pneumonia events</td>
</tr>
<tr>
<td>≥ 2 moderate exacerbations of COPD per year*</td>
<td>Blood eosinophils 100 to &lt; 300 cells/µL</td>
<td>Blood eosinophils &lt; 100 cells/µL</td>
</tr>
<tr>
<td>Blood eosinophils ≥ 300 cells/µL</td>
<td>History of mycobacterial infection</td>
<td></td>
</tr>
</tbody>
</table>

*Note: COPD: Chronic Obstructive Pulmonary Disease*
**Potential Indications for Hospitalization Assessment**

- Severe symptoms such as sudden worsening of resting dyspnea, high respiratory rate, decreased oxygen saturation, confusion, drowsiness
- Acute respiratory failure
- Onset of new physical signs (e.g., cyanosis, peripheral edema)
- Failure of an exacerbation to respond to initial medical management
- Presence of serious comorbidities (e.g., heart failure, newly occurring arrhythmias, etc.)
- Insufficient home support

*Local resources need to be considered

**Management of Severe but not Life-threatening Exacerbations**

- Assess severity of symptoms, blood gases, chest radiograph
- Administer supplemental oxygen therapy, obtain serial arterial blood gas, venous blood gas and pulse oximetry measurements
  - Bronchodilators:
    - Increase doses and/or frequency of short-acting bronchodilators
    - Combine short-acting beta 2-agonists and anticholinergics
    - Consider use of long-acting bronchodilators when patient becomes stable
    - Use spacers or air-driven nebulizers when appropriate
  - Consider oral corticosteroids
  - Consider antibiotics (oral) when signs of bacterial infection are present
  - Consider noninvasive mechanical ventilation (NIV)

At all times:
- Monitor fluid balance
- Consider subcutaneous heparin or low molecular weight heparin for thromboembolism prophylaxis
- Identify and treat associated conditions (e.g., heart failure, arrhythmias, pulmonary embolism etc.)

*Local resources need to be considered

**Key Points for the Management of Exacerbations**

- Short-acting inhaled beta2-agonists, with or without short-acting anticholinergics, are recommended as the initial bronchodilators to treat an acute exacerbation (Evidence C)
- Systemic corticosteroids can improve lung function (FEV1), oxygenation and shorten recovery time and hospitalization duration. Duration of therapy should not normally be more than 5 days (Evidence A)
- Antibiotics, when indicated, can shorten recovery time, reduce the risk of early relapse, treatment failure, and hospitalization duration. Duration of therapy should normally be 5 days (Evidence B)
- Methylyxanthines are not recommended due to increased side effect profiles (Evidence B)
- Non-invasive mechanical ventilation should be the first mode of ventilation used in COPD patients with acute respiratory failure who have no absolute contraindication because it improves gas exchange, reduces work of breathing and the need for intubation, decreases hospitalization duration and improves survival (Evidence A)
Open Forum

Share an idea. Anything you need help with? What’s new in your Virginia Health District? Any announcements?
ED COVID rates are least in Eastern VA

VDH Dashboard Snapshot

Case Rate per 100,000 by Age Group - 35 Selected Districts - Past 13 Weeks

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Case Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-9</td>
<td>807</td>
</tr>
<tr>
<td>10-19</td>
<td>636</td>
</tr>
<tr>
<td>20-29</td>
<td>925</td>
</tr>
<tr>
<td>30-39</td>
<td>952</td>
</tr>
<tr>
<td>40-49</td>
<td>985</td>
</tr>
<tr>
<td>50-59</td>
<td>1,104</td>
</tr>
<tr>
<td>60-69</td>
<td>1,250</td>
</tr>
<tr>
<td>70-79</td>
<td>1,629</td>
</tr>
</tbody>
</table>

4 week trend in percent of total inpatient beds used by COVID-19 patients

2.82 percent of inpatient beds in use for COVID-19 for the week ending 02/17/2024
## Accreditation

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   b. The course code for today’s event is: ###### (within 5 days of the event)

Complete Evaluation & Claim Credit, (within 60 days of the event)

1) Go to https://vcu.cloud-cme.com
2) Sign in using email address used above
3) Click “My CE”
4) Click “Evaluations and Certificates”

OR

1) Open the CloudCME app on your device
2) Click “My Evaluations”
3) Click the name of the activity to complete evaluation

Need help? ceinfo@vcuhealth.org
Thank you for joining us!

Next Newsletter - coming to you in March

Next Monthly Forum - Wednesday, March 20, 2024, 4-5 pm

Your Calendar Link - In the Zoom Registration Confirmation email you received today, there’s a calendar link to update your calendar for future meetings.

On your way out of our meeting today, kindly answer a brief feedback survey.

Stay in touch! Email us at ltccn@vcu.edu

Invite your colleagues! They can register at ltccn.vcu.edu
The speakers and presenters for today have no relevant financial conflicts of interest.

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Virginia Long-Term Care Infrastructure Pilot Project (VLIPP) funding will be utilized in nursing homes and long-term care facilities to assist with the ongoing COVID-19 response and to bolster preparedness for emerging infections. The projects are based on identified needs that align with funding objectives.