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

Primary Source

Vogelmeier et al. Global strategy for the Diagnosis, Management and Prevention of COPD: **2024 Report**

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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High pretest probability for Asthma or COPD
But.. what else could it be?
What are the harms of misdiagnosis?

Differential diagnosis

ACEI cough

Post-viral cough

COPD

PE

Asthma

Heart failure

TB

ILD

Pertussis

Angina

Deconditioning

Long COVID

Vocal cord dysfunction

Pleural effusion

Arrhythmia

Bronchiectasis

Foreign body aspiration

Eosinophilic bronchitis

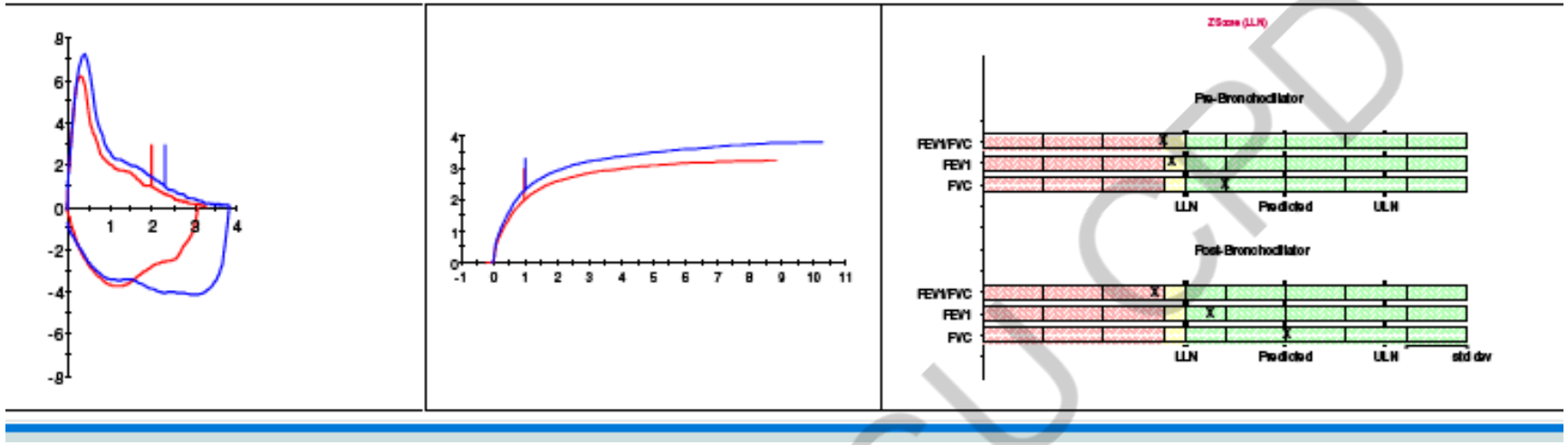
Anemia

Post-nasal drip

Pulmonary hypertension

Lung mass/cancer

Spirometry results



Interpretation
Mild obstruction with significant bronchodilator response.

	Pre-BD				Post-BD			
	Actual	LLN	Z Score	%Pred	Actual	%Pred	VolChng	%Chng
--- SPIROMETRY ---								
FVC (L)	3.25	2.89	-1.00	85	3.82	100	0.58	+15
FEV1 (L)	2.01	2.12	-1.86	68	2.32	79	0.31	+10
FEV1/FVC (%)	62	65	-2.02	80	61	78		-1
Expiratory Time (sec)	9.39				10.29			+9
TestGrade(ATS)	AA				AA			

Spirometry remains vastly underutilized

Misdiagnosed	Spirometry diagnosis
33% of "Asthma" pts[1]	Only 48% of new asthma pts[4]
30-60% of "COPD" pts[2,3]	Only 33-60% of new COPD pts[5,6]

1. Aaron et al, *JAMA* 2017.
2. Diab et al. *AJRCCM* 2018.
3. Sator et al, *Chest* 2019.
4. Sokol et al, *Am J Med* 2015
5. MeiLan et al, *Chest* 2007.
6. Baldomero et al, *COPD* 2022.

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

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c) Both ('overlap' syndrome)
d) Impossible to know yet

Disease Definitions

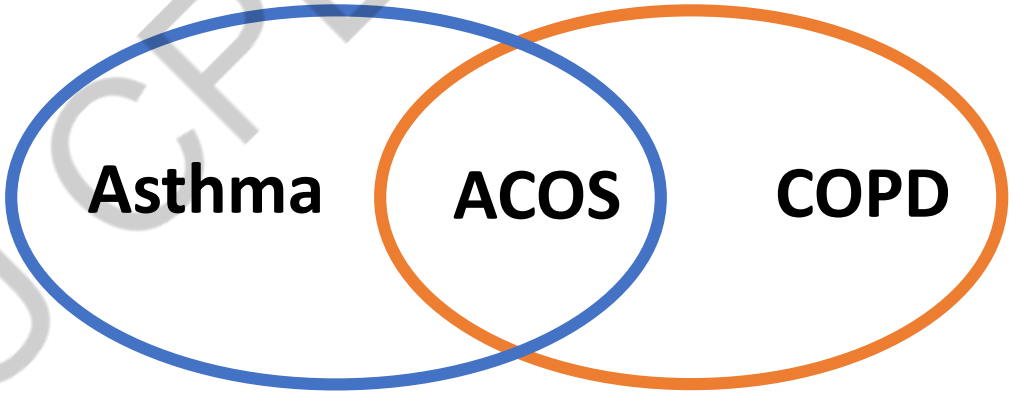
COPD	A heterogeneous lung condition characterized by chronic respiratory symptoms (dyspnea, cough, sputum production and/or exacerbations) due to **abnormalities of the airways** (bronchitis, bronchiolitis) **and/or alveoli** (emphysema) that cause **persistent, often progressive**, airflow obstruction.
Asthma	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.

Spirometry is <u>required</u> for diagnosis of either

GOLD 2024
GINA 2023

Distinguishing COPD from Asthma

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



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

GINA 2023

Asthma, COPD, or both?

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

GINA 2023

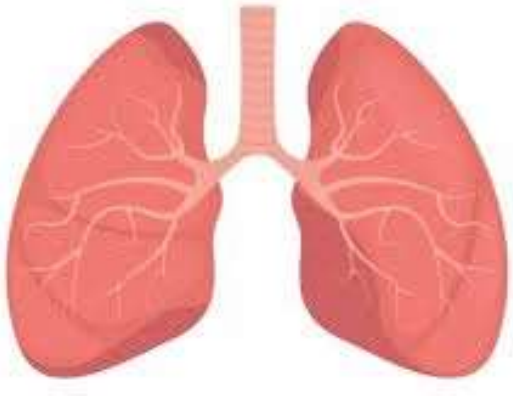
Asthma, COPD, or both?

Asthma	ACOS	COPD
MUST INCLUDE ICS Reduce risk of severe exacerbations & death	**MUST INCLUDE ICS** Reduce risk of severe exacerbations & death	**NO INITIAL ICS** (and LAMA>LABA) Reduce risk of excess pneumonias DO add for severe or frequent exacerbations

GINA 2023

Two Pathways to COPD

Normal lung development



Normal lung aging

Injury & accelerated decline

Genetic predisposition

Normal aging

Impaired lung development

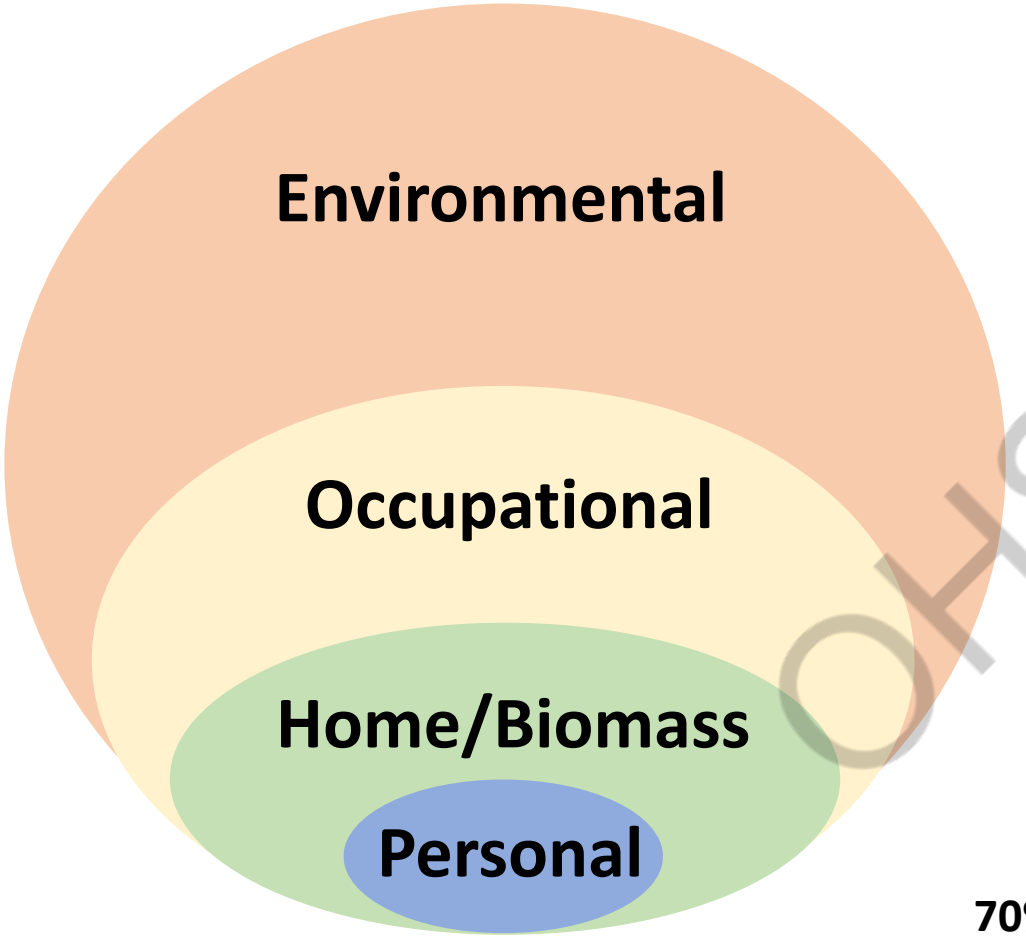
Normal lung aging

Impaired FEV1 (COPD)

COPD illness script: Were you born prematurely or underweight?

Augsti & Hogg. *NEJM* 2019.

Spheres of Exposure for COPD



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..

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

Cigarettes, cigars, pipes
Vaping? Marijuana?
Chemicals, fumes, dusts from hobbies

70% of cases in US

<40% of cases Globally

GOLD 2024.
Yang et al, *Lancet Respir* Med 2022.

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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COPD is vastly *under*-diagnosed

6% of Americans report COPD diagnosis

Estimated global COPD prevalence age ≥40 yrs is 10%

***Higher* in older adults**

CDC BRFSS 2011-2020.

GOLD 2024.
Adeloye et al. *J Global Health 2015.*

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
65-70% specificity
for COPD diagnosis

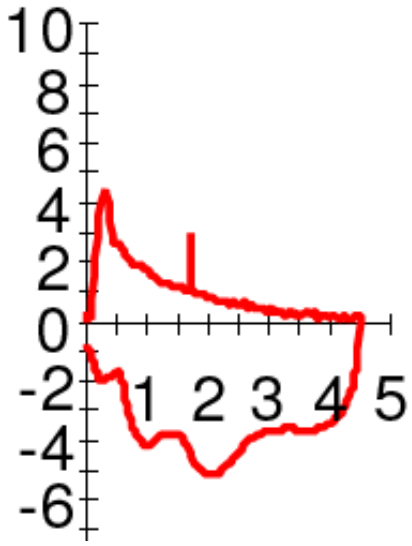
GOLD 2024.

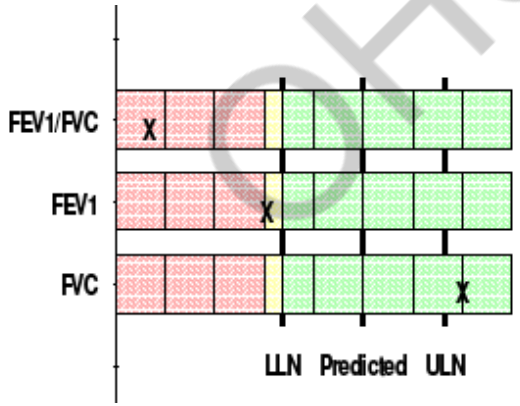
History and spirometry confirm COPD

- 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





	Actual	LLN	Z Score	%Pred
--- SPIROMETRY ---				
FVC (L)	4.53	2.60	+2.02	131
FEV1 (L)	1.74	1.90	-1.97	65
FEV1/FVC (%)	38.33	64.35	-4.35	49
Expiratory Time (sec)	16.25			
TestGrade(ATS)	AA			

Interpretation: Mild obstruction after bronchodilation.

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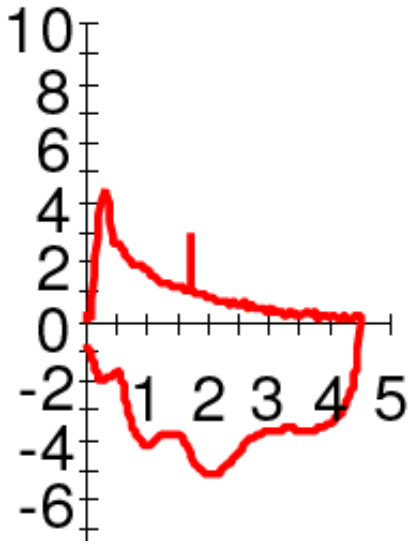

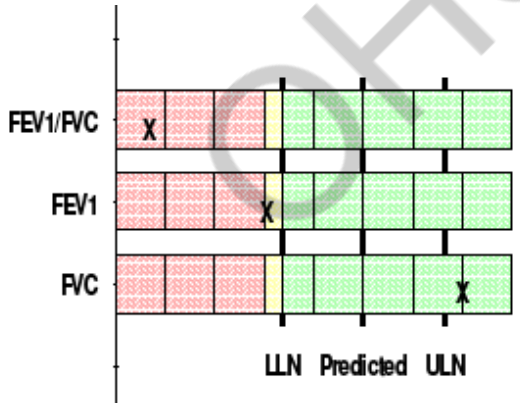

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GOLD COPD Assessment

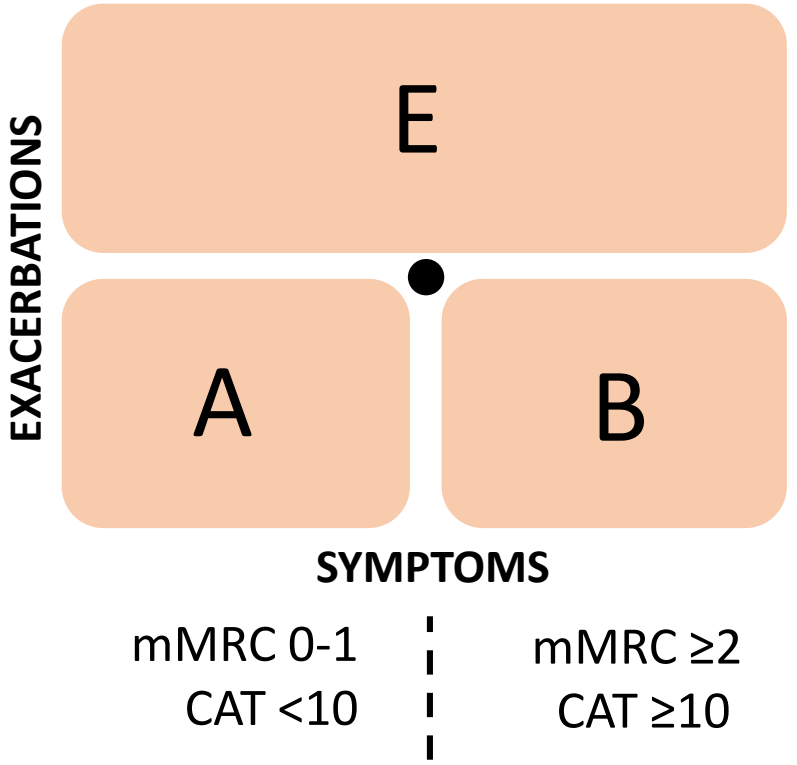
COPD diagnosed by spirometry → Degree of airflow obstruction → Assess symptoms and exacerbation risk (Groups A, B, E)

Post-bronchodilator FEV1/FVC <70%

Not <LLN

GOLD Grade	FEV1 (% predicted)
I - Mild	≥80
II - Mod	50-79
III - Severe	30-49
IV - Very sev	<30

Not Z-scores



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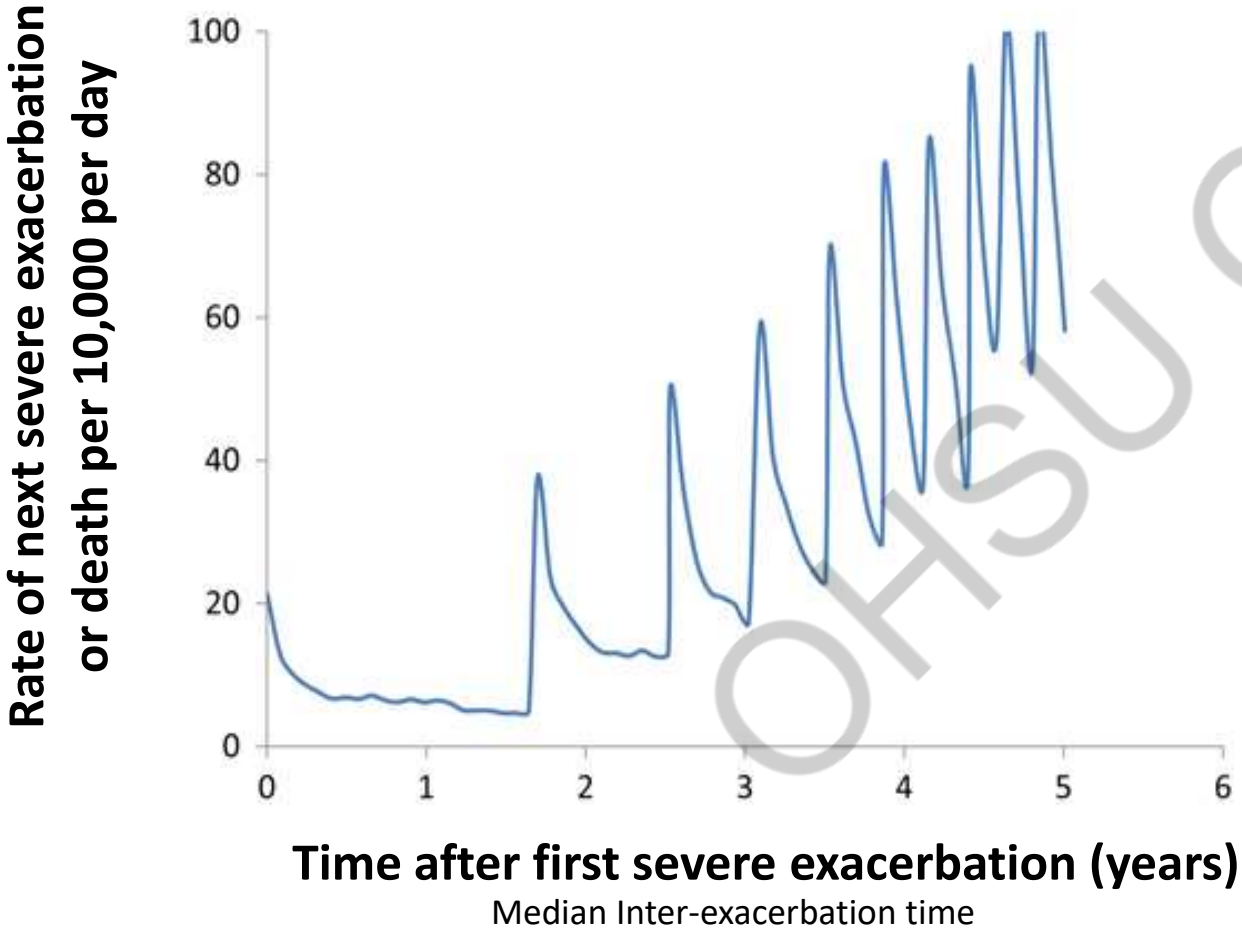
COPD exacerbations drive poor outcomes



More airway inflammation

Faster lung function decline

Poorer quality of life

Lower survival

Majority of COPD healthcare costs

Suissa et al, *Thorax* 2012.
Wedzicha and Seemungal, *Lancet* 2007.

COPD Exacerbation Classification

<u>COPD illness script</u>: How many COPD exacerbations last year?

(*How many times did you need prednisone*?)

Any with hospitalizations?

Severity	Criteria
Mild	Treated with SABDs* only
Moderate	SABDs* + systemic corticosteroids (± antibiotics)
Severe	Requires emergency care or hospitalization

≥2 steroids = E

≥1 admit = E

*SABD = short acting bronchodilators

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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)

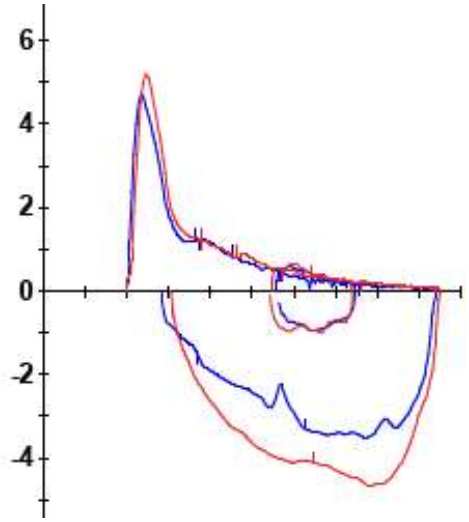
≥10 = more symptoms = B

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



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SPIROMETRY	Post-BD			
	Actual	%Pred	VolChng	%Chng
FVC (L)	3.75	89	0.05	1
FEV1 (L)	1.36	44	0.06	5
FEV1/FVC(%)	36	49		1

Interpretation: Moderate obstruction without significant bronchodilator response.

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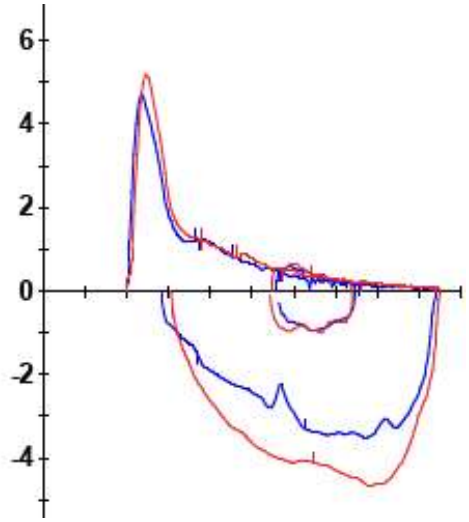

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COPD Treatment Goals

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COPD Treatments

Non-Pharmacologic

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

Preventative

- Smoking cessation
- Exposure avoidance
- Respiratory Vaccinations

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

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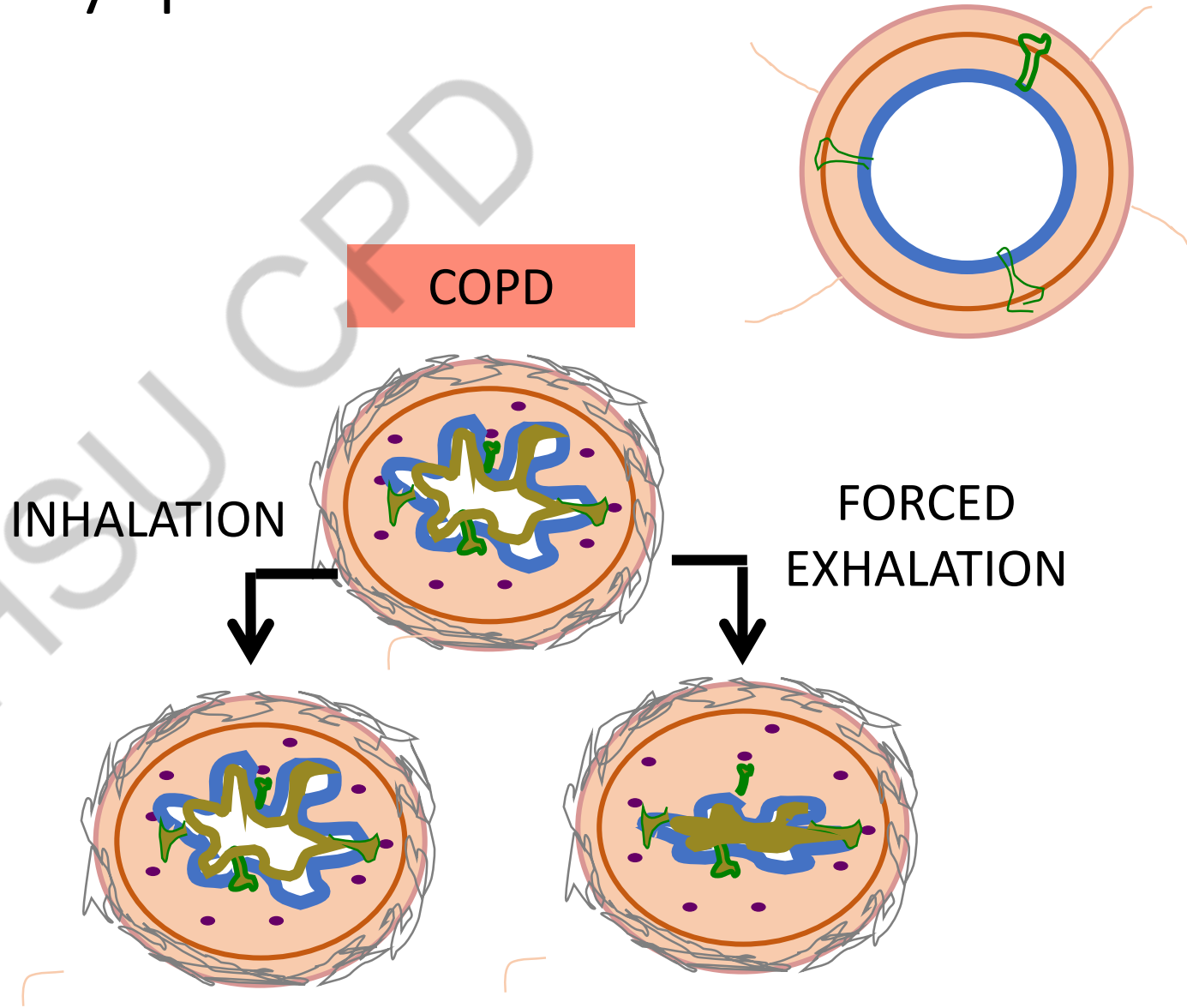
COPD Empathy Exercise

Hyperinflation and dyspnea



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

BMI = body mass index
RV = residual volume

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
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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

DECREASES	INCREASES
Dyspnea	Exercise tolerance
Anxiety Depression	Quality of life
Rehospitalizations	

AACVPR American Association of Cardiovascular and Pulmonary Rehabilitation

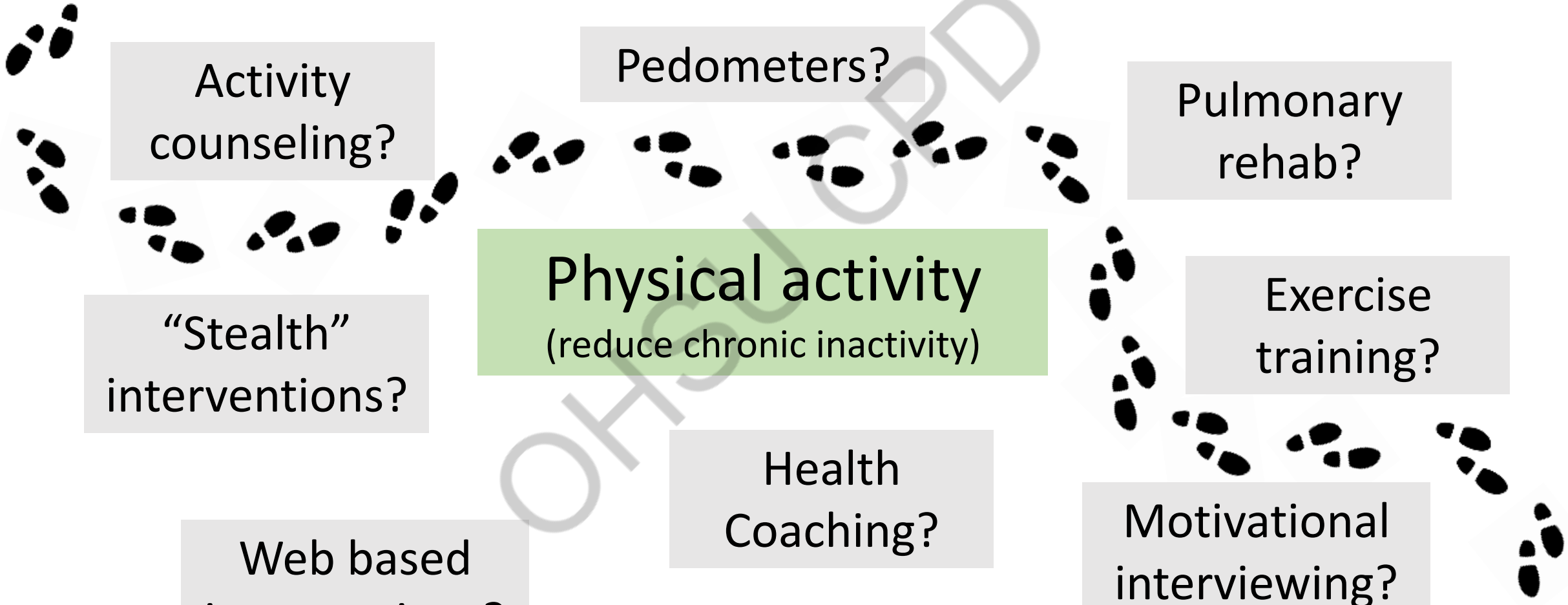
American Lung Association

ATS American Thoracic Society

COPD FOUNDATION

McCarthy et al, *Cochrane Review* 2015.
GOLD 2024.

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



GOLD 2024.

Lahham et al, *Intl J COPD* 2016.
Shu et al, *Nature Scientific Reports*, 2021.

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 <u>REDUCE</u> 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

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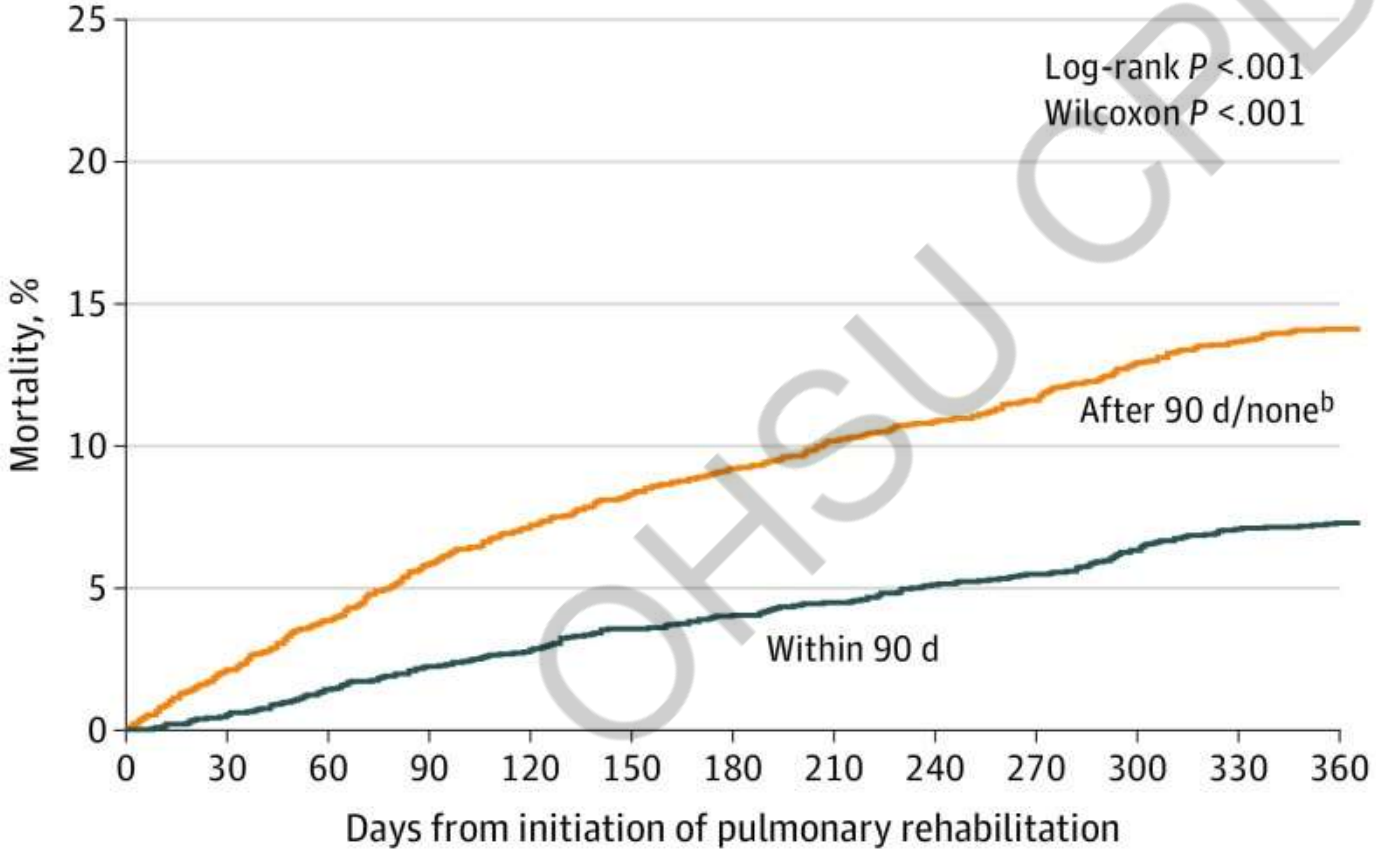
Timely PR after COPD Hospitalization Reduces Mortality



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

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

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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!