Wheeze, Cough, Gasp…
Chronic Respiratory Disorders

Patricia Copley, MD MPH

Disclosure

- I have no actual or potential conflict of interest in relation to this presentation

Overview

- Review the diagnosis of COPD vs Asthma
- Discuss the treatment of COPD vs Asthma
- Discuss treatment failure and when to refer

Definitions

- COPD
- Emphysema
- Chronic Bronchitis
- Asthma

COPD Definition

- “COPD is a common, preventable, and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases. The chronic airflow limitation that characterizes COPD is caused by a mixture of small airways disease (e.g., obstructive bronchiolitis) and parenchymal destruction (emphysema), the relative contributions of which vary from person to person. Chronic inflammation causes structural changes, small airways narrowing, and destruction of lung parenchyma. A loss of small airways may contribute to airflow limitation and mucociliary dysfunction, a characteristic feature of the disease.”

Dr. Copley’s COPD Definition

Fixed airflow obstruction usually (but not always) caused by something
**Definition of Emphysema**

Description of pathology changes that can be associated with COPD.

**Definition of Chronic Bronchitis**

Chronic productive cough for 3 months in 2 successive years, in a patient in whom other causes of chronic cough have been excluded.

**Definition of Asthma**

Respiratory symptoms due to airway inflammation that has variable duration, intensity, and expiratory airflow limitation.

- **Asthma, with airflow limitation**
  - Prominent respiratory symptoms and minimal expiratory airflow limitation

- **Asthma, with fixed airflow limitation**
  - Frequent chest tightness and/or nocturnal symptoms

- **Asthma, fixed airflow limitation**
  - Infrequent chest tightness and/or nocturnal symptoms

- **Eosinophilic Asthma**
  - Eosinophilic sputum
  - Responds well to ICS

- **Non-eosinophilic Asthma**
  - Sputum may be neutrophilic, eosinophilic or few inflammatory cells
  - Poorly responsive to ICS

**Asthma Symptom Presentation**

- **Typical Symptoms**
  - More than 1: wheeze, sob, cough, chest tightness
  - Worse @night or early morning
  - Vary over time and in intensity
  - Triggered by viral infx, exercise, allergies, weather, irritants

- **Atypical Symptoms**
  - Isolated cough without any other sx
  - Chronic sputum production
  - SOB with dizziness, light-headedness
  - Chest pain

**COPD Symptom Presentation**

**Physical Exam**

- **Wheezing** — may be absent or only with forced expiration
- **Wheezing during exacerbation** — can be decreased with severe exacerbation, but usually associated with respiratory failure
- **Ddx wheeze = upper airway dysfunction, COPD/Asthma, respiratory infection, tracheomalacia, obstruction/inhaled foreign body**
- **Crackles and inspiratory wheeze NOT features**
- **Nose with allergic rhinitis or nasal polypsis**
Diagnostic Criteria

Asthma
1. Symptoms of Asthma
2. History and exam
3. Spirometry with variable expiratory airflow limitation

COPD
1. Symptoms of COPD
2. History and exam – specifically risk factors
3. Spirometry with fixed airflow obstruction – REQUIRED TO ESTABLISH DIAGNOSIS

Pulmonary Function Testing - Asthma

- Documented excessive variability in lung function + airflow limitation
- The greater the variation or frequency, the stronger the dx support + FEV1/FVC reduced at least once (FEV1/FVC nl >0.75-0.80)
- Bronchodilator reversibility (hold SABA >4 hours, LABA >15 hours)
- Spirometry with fixed airflow obstruction – REQUIRED TO ESTABLISH DIAGNOSIS
- Excessive variability BID PEF/2 wks
- Avg daily diurnal PEF variability >10%
- Exercise challenge test
- Increase in FEV1 >12% + 200ml from baseline after 4 weeks of tx (excluding respiratory infection)
- Bronchial challenge test
- >20% drop from baseline FEV1 with methacholine or histamine
- Excessive variation in spirometry between visits
- FEV1 >12% + 200ml between visits, excluding respiratory infections

Pulmonary Function Testing - COPD

- Looking for reversible or irreversible airflow obstruction
- Staging with Spirometry, post-bronchodilator
  - GOLD 1: Mild (FEV1 ≥ 80%)
  - GOLD 2: Moderate (FEV1 50% ≤ 80% predicted)
  - GOLD 3: Severe (FEV1 30% ≤ 50% predicted)
  - GOLD 4: Very Severe (FEV1 < 30% predicted)
- Lung Volumes – not necessary, but sometimes helpful (air trapping, restrictive defect)
- Diffusing capacity for Carbon Monoxide – not necessary, but helpful

Ancillary Tests for Asthma

- Blood work not routine
- CBC w/diff to look for eosinophilia or anemia: severe asthma, hospitalization, nasal polyps, abnormal CXR, possible parasitic infx
- alpha-1 anti-trypsin level: atypical asthma with persistent irreversible airflow obstruction
- Total serum IgE: mod-severe persistent asthma, considering tx with anti-IgE monoclonal antibody (omalizumab), eosinophilia and suspected allergic bronchopulmonary aspergillosis
- ELISA for allergen-specific IgE or allergy skin testing: persistent asthma
Ancillary Tests for COPD

- **alpha-1 anti-trypsin level**: family history, early onset, findings out of proportion to exposure, non-smoker, region with high incidence
- **BNP, BMP, CBC with diff, TSH**: evaluation of dyspnea, chronic hypercapnia typically with increased serum bicarb due to compensatory metabolic alkalosis
- **ABG**: not routine
- **Radiology**: CXR, Low dose CT for cancer screening/CT scan

Differential Diagnosis for Chronic Cough

**Intrathoracic**
- Asthma
- Lung Cancer
- Tuberculosis
- Bronchiectasis
- Left Heart Failure
- Interstitial Lung Disease
- Cystic Fibrosis
- Idiopathic Cough

**Extrathoracic**
- Chronic Allergic rhinitis
- Post Nasal Drip Syndrome
- Upper Airway Cough Syndrome
- Gastroesophageal Reflux
- Medications (i.e. ACE-i)

Differential Diagnosis

- Sneezing, itching, blocked nose, throat clearing
- Chronic upper airway cough syndrome
- Dizziness, paresthesia, sighing
- Hyperventilation, dysfunctional breathing
- Recurrent ills, productive cough
- Bronchiectasis
- Recurrent ills, productive cough, sinusitis
- Cystic fibrosis
- Cardiac murmur
- Congenital heart disease
- Shortness of breath, FMH early emphysema
- Alpha-antitrypsin deficiency


Treatment

- Routine monitoring of symptoms and lung function
- Patient education
  - Prevention plan
  - Plan for exacerbations
- Controlling environmental factors and comorbid conditions
- Pharmacological therapy
- Smoking cessation
- Reduction in other risk factors
- Vaccinations – Influenza, Pneumococcal
- COPD, specifically
  - Oxygen therapy
  - Pulmonary rehab

Differential Diagnosis

- Sudden onset, unilateral wheeze
- Inhaled foreign body
- Dyspnea with exertion, nocturnal sx
- Cardiac failure
- ACE-inhibitor
- Medication-related cough
- Dyspnea with exertion, non-productive cough, finger clubbing
- Parenchymal lung disease
- Sudden onset dyspnea, chest pain
- Pulmonary embolism
- Dyspnea, unresponsive to bronchodilators
- Central airway obstruction
- Dyspnea, inspiratory wheezing (stridor)
- Vocal cord dysfunction


Well-controlled Asthma

- Daytime symptoms < 2x/week
- Nighttime symptoms < 2x/month
- SABA for symptom management < 3 days/week
- No interference with normal activity (SABA preventive use excluded)
- Peak flow > 80% predicted/personal best
- Glucocorticoids or Urgent Care visits < 1x/year
Asthma Treatment

Step 1
Consider low dose ICS

Step 2
Low dose ICS AND Leukotriene receptor antagonist (LTRA)

Step 3
Low dose ICS/LABA AND Medium/High dose ICS OR Low dose ICS + LTRA

Step 4
Medium/High dose ICS/LABA AND Tiotropium or Medium/High dose ICS + LTRA

Step 5
Refer for add-on treatment (i.e. anti-IgE, anti-IL5)

COPD Assessment

Minimally symptomatic, low risk of exacerbation (Category A)
More symptomatic, low risk of exacerbation (Category B)
Minimally symptomatic, high risk of exacerbation (Category C)
More symptomatic, high risk of exacerbation (Category D)

Modified MRC Dyspnea Scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description of breathlessness</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>I only get breathless with strenuous exercise</td>
</tr>
<tr>
<td>1</td>
<td>I get short of breath when hurrying on level ground or walking up a slight hill</td>
</tr>
<tr>
<td>2</td>
<td>On level ground, I walk slower than people of the same age because of breathlessness, or have to stop for breath when walking at my own pace</td>
</tr>
<tr>
<td>3</td>
<td>I stop for breath after walking about 100 yards or after a few minutes on level ground</td>
</tr>
<tr>
<td>4</td>
<td>I am too breathless to leave the house or I am breathless when dressing</td>
</tr>
</tbody>
</table>

COPD Assessment Test (CAT™)

<table>
<thead>
<tr>
<th>Item</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>I never cough</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>I have no phlegm (mucus) in my chest at all</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>My chest does not feel tight at all</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>When I walk up a hill or one flight of stairs I am not breathless</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>I am not limited doing any activities at home</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>I am confident leaving my home despite my lung condition</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>I sleep soundly</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>I have lots of energy</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>My chest feels very tight</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>When I walk up a hill or one flight of stairs I am very breathless</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>I am very limited doing activities at home</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>I am not at all confident leaving my home because of my lung condition</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>I don't sleep soundly because of my lung condition</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>I have no energy at all</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

References:
Fletcher CM. BMJ 1960; 2: 1662
Jones et al. ERJ 2009; 24(3); 648-54
COPD Assessment

- 2 exacerbations/year or ≥ 1 leading to hospital admission
- ≥ 2 exacerbations/year not leading to hospital admission

Minimally symptomatic, low risk of exacerbation (Category A)
More symptomatic, low risk of exacerbation (Category B)
Minimally symptomatic, high risk of exacerbation (Category C)
More symptomatic, high risk of exacerbation (Category D)

COPD Treatment

- Group C, ↓ sx, ↑ risk =
  - Long-Acting (LABA)
  - For further exacerbations: LAMA/LABA scheduled or LABA/ICS
- Group A, ↓ sx, ↓ risk =
  - Short-acting bronchodilator short acting beta-agonist and anticholinergic pm.
  - ↓ Long-acting bronchodilator if beneficial
- Group B, ↑ sx, ↑ risk =
  - Long-acting bronchodilator (either LAMA or LABA) scheduled or short-acting bronchodilator if beneficial
- Group D, ↑ sx, ↑ risk =
  - LABA/LAMA scheduled or LAMA/ICS if asthmatic component = SABA pm
  - LABA/ICS if ICS contraindicated
  - For further exacerbations:
    - LABA/LAMA/ICS or less preferred unless asthma component
  - Short acting bronchodilator or short acting beta-agonist and anticholinergic pm.
  - ↓ Long-acting bronchodilator if beneficial

How to use an inhaler

**MDI without Spacer**
- Prime inhaler
- Shake MDI vigorously for 5 sec
- Hold upright index on top, thumb-on bottom
- Breathe out normally
- Mouthpiece between teeth and close lips or position 2 fingers from mouth
- Press down on the top WHILE inhaling in slowly and deeply
- Hold the medication in for as long as comfortable
- Wait 15-30 sec between puffs, shake again before next use
- Rinse spit after ICS

**Powder inhaler**
- Remove cover
- Load dose
- Hold inhaler upright (usually horizontal for multi-dose inhaler)
- Breathe out normally – but NOT into the inhaler
- Put mouth around mouthpiece
- Breathe in slowly, steadily, and deeply as possible
- Remove mouth from mouthpiece and hold breath for 5-10 sec
- Rinse spit
- Store cool, dry place
- Make sure they know how to track doses
How to use an inhaler

**Soft Mist inhaler Prime**
- Insert cartridge with the medicine
- Release safety catch on side
- Remove the base
- Push narrow end of cartridge into the inhaler until it clicks
- Make sure it is all the way in
- Replace clear plastic base and press until click
- Press button until mist seen
- Initial Prime cycle, press until mist comes out 3 more times (4 total)
- Prime if not used for > 3 days to release 1 spray of medicine, go through initial prime sequence (4 sprays) if inhaler not used for > 3 weeks

**Soft Mist Inhaler Use**
- Hold upright, use other hand to turn base until click
- Remove cap
- Breathe out slowly and completely
- Put mouthpiece in mouth, holding horizontal
- Close lips around mouthpiece but do not cover holes on side (air vents)
- Slow deep breathe in, press button at beginning of inhalation
- When lungs full, hold breathe for at least 10 seconds
- Breathe out slowly

Asthma Exacerbation Treatment

- Increase SABA (2-4 puffs with spacer or nebulizer)
- Confirm use of controller rx, may need to increase
- Prednisone 40-60mg qday x 5-7 days
- Consider emergency room
- Patient education

COPD Exacerbation Treatment

Cardiopulmonary Rehab

- Exercise – lower body, upper body, breathing, strength training
- Breathing techniques
- Nutrition
- Relaxation
- Emotional and group support
- Education about medication, oxygen therapy, diet
- Smoking cessation
- Strategies for living with COPD

End of Life

- Encourage smoking cessation/avoid secondhand smoke/air pollution/dust/chemicals
- Maintain weight
- Exercise – pulmonary rehab
- Consider morphine for FEV1 < 1
- Anxiolytics
- Antidepressants
- Discuss code status, tracheostomy, POA
- Family education on hypoxemia/hypercarbia/911
- Plan for exacerbations
- Hospice – not just for the last days
### Cancer Screening Guidelines

<table>
<thead>
<tr>
<th>Organization</th>
<th>Groups eligible for screening</th>
</tr>
</thead>
</table>
| American Association for Thoracic Surgery | 1. Age 55 to 79 years with ≥ 30 pack-year smoking history.  
2. Long-term lung cancer survivors who have completed 4 yrs of surveillance without recurrence, and who can tolerate lung cancer treatment in order to detect second primary lung cancer until the age of 79.  
3. Age 50 to 79 years with ≥ 20 pack-year smoking history and additional comorbidity that produces a cumulative risk of developing lung cancer ≥ 5% in 5 years. |
| American Cancer Society | Age 55 to 74 years with ≥ 30 pack-year smoking history, either currently smoking or have quit within the past 15 years, and who are in relatively good health. |
| American College of Chest Physicians and American Society of Clinical Oncology | Age 55 to 74 years with ≥ 30 pack-year smoking history and either continue to smoke or have quit within the past 15 years. |
| US Preventive Services Task Force | Annual low-dose CT, Age 55-80 with ≥ 30 pack-year smoking history and currently smoke or quit within the past 15 years. Screening should be discontinued once person hasn’t smoked for 15 years or develops a health problem that substantially limits life expectancy or the ability or willingness to have curative lung surgery. |

### Pre-op Evaluation
- COPD less risk than other patient-related risk factors including age and heart failure
- PFTs, ABG and CXR not routinely indicated
- No increased risk with well controlled asthma
- Maximize pulmonary function prior to procedures
- Recommend pulmonary evaluation for high risk cardiothoracic procedures in patient with known moderate to severe COPD
- No prohibitive level of pulmonary function below which surgery is absolutely contraindicated – but there are consequences
- Use as teachable moment for smoking cessation

### When Should I Refer?
- Refer when a patient doesn’t respond like they should
- Refer when a patient is declining faster than they should
- Refer when frequent hospitalizations occur

### What do I REALLY want you to remember?
- COPD diagnosis is with spirometry, but Rx are based on symptoms
- Step Asthma Treatment both Up and Down
Educate re: prevention, immunizations, symptom management, plans

Take time to make sure medications are being used AND used correctly

Not Everyone Who Wheezes, Coughs or Gasp is COPD or Asthma

Don’t forget about CXR/CT, serology, clinical exam

Refer Patients

References

• www.uptodate.com
• Fletcher CM. BMJ 1960; 2: 1662
Email: patriciacopley@inspiratorysolutions.com