

# COPD

By

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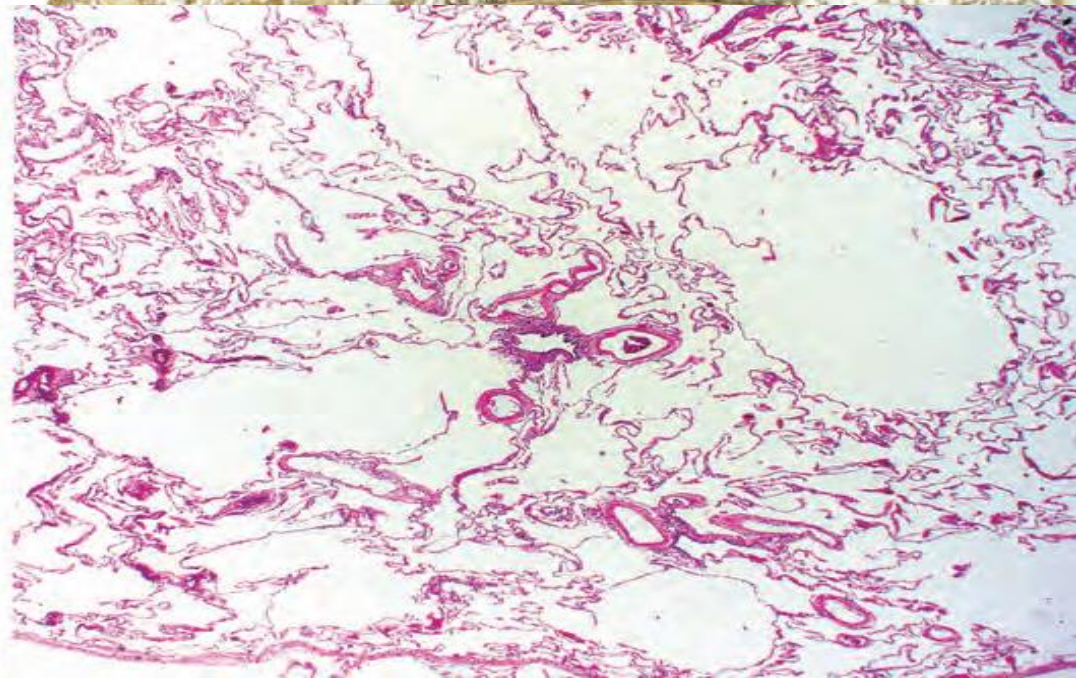
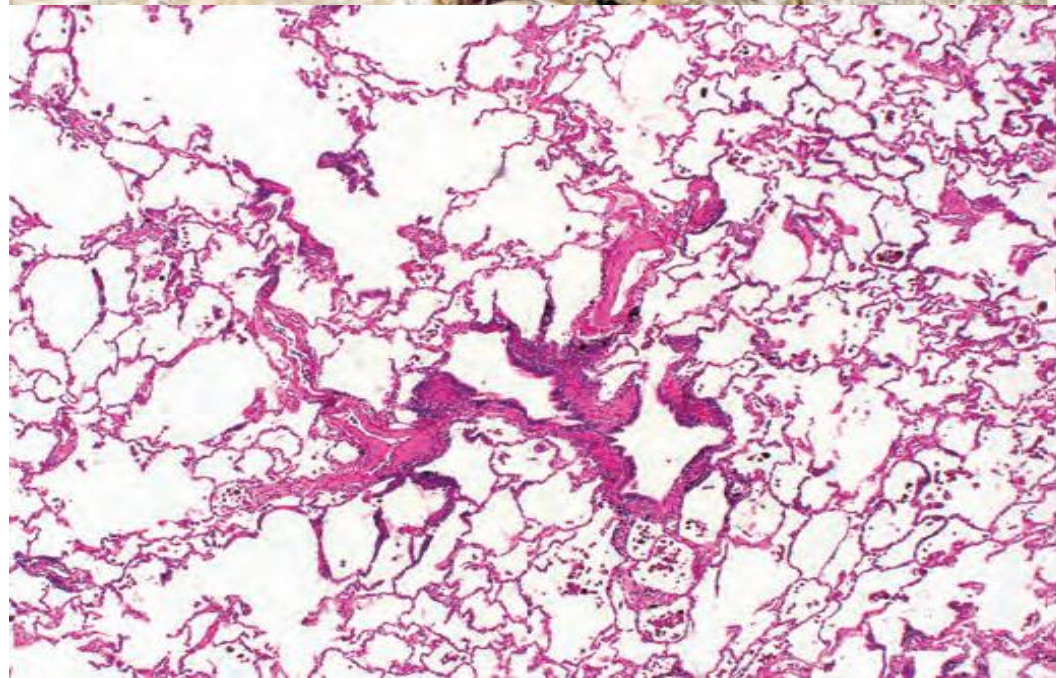
# Content

- Definition and diagnosis
- Assessment and management
- COPD exacerbation



# Definition of COPD

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



## Proposed Taxonomy (Etiotypes) for COPD

Table 1.1

Classification	Description
Genetically determined COPD (COPD-G)	Alpha-1 antitrypsin deficiency (AATD) Other genetic variants with smaller effects acting in combination
COPD due to abnormal lung development (COPD-D)	Early life events, including premature birth and low birthweight, among others
Environmental COPD	
Cigarette smoking COPD (COPD-C)	<ul style="list-style-type: none"> <li>• Exposure to tobacco smoke, including <i>in utero</i> or via passive smoking</li> <li>• Vaping or e-cigarette use</li> <li>• Cannabis</li> </ul>
Biomass and pollution exposure COPD (COPD-P)	Exposure to household pollution, ambient air pollution, wildfire smoke, occupational hazards
COPD due to infections (COPD-I)	Childhood infections, tuberculosis-associated COPD, HIV-associated COPD
COPD & asthma (COPD-A)	Particularly childhood asthma
COPD of unknown cause (COPD-U)	

\*Adapted from Celli et al. (2022) and Stolz et al. (2022)



## Clinical Indicators for Considering a Diagnosis of COPD

Table 2.1

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

Progressive over time  
Worse with exercise  
Persistent

### Recurrent wheeze

### Chronic cough

May be intermittent and may be unproductive

### Recurrent lower respiratory tract infections

### History of risk factors

Tobacco smoke (including popular local preparations)  
Smoke from home cooking and heating fuels  
Occupational dusts, vapors, fumes, gases and other chemicals  
Host factors (e.g., genetic factors, developmental abnormalities, low birthweight, prematurity, childhood respiratory infections etc.)



## Other Causes of Chronic Cough

Table 2.2

### INTRATHORACIC

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

### EXTRATHORACIC

- Chronic Allergic Rhinitis
- Post Nasal Drip Syndrome (PNDS)
- Upper Airway Cough Syndrome (UACS)
- Gastroesophageal Reflux
- Medication (e.g., ACE Inhibitors)



# A. Spirometry - Normal Trace

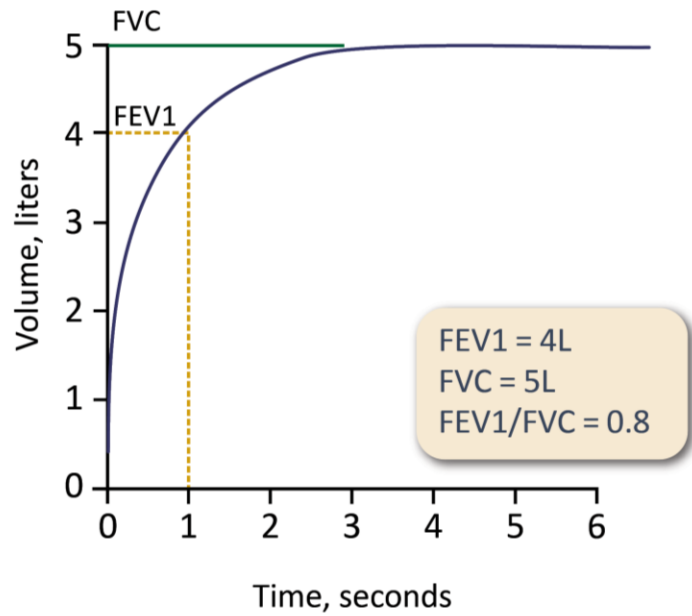
# B. Spirometry - Airflow Obstruction

Figure 2.1

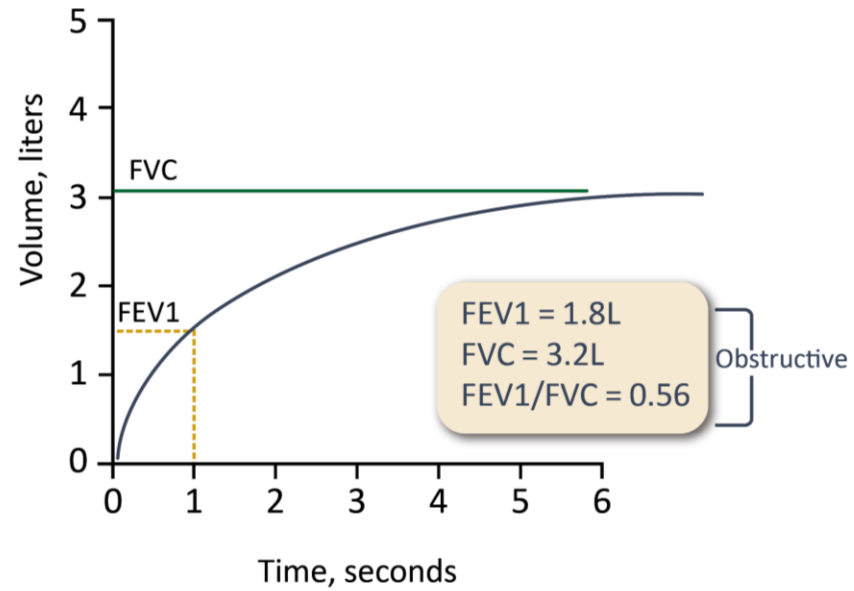
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Teaching  
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A



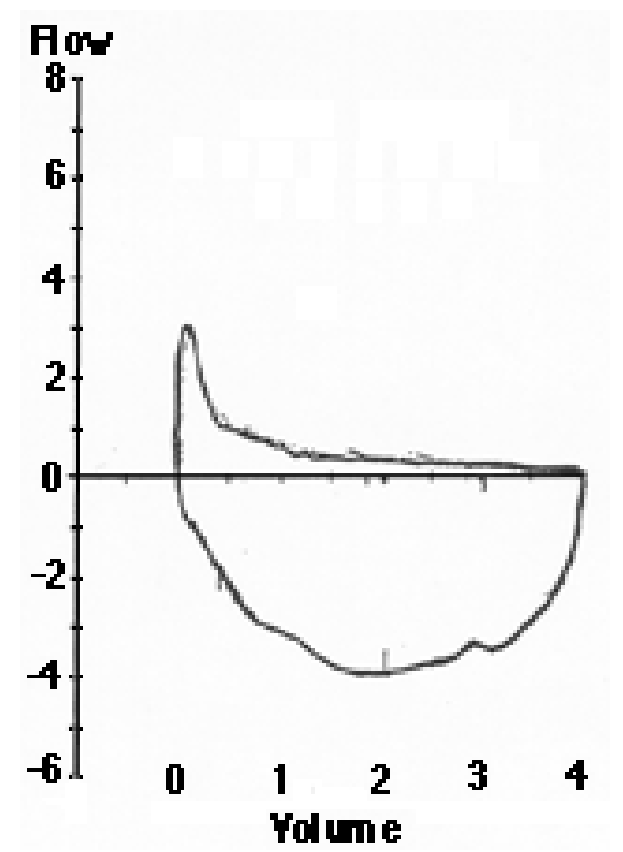
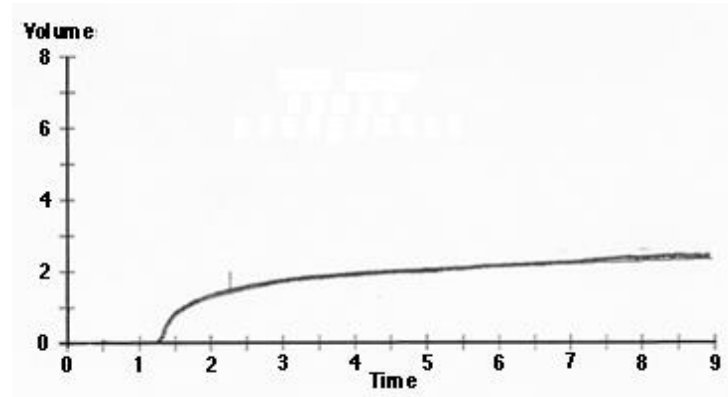
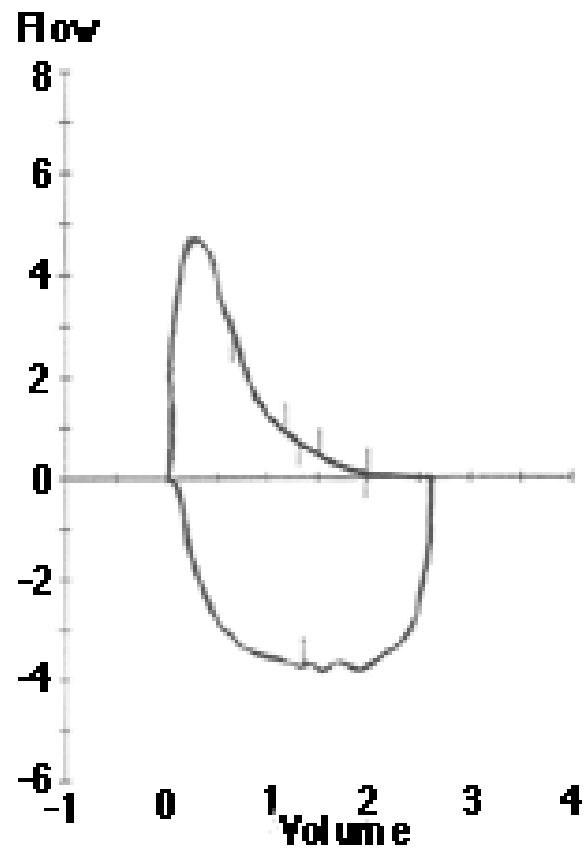
B



FVC = —————  
FEV1 = - - - - -







Airflow obstruction

Mild on left

Severe on right

## Role of Spirometry in COPD

Table 2.5

- **Diagnosis**
- **Assessment of severity of airflow obstruction (for prognosis)**
- **Follow-up assessment**
  - Therapeutic decisions
    - Pharmacological in selected circumstances (e.g., discrepancy between spirometry and level of symptoms)
    - Consider alternative diagnoses when symptoms are disproportionate to degree of airflow obstruction
    - Non-pharmacological (e.g., interventional procedures)
  - Identification of rapid decline





*Figure 1: COPD chest x-ray (AP view): hyperinflated lung, flattened diaphragm, increased intercostal spaces*



*Figure 2: COPD chest x-ray (lateral view): hyperinflated lung, flattened diaphragm, increased antero-posterior diameter (barrel chest) in lateral view*

## Use of CT in Stable COPD

Table 2.8

### Differential Diagnosis

- Frequent exacerbations with excessive cough with sputum production, raising concern for bronchiectasis or atypical infection
- Symptoms out of proportion to disease severity based on lung function testing

### Lung Volume Reduction

- Endobronchial valve therapy may be a therapeutic option for patients if they demonstrate postbronchodilator FEV1 between 15-45% 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



## Common Risk Factors for Development of Lung Cancer

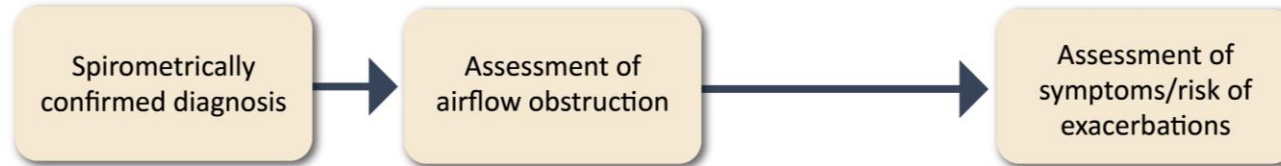
Table 6.1

- Age > 55
- Smoking history > 30 pack years
- Presence of emphysema by CT scan
- Presence of airflow limitation FEV1/FVC < 0.7
- BMI < 25 kg/m<sup>2</sup>
- Family history of lung cancer



**GOLD ABE Assessment Tool**

Figure 2.3



Post-bronchodilator FEV1/FVC < 0.7

GRADE	FEV1 (% predicted)	EXACERBATION HISTORY (PER YEAR)	SYMPTOMS	
<b>GOLD 1</b>	≥ 80	≥ 2 moderate exacerbations or ≥ 1 leading to hospitalization	<b>E</b>	
<b>GOLD 2</b>	50-79	0 or 1 moderate exacerbations (not leading to hospitalization)	<b>A</b>	<b>B</b>
<b>GOLD 3</b>	30-49			
<b>GOLD 4</b>	< 30			

mMRC 0-1    mMRC ≥ 2  
 CAT < 10    CAT ≥ 10



## GOLD Grades and Severity of Airflow Obstruction in COPD (based on post-bronchodilator FEV<sub>1</sub>)

Table 2.6

In COPD patients (FEV<sub>1</sub>/FVC < 0.7):

<b>GOLD 1:</b>	Mild	FEV <sub>1</sub> ≥ 80% predicted
<b>GOLD 2:</b>	Moderate	50% ≤ FEV <sub>1</sub> < 80% predicted
<b>GOLD 3:</b>	Severe	30% ≤ FEV <sub>1</sub> < 50% predicted
<b>GOLD 4:</b>	Very Severe	FEV <sub>1</sub> < 30% predicted





## Modified MRC Dyspnea Scale

Table 2.7

PLEASE TICK IN THE BOX THAT APPLIES TO YOU | ONE BOX ONLY | Grades 0 - 4

mMRC Grade 0	mMRC Grade 1	mMRC Grade 2	mMRC Grade 3	mMRC Grade 4
I only get breathless with strenuous exercise	I get short of breath when hurrying on the level or walking up a slight hill	I walk slower than people of the same age on the level because of breathlessness, or I have to stop for breath when walking on my own pace on the level	I stop for breath after walking about 100 meters or after a few minutes on the level	I am too breathless to leave the house or I am breathless when dressing or undressing
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Reference: ATS (1982) Am Rev Respir Dis. Nov;126(5):952-6.



### CAT™ Assessment

Figure 2.2

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

Reference: Jones et al. ERJ 2009; 34 (3); 648-54.

**TOTAL SCORE:**



## Initial Pharmacological Treatment

Figure 4.2



\*single inhaler therapy may be more convenient and effective than multiple inhalers  
Exacerbations refers to the number of exacerbations per year



## Factors to Consider when Initiating ICS Treatment

Figure 3.1

### Factors to consider when adding ICS to long-acting bronchodilators:

(note the scenario is different when considering ICS withdrawal)

#### STRONGLY FAVORS USE

History of hospitalization(s) for exacerbations of COPD<sup>#</sup>  
 $\geq 2$  moderate exacerbations of COPD per year<sup>#</sup>  
 Blood eosinophils  $\geq 300$  cells/ $\mu$ L  
 History of, or concomitant asthma

#### FAVORS USE

1 moderate exacerbation of COPD per year<sup>#</sup>  
 Blood eosinophils 100 to  $< 300$  cells/ $\mu$ L

#### AGAINST USE

Repeated pneumonia events  
 Blood eosinophils  $< 100$  cells/ $\mu$ L  
 History of mycobacterial infection

<sup>#</sup>despite appropriate long-acting bronchodilator maintenance therapy (see Table 3.4 and Figure 4.3 for recommendations);

\*note that blood eosinophils should be seen as a continuum; quoted values represent approximate cut-points; eosinophil counts are likely to fluctuate.

Adapted from & reproduced with permission of the © ERS 2019: *European Respiratory Journal* 52 (6) 1801219; DOI: 10.1183/13993003.01219-2018 Published 13 December 2018



# Nonpharmacological treatment(stable COPD)

- **Smoking cessation**
- **Education , self management and pulmonary rehabilitation**
- **Vaccinations**
- **Nutrition**
- **End of life and palliative care**
- **Treatment of hypoxia**
- **Treatment of hypercapnia**
- **Intervention bronchoscopy and surgery**



## Goals for Treatment of Stable COPD

Table 4.1

- Relieve Symptoms
- Improve Exercise Tolerance
- Improve Health Status

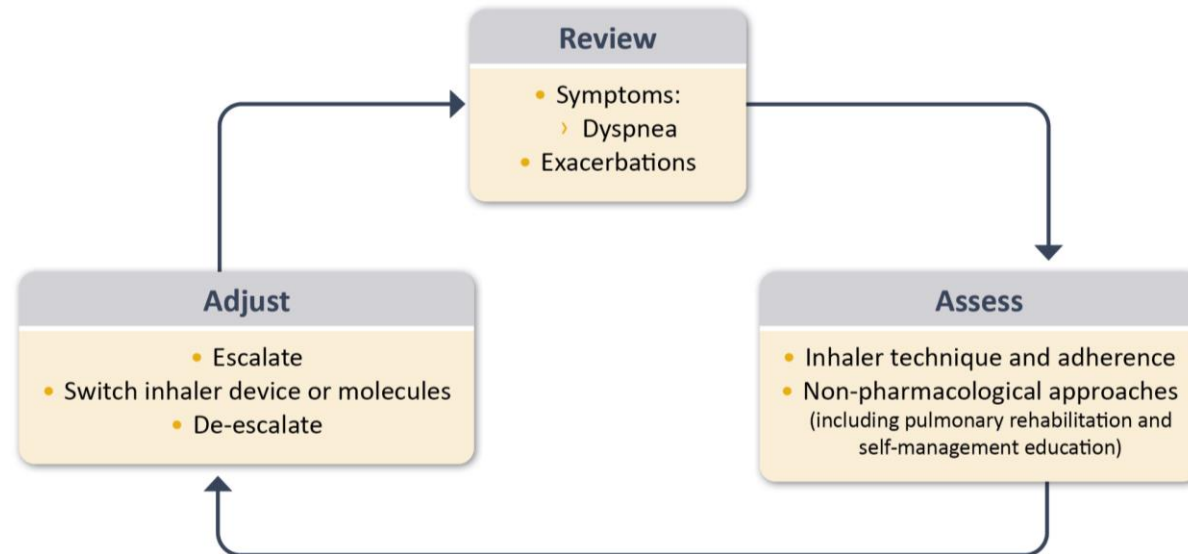
**REDUCE SYMPTOMS****AND**

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

**REDUCE RISK**

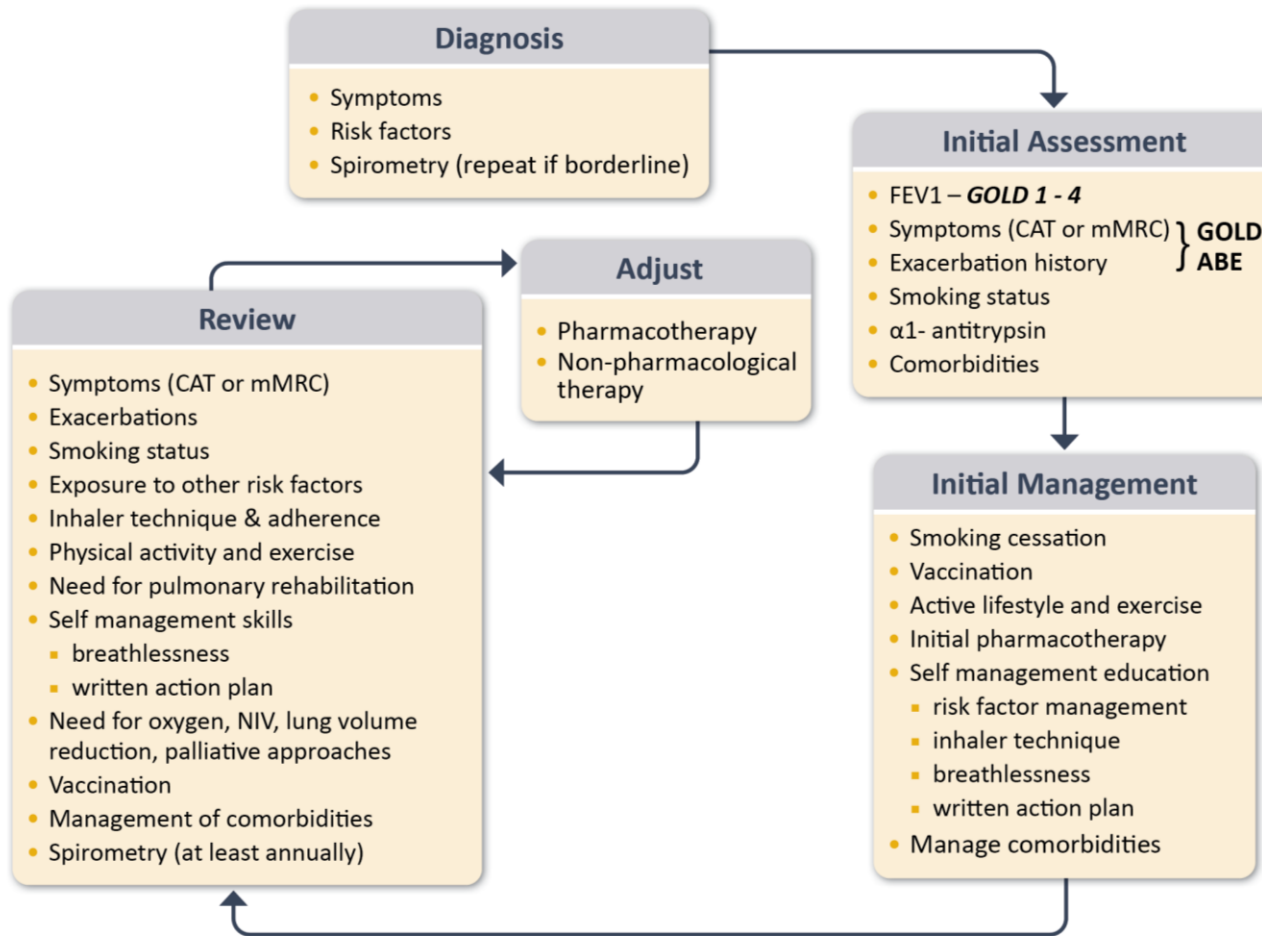
## Management Cycle

Figure 4.3



## Management of COPD

Figure 4.1





# COPD Exacerbation

An event characterized by dyspnea and/or cough and sputum that worsen **over ≤14 days**, which may be accompanied by **tachypnea** and/or tachycardia and is often associated with increased local and systemic **inflammation** caused by airway infection, pollution, or other insult to the airway.

## Diagnosis and Assessment

Table 5.2

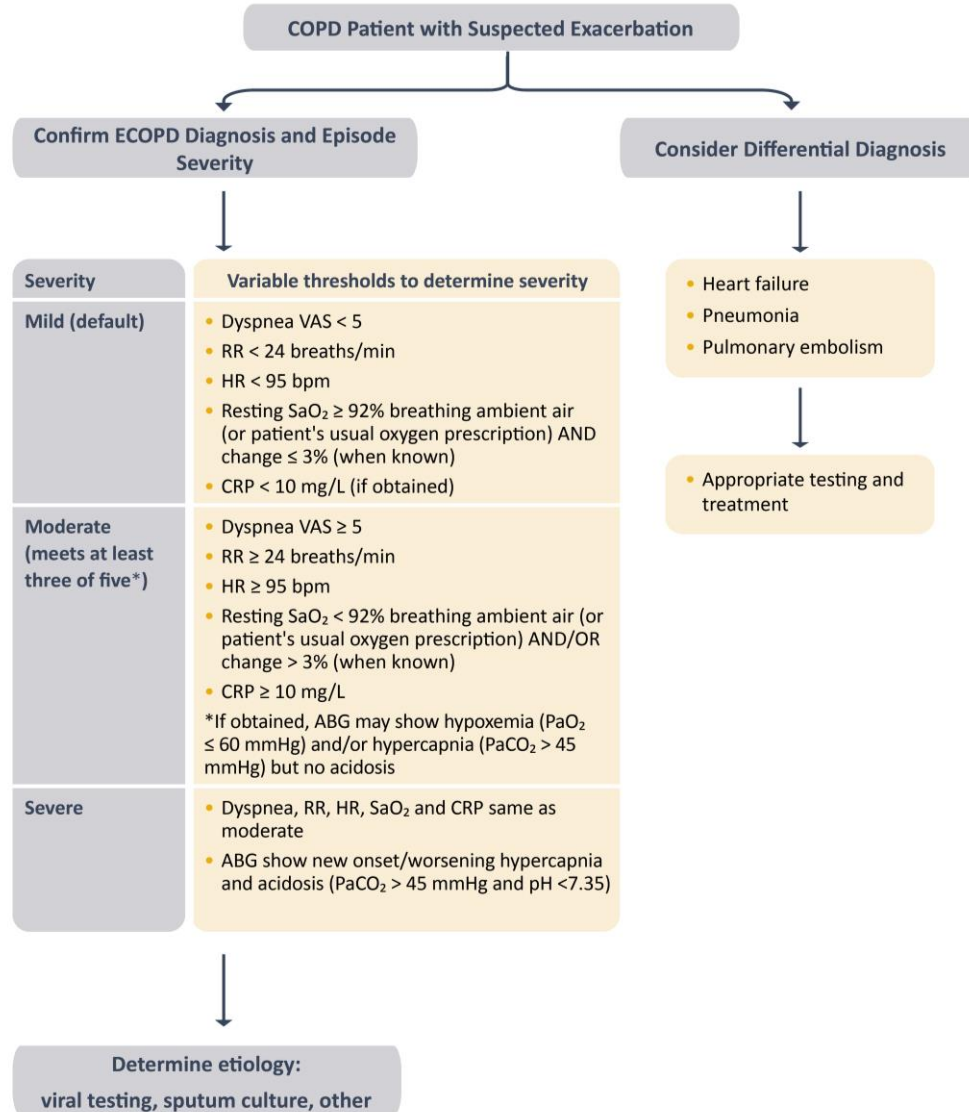
1.	Complete a thorough clinical assessment for evidence of COPD and potential respiratory and nonrespiratory concomitant diseases, including consideration of alternative causes for the patient's symptoms and signs: primarily pneumonia, heart failure, and pulmonary embolism.
2.	<b>Assess:</b> <ol style="list-style-type: none"><li>Symptoms, severity of dyspnea that can be determined by using a VAS, and documentation of the presence of cough.</li><li>Signs (tachypnea, tachycardia), sputum volume and color, and respiratory distress (accessory muscle use).</li></ol>
3.	Evaluate severity by using appropriate additional investigations such as pulse oximetry, laboratory assessment, CRP, arterial blood gases.
4.	Establish the cause of the event (viral, bacterial, environmental, other).

Definition of abbreviations: COPD = chronic obstructive pulmonary disease; CRP = C-reactive protein; VAS = visual analog scale.



# Classification of the Severity of COPD Exacerbations

Figure 5.1



Adapted from: The ROME Proposal, Celli et al. (2021) Am J Respir Crit Care Med. 204(11): 1251-8. Abbreviations: VAS visual analog dyspnea scale; RR respiratory rate; HR heart rate; SaO<sub>2</sub> oxygen saturation; CRP C-reactive protein; ABG arterial blood gases; PaO<sub>2</sub> Arterial pressure of oxygen.



## Potential Indications for Hospitalization Assessment\*

Table 5.3

- 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



Thank you