COPD

Elena Bissell MD

Department of Family and Community Medicine

OBJECTIVES

- Board Review Questions-get them ALL right

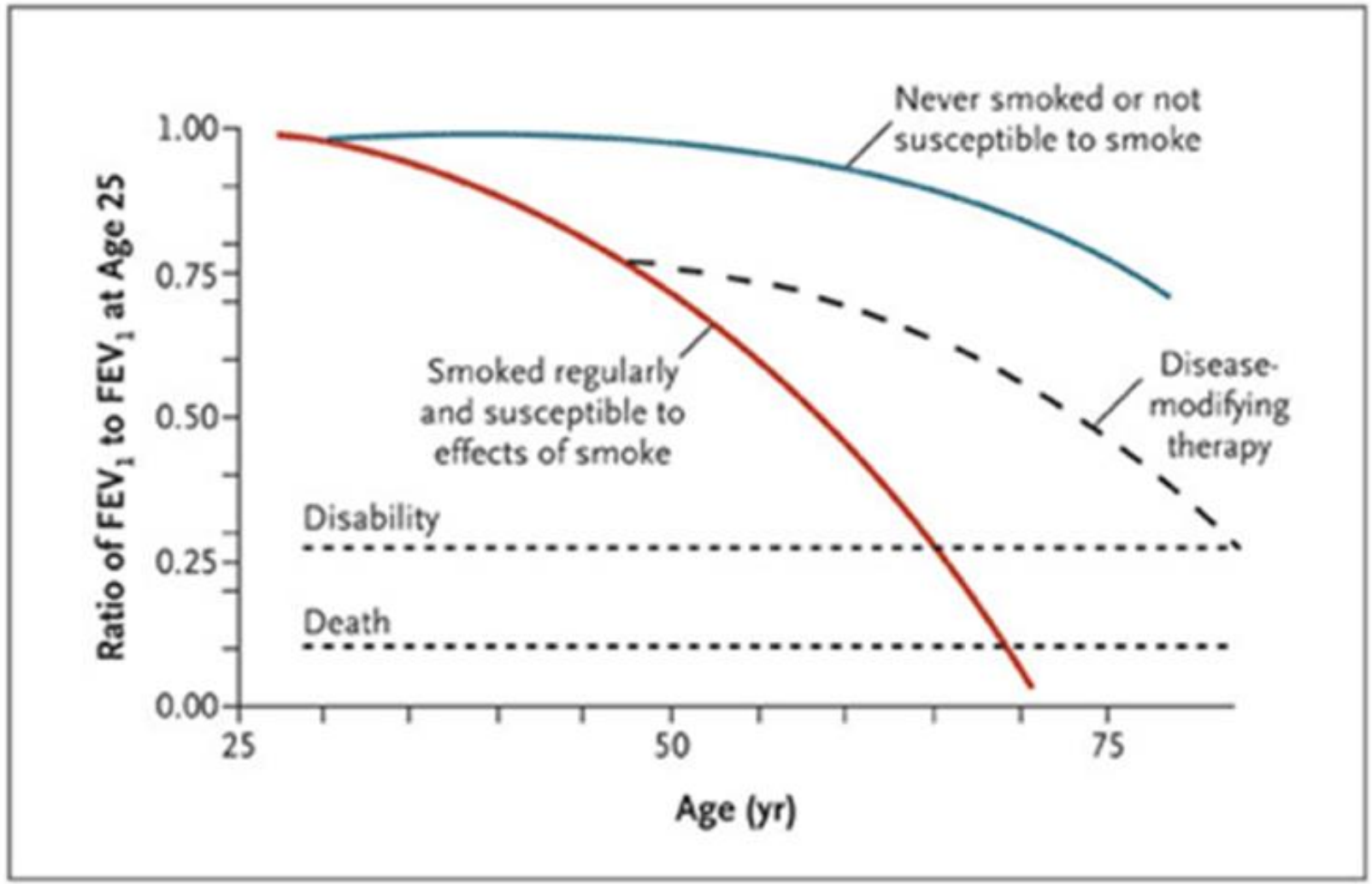
Recognize symptoms/risk factors/findings of COPD

Become familiar with COPD staging and treatment guidelines

- 12.6 million US citizens affected
- Women account for 63% of COPD cases
- ~70% of COPD patients are younger than 65
- Genetic Predisposition
- Exposure to Smoking
- Only 15-25% of smokers develop COPD
- Alpha-1-antitrypsin deficiency is most common genetic disorder associated with COPD
- Airway obstruction
  - Mucus hypersecretion
  - Emphysema (disrupted alveolar attachements)
  - Mucosal and peribronchial fibrosis and inflammation
- Respiratory Bronchiolitis is precursor
  - Alveolar macrophages
  - Proteases
  - Cytokine mediators

- History
  -Smoking, exposure to smoke
  -Other social/occupational/hobby exposures
  -alpha one antitrypsin deficiency

- Symptoms
  - Dyspnea
  - Cough with and without phlegm
  - Fatigue
  - Reduction in Activities of Daily Living
- Dyspnea history
  - Onset of symptoms does not occur until FEV1 is down 50%


Never smoked or not susceptible to smoke
Smoked regularly and susceptible to effects of smoke
Disease-modifying therapy
Disability
Death
Ratio of FEV1 to FEV1 at Age 25
1.00
0.75
0.50
0.25
0.00
25
50
75
Age (yr)

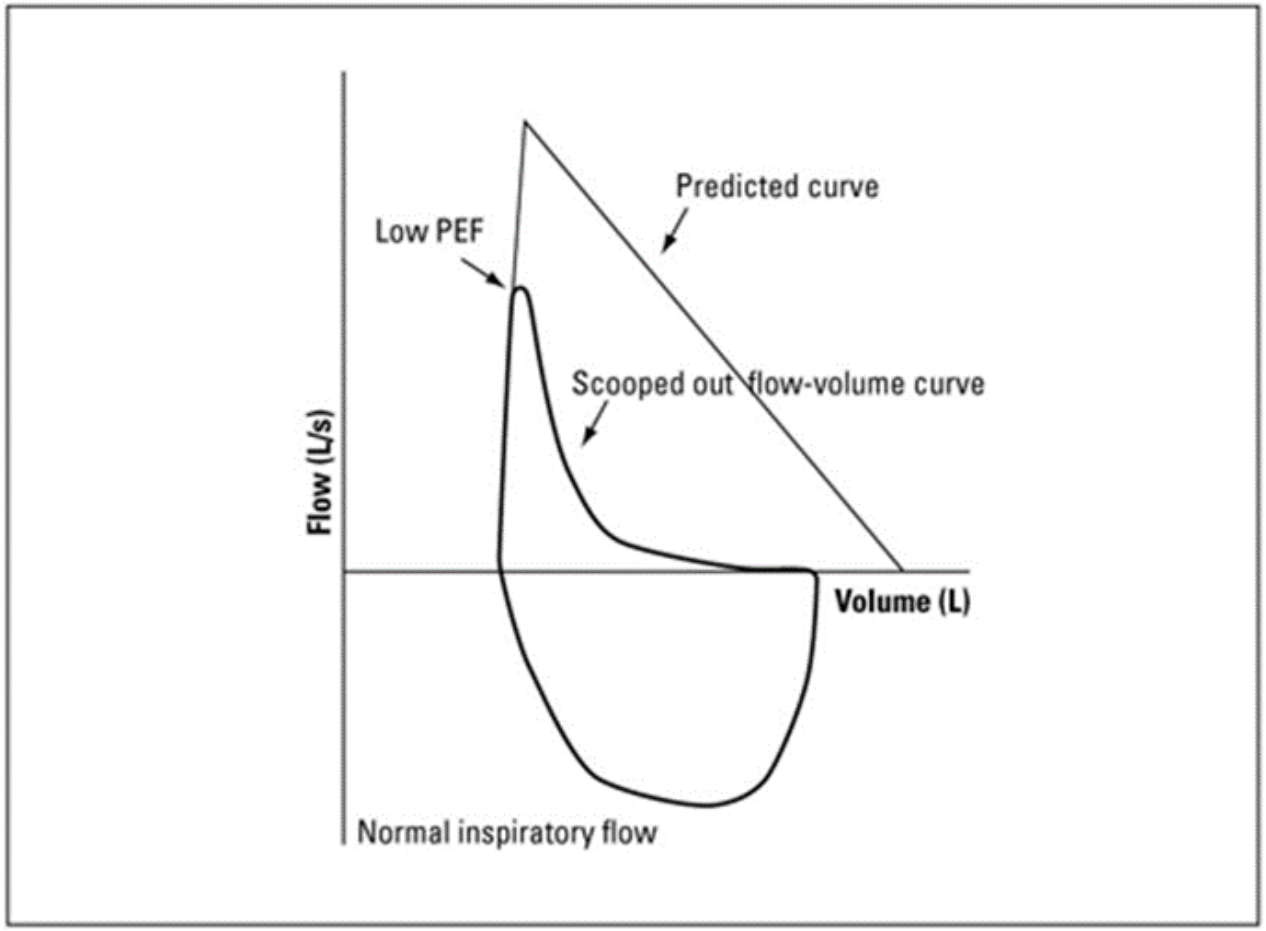


Figure 3. Maximal inspiratory and expiratory flow-volume curve. In emphysema, the loss of supportive tissues means the airways tend to collapse with forced exhalation, giving a characteristic concave appearance in the expiratory portion of the flow-volume curve. This can also be seen in other obstructive disorders such as asthma.

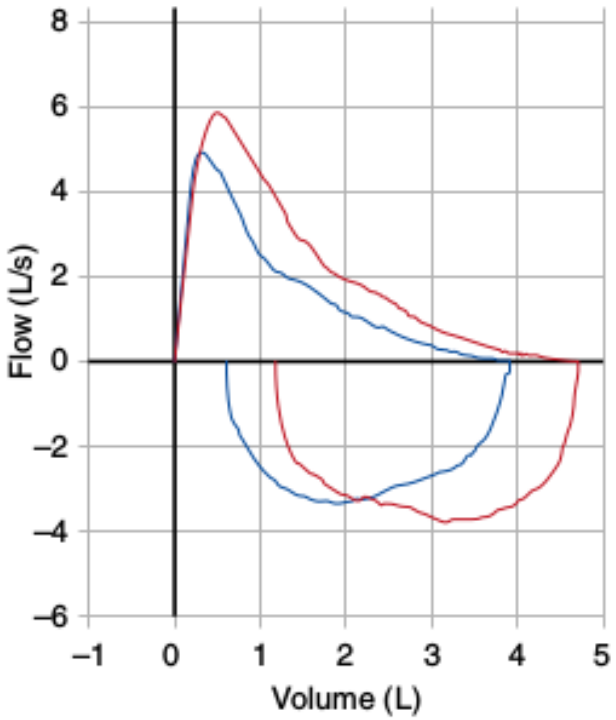
PEF: peak expiratory flow

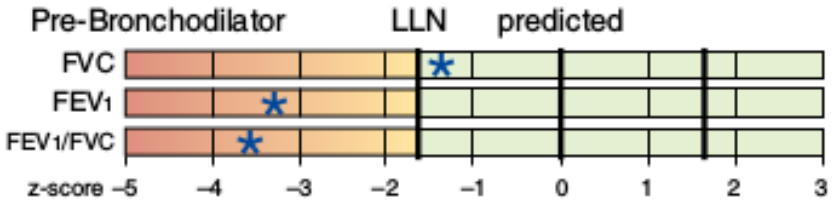
FEV1/FVC ratio <70%
Incomplete or
no response to
bronchodilator

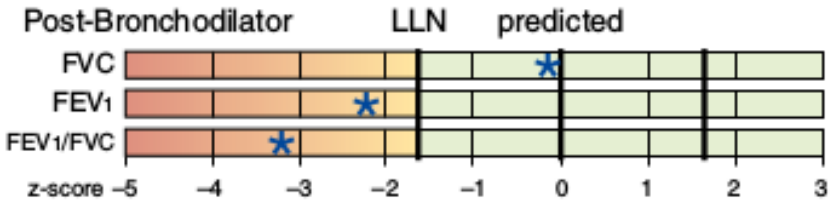
Spirometry:

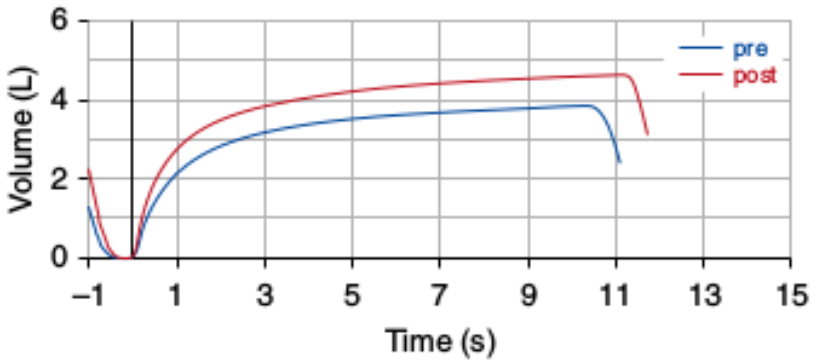
SPIROMETRY

	Pre-Bronchodilator				Post-Bronchodilator				
	Best	LLN	z-score	%Pred	Best	z-score	%Pred	Change	%Chng
FVC (L)	**3.90**	3.70	−1.34	82%	**4.70**	−0.09	99%	600 mL	20%
FEV1 (L)	**2.02**	2.91	−3.78	54%	**2.61**	−2.21	70%	590 mL	29%
FEV1/FVC	**0.52**	0.68	−3.54		**0.55**	−3.35			
FET (s)	**10.3**				**11.2**				
Reference values: GLI 2012 Test quality: Pre: FEV1 - A, FVC - A; Post: FEV1 - A, FVC - B									









Race based?

- Spirometry readings are calculated using age, sex, height and race.

From ONE study (Lancet Respiratory Medicine 2013) a community based prospective study of 38k people-separating South Asian, Southeast Asian, East Asian, African, Middle East and North American/European which states that it did not examine other factors including socioeconomic, environmental or genetic factors.

Spirometric Classification of COPD Severity Based on Post-Bronchodilator FEV1

- **Gold I**: Mild FEV1/FVC < 0.70
  - FEV1 > 80% predicted
- **Gold II**: Moderate FEV1/FVC < 0.70
  - 50% FEV1 < 80% predicted
- **Gold III**: Severe FEV1/FVC < 0.70
  - 30% FEV1 < 50% predicted
- **Gold IV**: Very Severe FEV1/FVC < 0.70
  - FEV1 < 30% predicted or FEV1 < 50% predicted plus chronic respiratory

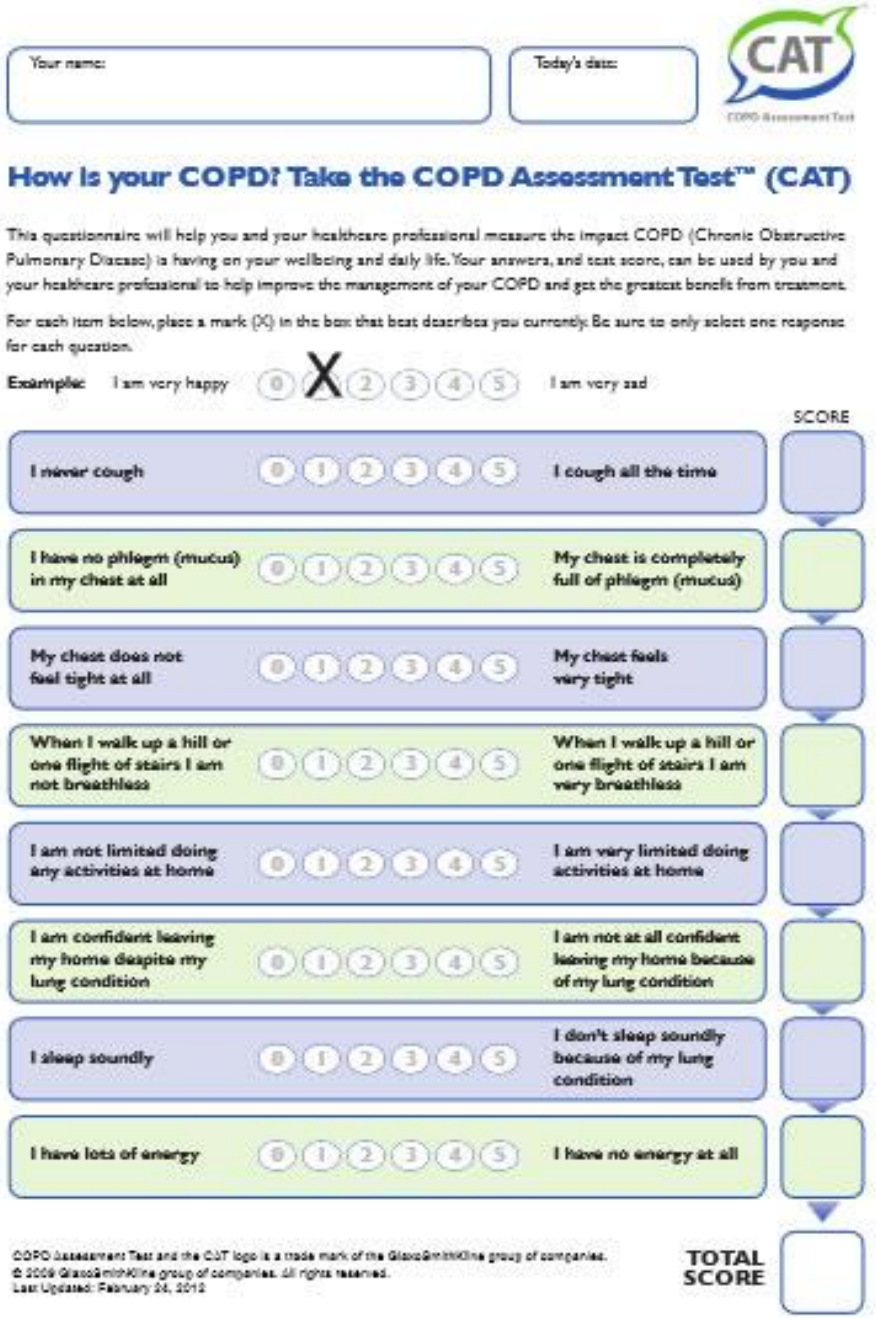
* SMOKING CESSATION AND OXYGEN ARE ONLY INTERVENTIONS THAT DECREASE OVERALL MORTALITY

Modified MRC dyspnea scale

Grade	Symptom
0	I only get breathlessness with strenuous exercise
1	I get short of breath when hurrying on level ground or walking up a slight hill
2	I walk slower than other people of the same age on level ground because of breathlessness or I have to stop for breath when walking on level ground
3	I stop for breath after walking about 100 meters or after a few meters on level ground
4	I am too breathless to leave the house or I am breathless when dressing or undressing

CAT scale

Assessment of exacerbation risk based on symptoms



Your name:

Today's date:

CAT
COPD Assessment Test

How is your COPD? Take the COPD Assessment Test™ (CAT)

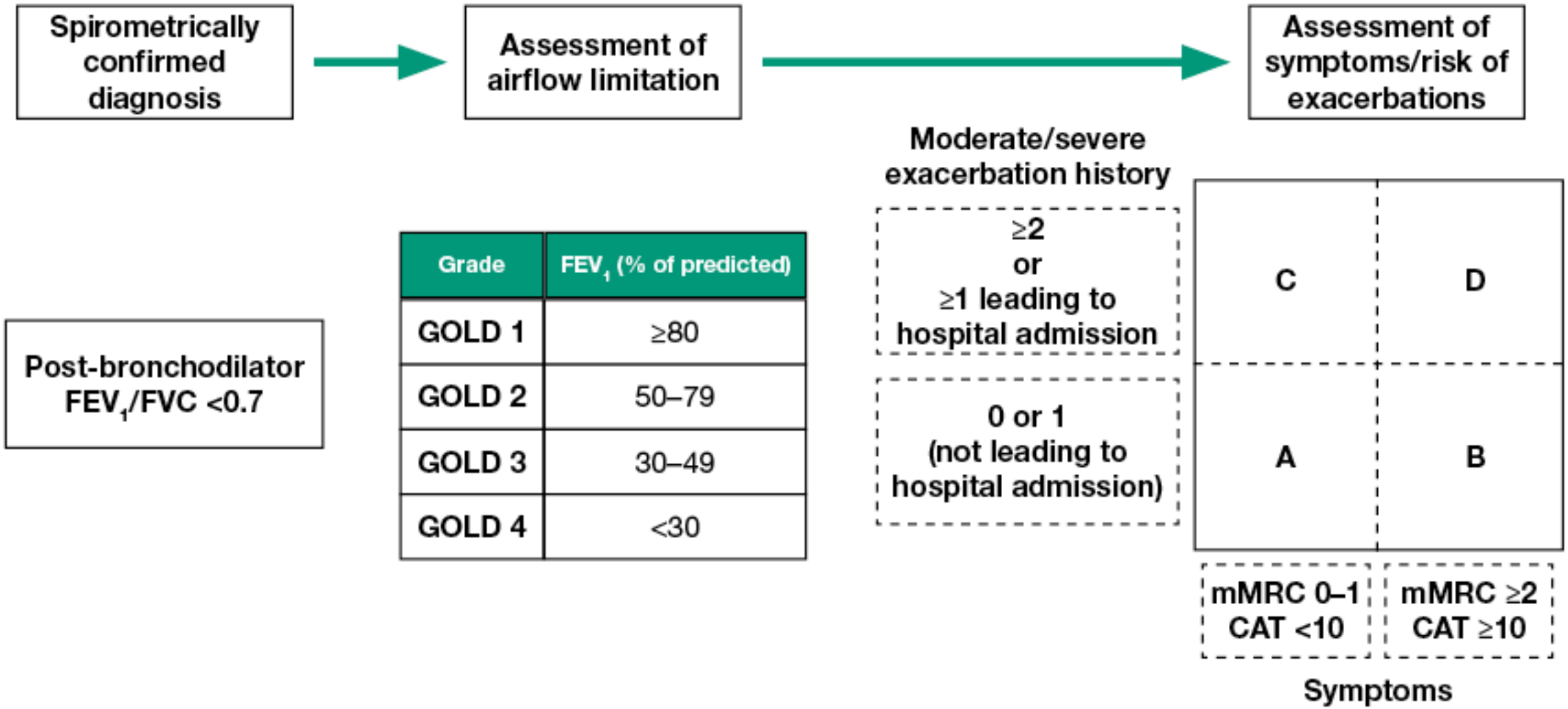
This questionnaire will help you and your healthcare professional measure the impact COPD (Chronic Obstructive Pulmonary Disease) is having on your wellbeing and daily life. Your answers, and test score, can be used by you and your healthcare professional to help improve the management of your COPD and get the greatest benefit from treatment.

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.

Example: I am very happy 0 X 2 3 4 5 I am very sad

		SCORE
I never cough	0 1 2 3 4 5 I cough all the time	
I have no phlegm (mucus) in my chest at all	0 1 2 3 4 5 My chest is completely full of phlegm (mucus)	
My chest does not feel tight at all	0 1 2 3 4 5 My chest feels very tight	
When I walk up a hill or one flight of stairs I am not breathless	0 1 2 3 4 5 When I walk up a hill or one flight of stairs I am very breathless	
I am not limited doing any activities at home	0 1 2 3 4 5 I am very limited doing activities at home	
I am confident leaving my home despite my lung condition	0 1 2 3 4 5 I am not at all confident leaving my home because of my lung condition	
I sleep soundly	0 1 2 3 4 5 I don't sleep soundly because of my lung condition	
I have lots of energy	0 1 2 3 4 5 I have no energy at all	
		TOTAL SCORE

Last Updated: February 24, 2012



FEV_1=forced expiratory volume in the first second; FVC=forced vital capacity; mMRC=modified Medical Research Council dyspnoea questionaire; CAT=COPD assessment test.

Combined Assessment of COPD

Patient	Characteristic	Spirometry	Exacerbations/year	CAT (COPD assessment test)	mMRC (modified British Medical Research Council)
A	Low risk Less symptoms	Gold 1-2 (FEV >50%)	≤1	<10	0-1
B	Low risk More symptoms	Gold 1-2 (FEV>50%)	≤1	≥10	≥2
C	High risk Less symptoms	Gold 3-4 (FEV <50%)	>2	<10	0-1
D	High risk More symptom	Gold 3-4 (FEV<50%)	>2	>10	>2

COPD Severity	First choice
Stage I Mild Mild FEV1/FVC < 0.70 FEV1 80% predicted Less than one exacerbation in past year	Long-acting anticholinergic (e.g., tiotropium [Spiriva]) or Long-acting $beta_2$ agonist (e.g., salmeterol [Serevent Diskus])
Stage II Moderate FEV1/FVC < 0.70 50% > FEV1 < 80% predicted 1-2 exacerbations in past year	Long-acting anticholinergic and Long-acting $beta_2$ agonist
Stage III Severe Severe FEV1/FVC < 0.70 30% > FEV1 < 50% predicted ≥ 2 exacerbations in past year	Inhaled corticosteroid(e.g., fluticasone [Flovent]) and long-acting $beta_2$ agonist and Long-acting anticholinergic
Stage IV Very Severe FEV1/FVC < 0.70 FEV1<30%predicted or FEV1 < 50% predicted plus chronic respiratory ≥ 2 exacerbations in past year	Increase Inhaled corticosteroid and long-acting $beta_2$ agonist Long-acting anticholinergic Can add short acting beta agonist or anticholinergic for symptom relief

Group A:SAMA or SABA→LABA

Group B:LAMA or LABA->LAMA and LABA

Group C: LAMA (found to reduce exacerbations)->LAMA and LABA

Group D: ICS +LABA or ICS +LABA and LAMA

Recommendations per GOLD Guidelines 2021 Evidence A

- Vaccinations-pneumonia, influenza and pertussis
- Tobacco cessation
- Oxygen in severe hypoxemia (88% at rest)
- Regular use of ICS increases risk of PNA especially in severe disease
- Long term use of oral glucocorticoids has numerous side effects DO NOT USE
- Pulmonary Rehab improves dyspnea, health status and exercise tolerance in stable pts

Recommendations per GOLD Guidelines 2021 Evidence A

- Bronchodilators (SAMA and SABA) improve symptoms and FEV1 *
- LABA and LAMAs improved lung function, dyspnea and reduce exacerbations*

  *combo is more effective
- ICS with LABA is more effective than individual components in improving lung fxn and reducing exacerbations
- In Group D patients-PDE4 inhibitor improves lung fxn and decreases exacerbations

MS is a 56 yo female who is on albuterol prn for SOB related to her COPD. She is now complaining of increasing symptoms of dyspnea and is using her inhaler up to 8 xday. She hates it because it makes her heart race. She is not having increased cough or sputum production. You do spirometry on her and compare it to previous- her FEV1 was previously 80% of predicted and is now 60% of predicted.

-What stage of COPD does she have?

-How should you manage her COPD?

a. schedule for lung transplant

b. stop albuterol and add a long acting anticholinergic once a day

c. add inhaled corticosteroid BID

d. oral steroids and antibiotics for exacerbation

-What other recommendations should be given to pt to reduce mortality?

- FEV at 60% with dyspnea and no increased sputum, no exacerbations

Stage II based on FEV1 and group A based on symptoms

B. stop SABA->LAMA or LABA

BB is a 60 yo male with COPD due to alpha 1 antitrypsin deficiency. He is on continuous oxygen at 4L NC. His FEV1 is 13% of predicted. He is on a combination of inhaled corticosteroid and long-acting $beta_2$ agonist. He continues to feel very SOB and requests additional txt for symptom relief. Has had multiple exacerbations this year

-What stage is his COPD

-What can you add for symptom relief?

a. add long acting anticholinergic

b. oral steroids every day

c. morphine for dyspnea

d. change his medications to nebulizations for improved symptom relief

- FEV <30% very symptomatic and multiple exacerbations indicates Stage IV very severe copd, Group D

A. pt is on LABA-ICS->LABA-ICS plus a LAMA ->consider PDE4 inhibitor in addition if cost is not barrier

Symptom relief with SABA

Consider palliative options

DO NOT USE oral steroids if not exacerbation

Which one of the following treatments is recommended in combination with inhaled corticosteroids for patients who have asthma and COPD?

a. Cromolyn
b. Long acting muscarinic antagonists
c. Methylxanthines (theophylline)
d. Oral antihistamines

- B-LAMA according to GOLD guidelines and 2018 Global initiative for asthma guidelines

Spirometry can be used to monitor disease progression in COPD patients. To be reliable, what minimum interval is recommended?

a. 3 months
b. 9 months
c. 12 months
d. 24 months

c. 12 months

A 47 yo male presents with SOB and cough. On PFT his FVC is <80% predicted, his FEV/FVC is 90% predicted and there is no improvement with bronchodilator. The diffusing capacity of lung for carbon monoxide (DCLO) is also low.

Based on these results, which one of the following is most likely to be the cause of this patient's problem?

a. Asthma
b. Bronchiectasis
c. COPD
d. Cystic fibrosis
e. Idiopathic pulmonary fibrosis

- e- idiopathic pulmonary fibrosis!!!

Pt has restrictive pattern with low diffusing capacity. All other choices would be obstructive pattern

Exacerbations

- IV or PO steroids –usually burst but some patients benefit from taper
- Antibiotics? GOLD guidelines recommend 5-7 days of abx if pt has purulent sputum

References

- Lee H, Kim J, Tagmazyan K. **Treatment of stable chronic obstructive pulmonary disease: the GOLD guidelines.** Am Fam Physician. 2013 Nov 15;88(10):655-63, 663B-F.
- GOLD guidelines 2018, 2021
- Global differences in lung function by region (PURE): an international, community-based prospective study. Lancet Journal of Respiratory Med. ARTICLES| VOLUME 1, ISSUE 8, P599-609, OCTOBER 01, 2013