2024 Updates in COPD
From a Pulmonologist

Katie Artis, MD MPH
February 13, 2024
Disclosure Statement

• No financial conflicts of interest

• Practicing pulmonologist at Portland VA Medical Center
  My views are not representative of the Veterans Health Administration.

• American Thoracic Quality Improvement Implementation Committee
  I help steward several COPD performance measures.
Objectives

• Identify and diagnose patients at risk for COPD
• Assess and stage COPD patients
• Understand goals of COPD treatment
• Review highlights in non-pharmacologic management

Some updates and new areas of emphasis
No major paradigm shifts
58 y.o. woman, URI 3 months ago, feels like she still isn’t better “Do I need antibiotics?”

- Dyspnea climbing stairs and carrying groceries
- Lingering dry cough
- No prior history of asthma or atopy
- Former smoker (20PY), husband still smokes
- Works as a house cleaner, chemical fumes and dust
- SpO2 95%, occasional expiratory wheeze

What’s your next step?

a) Trial albuterol inhaler
b) Prescribe antibiotics
c) Prescribe prednisone
d) Order spirometry
e) Provide reassurance
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d) **Order spirometry**
e) Provide reassurance

**High pretest probability for Asthma or COPD**

But.. what else could it be?
What are the harms of misdiagnosis?
Differential diagnosis

- COPD
- Asthma
- Post-viral cough
- Long COVID
- Heart failure
- PE
- TB
- ILD
- COPD
- Pertussis
- Asthma
- Pleural effusion
- Angina
- Deconditioning
- Long COVID
- Vocal cord dysfunction
- Bronchiectasis
- Pulmonary hypertension
- Eosinophilic bronchitis
- Anemia
- Post-nasal drip
- Foreign body aspiration
- Lung mass/cancer
- ACEI cough
- Deconditioning
- ILD
- Angina
- Arrhythmia
- Post-nasal drip
- Pulmonary hypertension
- Eosinophilic bronchitis
- Anemia
- Post-nasal drip
Spirometry results

Interpretation
Mild obstruction with significant bronchodilator response.

<table>
<thead>
<tr>
<th></th>
<th>Pre-BD</th>
<th></th>
<th>Post-BD</th>
<th></th>
<th>VolChng</th>
<th>% Chng</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Actual</td>
<td>LLN</td>
<td>Z Score</td>
<td>% Pred</td>
<td>Actual</td>
<td>% Pred</td>
</tr>
<tr>
<td>FVC (L)</td>
<td>3.25</td>
<td>2.89</td>
<td>-1.00</td>
<td>85</td>
<td>3.82</td>
<td>100</td>
</tr>
<tr>
<td>FEV1 (L)</td>
<td>2.01</td>
<td>2.12</td>
<td>-1.86</td>
<td>68</td>
<td>2.32</td>
<td>79</td>
</tr>
<tr>
<td>FEV1/FVC (%)</td>
<td>62</td>
<td>65</td>
<td>-2.02</td>
<td>80</td>
<td>61</td>
<td>78</td>
</tr>
<tr>
<td>Expiratory Time (sec)</td>
<td>9.39</td>
<td>10.29</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TestGrade(ATS)</td>
<td>AA</td>
<td>AA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Spirometry remains vastly underutilized

Misdiagnosed

- 33% of “Asthma” pts\(^1\)
- 30-60% of “COPD” pts\(^2,3\)

Spirometry diagnosis

- Only 48% of new asthma pts\(^4\)
- Only 33-60% of new COPD pts\(^5,6\)

Does this patient have Asthma or COPD?

- Dyspnea climbing stairs and carrying groceries
- Lingering dry cough
- No prior history of asthma or atopy
- Former smoker (20PY), husband still smokes
- Works as house cleaner, chemical fumes and dust
- SpO2 95%, occasional expiratory wheeze
- Clear chest-Xray
- Mild obstruction w/significant bronchodilator response

Pick the most likely diagnosis:

a) Asthma
b) COPD
c) Both (‘overlap’ syndrome)
d) Impossible to tell
Does this patient have Asthma or COPD?

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- Lingering dry cough
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- Mild obstruction w/significant bronchodilator response

Pick the most likely diagnosis:

a) Asthma
b) COPD
c) Both (‘overlap’ syndrome)
d) Impossible to know yet
Disease Definitions

<table>
<thead>
<tr>
<th>COPD</th>
<th>A heterogeneous lung condition characterized by chronic respiratory symptoms (dyspnea, cough, sputum production and/or exacerbations) due to abnormalities of the airways (bronchitis, bronchiolitis) and/or alveoli (emphysema) that cause persistent, often progressive, airflow obstruction.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma</td>
<td>A heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation.</td>
</tr>
</tbody>
</table>

Spirometry is required for diagnosis of either
Distinguishing COPD from Asthma

- Age of onset
- Symptom nuance
- Predisposing factors
- Spirometry features

Asthma vs. COPD differentiation may not be possible from a single point in time or first visit

GINA 2023
<table>
<thead>
<tr>
<th><strong>Asthma</strong></th>
<th><strong>ACOS</strong></th>
<th><strong>COPD</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Onset age &lt;40</td>
<td>A mix of features</td>
<td>Onset age &gt;40</td>
</tr>
<tr>
<td>Prior or childhood asthma dx</td>
<td></td>
<td>No prior asthma dx</td>
</tr>
<tr>
<td>Absent to bad sx days, Intermittent &amp; episodic</td>
<td></td>
<td>Less bad to bad sx days, Persistent dyspnea</td>
</tr>
<tr>
<td>Bronchodilators very helpful</td>
<td></td>
<td>Bronchodilators help some</td>
</tr>
<tr>
<td>Triggers: seasonal, allergens, laughter, exercise</td>
<td></td>
<td>Hx of smoking, other toxic exposures, low birthweight</td>
</tr>
<tr>
<td>FEV1/FVC normal or low</td>
<td>FEV1/FVC low</td>
<td>FEV1/FVC low</td>
</tr>
<tr>
<td>FEV1 a marker of control</td>
<td>FEV1 a marker of risk</td>
<td>FEV1 a marker of risk &amp; severity</td>
</tr>
<tr>
<td>Robust reversibility (&gt;400ml) Less when well controlled</td>
<td>Varying degrees of reversibility (≥200ml)</td>
<td>Some or no reversibility Can be &gt;200ml but usually &lt;400</td>
</tr>
</tbody>
</table>

GINA 2023
<table>
<thead>
<tr>
<th></th>
<th>Asthma</th>
<th>ACOS</th>
<th>COPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUST INCLUDE ICS</td>
<td>MUST INCLUDE ICS</td>
<td>NO INITIAL ICS (and LAMA&gt;LABA)</td>
<td></td>
</tr>
<tr>
<td>Reduce risk of severe exacerbations &amp; death</td>
<td>Reduce risk of severe exacerbations &amp; death</td>
<td>Reduce risk of excess pneumonias DO add for severe or frequent exacerbations</td>
<td></td>
</tr>
</tbody>
</table>
Two Pathways to COPD

Normal lung development

Impaired lung development

COPD illness script: Were you born prematurely or underweight?

Spheres of Exposure for COPD

Environmental
- Man-made air pollution
  - industrial, automotive, power plants
  - mining, agriculture
- Natural sources
  - wildfires, volcanic ash, wind blown dust
- Organic & inorganic dusts
  - Chemical agents & fumes
  - Construction, horticulture, cleaning, factory work, wood mills, firefighting and more..

Occupational
- Indoor heating & cooking sources
  - Wood, animal dung, crop residues, coal
- Second-hand tobacco smoke

Home/Biomass
- Tobacco & COPD
  - 70% of cases in US
  - <40% of cases globally
- Cigarettes, cigars, pipes
- Vaping? Marijuana?
- Chemicals, fumes, dusts from hobbies

Personal

GOLD 2024.
70 y.o. man, enrolled in lung cancer screening (LCS). Emphysema incidentally noted on CT report.

Should you order spirometry to diagnose COPD?

a) No, USPSTF recommends against screening for COPD.
b) No, emphysema was discovered incidentally.
c) No, COPD is already diagnosed given emphysema on CT.
d) Yes, all patients enrolled in LCS should also undergo spirometry.
e) Yes, COPD diagnosis is likely, but requires spirometry.
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d) Yes, all patients enrolled in LCS should also undergo spirometry.
e) Yes, COPD diagnosis is likely, but requires spirometry.
COPD is vastly under-diagnosed

6% of Americans report COPD diagnosis

Estimated global COPD prevalence age ≥40 yrs is 10%

Higher in older adults


GOLD 2024.
## Screening vs. Case finding for COPD

### USPSTF, 2022

Do not screen asymptomatic adults for COPD

*Excludes:* populations at very high risk for COPD

### GOLD 2024

**Spirometry** in patients undergoing LCS and:

- Any respiratory symptoms
- LCS eligibility
- 50-80 years
- ≥20 PY smoking history

with incidental lung imaging findings *such as*:
- Emphysema
- Air trapping/hyperinflation
- Airway wall thickening
- Mucus plugging

*Radiographic emphysema alone:*
- 65-75% sensitivity for COPD
- 65-70% specificity diagnosis

GOLD 2024.
History and spirometry confirm COPD

- Stopped going hunting, “hills are too hard”
- Slowly worsening, walks slow on flat surfaces
- Cough with white phlegm
- No known exacerbations

You assess his COPD as:
- a) GOLD Grade I, Mild
- b) GOLD Grade II, Moderate
- c) GOLD Grade I, Group A
- d) GOLD Grade II, Group B
- e) GOLD Grade II, Group E

Interpretation: Mild obstruction after bronchodilation.
History and spirometry confirm COPD

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- Slowly worsening, walks slow on flat surfaces
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Interpretation: Mild obstruction after bronchodilation.
**GOLD COPD Assessment**

- **COPD** diagnosed by spirometry
- Degree of airflow obstruction
- Assess symptoms and exacerbation risk (Groups A, B, E)

**POST-BRONCHODILATOR FEV1/FVC <70%**

Not <LLN

<table>
<thead>
<tr>
<th>GOLD Grade</th>
<th>FEV1 (% predicted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I - Mild</td>
<td>≥80</td>
</tr>
<tr>
<td>II - Mod</td>
<td>50-79</td>
</tr>
<tr>
<td>III - Severe</td>
<td>30-49</td>
</tr>
<tr>
<td>IV - Very Sev</td>
<td>≤30</td>
</tr>
</tbody>
</table>

**Symptoms & Exacerbations**

- Not Z-scores

**GROUPS**

- **Group A**
  - mMRC 0-1
  - CAT <10
- **Group B**
  - mMRC ≥2
  - CAT ≥10
- **Group E**
  - ≥2 moderate/yr
  - ≥1 inpt/yr
  - ≤1 moderate/yr

**GOLD 2024 COPD**
COPD exacerbations drive poor outcomes

# COPD Exacerbation Classification

<table>
<thead>
<tr>
<th>Severity</th>
<th>Criteria</th>
<th>≥2 steroids = E</th>
<th>≥1 admit = E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>Treated with SABDs* only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>SABDs* + systemic corticosteroids (± antibiotics)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>Requires emergency care or hospitalization</td>
<td></td>
<td></td>
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</table>

*CABD = short acting bronchodilators

**COPD illness script:** How many COPD exacerbations last year? *(How many times did you need prednisone?)*

Any with hospitalizations?
COPD Symptom Assessment Tools

**mMRC Dyspnea scale**

Rate your breathlessness:

- **0**: Only breathless with strenuous exercise
- **1**: Short of breath hurrying or walking up slight hill
- **2**: Walks slower than age group or has to stop for breath when walking on level ground at own pace
- **3**: Stops for breath after walking 100 meters or a few minutes on level ground
- **4**: Breathless when dressing/undressing OR too breathless to leave the house

≥2 = more dyspnea = B

**COPD Assessment Test (CAT)**

For each item below, place a mark (X) in the box that best describes you currently. Be sure to only select one response for each question.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I never cough</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. I cough all the time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I have no phlegm (mucus) in my chest at all</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. My chest is completely full of phlegm (mucus)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. My chest doesn’t feel tight at all</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. My chest feels very tight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. When I walk up a hill or one flight of stairs, I am not breathless</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. When I walk up a hill or one flight of stairs, I am very breathless</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. I am not limited doing any activities at home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. I am very limited doing activities at home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. I am confident leaving my home despite my lung condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. I am not at all confident leaving my home because of my lung condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. I sleep soundly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. I don’t sleep soundly because of my lung condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. I have lots of energy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. I have no energy at all</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

≥10 = more symptoms = B
69yo F with COPD & worsening dyspnea

- 1 admit for COPD 4-months ago
- Previously could walk 3 blocks
- Now, stops to rest at end of driveway
- ++coughing, poor energy

**You assess her COPD as:**

a) GOLD II (MOD), Group B
b) GOLD II (MOD), Group E
c) GOLD III (SEVERE), Group A
d) GOLD III (SEVERE), Group B
e) GOLD III (SEVERE), Group E

**Interpretation:** Moderate obstruction without significant bronchodilator response.

**SPIROMETRY**

<table>
<thead>
<tr>
<th>SPIROMETRY</th>
<th>Post-BD</th>
</tr>
</thead>
<tbody>
<tr>
<td>FVC (L)</td>
<td>Actual</td>
</tr>
<tr>
<td>3.75</td>
<td>89</td>
</tr>
<tr>
<td>FEV1 (L)</td>
<td>1.36</td>
</tr>
<tr>
<td>FEV1/FVC(%)</td>
<td>36</td>
</tr>
</tbody>
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**GOLD Grade**

- I - Mild: ≥80
- II - Mod: 50-79
- III - Severe: 30-49
- IV - Very severe: <30
69yo F with COPD & worsening dyspnea

- 1 admit for COPD 4-months ago
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Interpretation:

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Interpretation: Moderate obstruction without significant bronchodilator response.
COPD Treatment Goals

- Relieve Symptoms
- Improve Exercise Tolerance
- Improve Health Status

AND

- Prevent Disease Progression
- Prevent and Treat Exacerbations
- Reduce Mortality

REDUCE SYMPTOMS

REDUCE RISK
COPD Treatments

**Preventative**
- Smoking cessation
- Exposure avoidance
- Respiratory Vaccinations

**Non-Pharmacologic**
- Education/self management
- Inhaler instruction
- Physical activity
- Pulmonary rehab
- Nutrition support
- End-of-life/palliative care

**Pharmacologic**
- Bronchodilators
  - SABA, SAMA
  - LABA, LAMA
  - methylxanthines (theophylline)
- Anti-inflammatory agents
  - ICS (w/long-acting bronchodilators)
  - PGE4 inhibitors (roflumilast)
  - macrolides (azithromycin)
  - antioxidants (NAC)

**Respiratory Devices**
- Long-term oxygen
- Other oxygen devices
- NIPPV

**Bronchoscopic & Surgical**
- Hyperinflation & emphysema
  - LVRS, bullectomy
  - valves, coils, ablation
- Airway
  - Stenting, tracheoplasty
  - Nitrogen cryospray, rheoplasty
  - Lung denervation

GOLD 2024
COPD Empathy Exercise
Hyperinflation and dyspnea

INHALATION

FORCED EXHALATION

NORMAL

COPD
67yo M, GOLD III/Group B
“My inhalers don’t work anymore.”

- Taking LABA/LAMA inhaler
- Appropriate inhaler technique
- Dyspnea walking <1 block and with grocery shopping
- Pet dog died 3 months ago

- SpO2 93% on room air
- BMI 25
- RV 235% predicted on PFTs

In addition to considering other causes of dyspnea, you:
- a) Add ICS to LABA/LAMA
- b) Prescribe oxygen with activity
- c) Refer for pulmonary rehabilitation
- d) Recommend modest weight loss
- e) Counsel that COPD is a progressive, irreversible disease

LABA = long-acting beta-agonist
LAMA = long-acting muscarinic antagonist
ICS = inhaled corticosteroid

BMI = body mass index
RV = residual volume
67yo M, GOLD III/Group B
“My inhalers don’t work anymore.”

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COPD Pulmonary Rehabilitation

The basics
• 2-3x weekly sessions, 6-12 weeks total
• Baseline assessment
• COPD education
• COPD self-management
• Supervised escalating physical activity
• Tailored to each patient

<table>
<thead>
<tr>
<th>DECREASES</th>
<th>INCREASES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyspnea</td>
<td>Exercise tolerance</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Quality of life</td>
</tr>
<tr>
<td>Depression</td>
<td>Rehospitalizations</td>
</tr>
</tbody>
</table>

Start (and keep on) moving... *but how?*

- Activity counseling?
- "Stealth" interventions?
- Web based interventions?
- Pedometers?
- Physical activity (reduce chronic inactivity)
- Pulmonary rehab?
- Exercise training?
- Motivational interviewing?
- Health Coaching?


GOLD 2024.
69yo F, 1 week f/u after another COPD hospitalization

- 5 day admit on medicine ward
- Currently takes LABA/LAMA inhaler
- Easily fatigued walking in her house
- Required 2LPM oxygen with activity
- In-office SpO2 92% on room air
- Hospital ABG: pH 7.34, pCO2 47, PaO2 65
- CT scan with diffuse emphysema

In addition to quitting smoking, which of the following will REDUCE her risk of death?

a) Treatment with LABA/LAMA/ICS
b) Prompt referral to Pulm rehab
c) Long-term oxygen supplementation
d) Non-invasive positive pressure ventilation (NIPPV) at home
e) Lung volume reduction surgery

LABA = long-acting beta-agonist
LAMA = long-acting muscarinic antagonist
ICS = inhaled corticosteroid
69yo F, 1 week f/u after another COPD hospitalization

- 5 day admit on medicine ward
- Currently takes LABA/LAMA inhaler
- Easily fatigued walking in her house
- Required 2LPM oxygen with activity
- In-office SpO2 92% on room air
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Timely PR after COPD Hospitalization Reduces Mortality

Mortality reduction in smaller RCTs\(^1\) corroborated by large population level data\(^2\)

Post-discharge PR timing
\(^1\) within 4 weeks
\(^2\) within 3 months

1. Ryrsø et al (2018); BMC Pulmonary Medicine
2. Lindenauer et al (2020); JAMA
## COPD interventions that reduce all-cause mortality

<table>
<thead>
<tr>
<th>COPD intervention</th>
<th>Trial(s), year</th>
<th>COPD Sub-population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking cessation</td>
<td>Lung Health Study, 2005</td>
<td>Mild COPD, few symptoms</td>
</tr>
<tr>
<td>LABA+LAMA+ICS</td>
<td>IMPACT, 2020 ETHOS, 2021</td>
<td>GOLD II-IV, Group E (at least 1 hospitalization)</td>
</tr>
<tr>
<td>Pulmonary rehabilitation</td>
<td>Puhan et al, 2011 &amp; 2016</td>
<td>Started ≤4 weeks after COPD exacerbation admission</td>
</tr>
<tr>
<td>Long-term oxygen</td>
<td>NOTT, 1980 MRC, 1981</td>
<td>PaO2 ≤55 or &lt;60 with cor pulmonale or secondary polycythemia</td>
</tr>
<tr>
<td>Noninvasive positive pressure ventilation (NIPPV)</td>
<td>Kohlein et al, 2014</td>
<td>Stable COPD with pCO2 ≥52, Avg IPAP 22cm H2O, 6hrs/day</td>
</tr>
<tr>
<td>Lung volume reduction surgery</td>
<td>NETT, 2003</td>
<td>Upper lobe emphysema and low exercise capacity</td>
</tr>
</tbody>
</table>
Key Messages

• COPD is both over and under-diagnosed - order more spirometry
• Consider non-tobacco exposures & impaired lung development
• Use ABE staging not FEV1; exacerbations drive outcomes
• Refer more patients to pulmonary rehabilitation
• Spend more time talking about physical activity
• Remember COPD therapies that reduce mortality
Thank you!