

# COPD



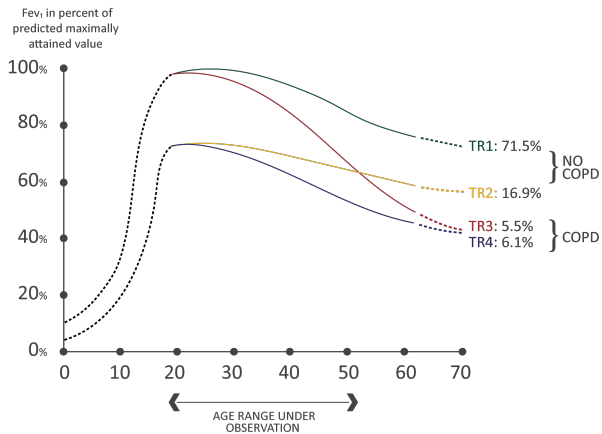
**DR. ASEEL ZGHAYER**

## COPD Definition

Chronic Obstructive Pulmonary Disease (COPD) is a common, preventable and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation or obstruction that is not fully reversible.



## FEV1 progression over time



- TR1: Normal
- TR2: Small lungs but no COPD
- TR3: Normal initial FEV<sub>1</sub> with rapid decline leading to COPD
- TR4: Small lungs leading to COPD

FIGURE 1.2

- COPD is now one of the top three causes of death worldwide.
- The most common respiratory symptoms include dyspnea, cough and/or sputum production. These symptoms may be under reported by patients.
- The main risk factor for COPD is tobacco smoking but other environmental exposures such as biomass fuel exposure and air pollution may contribute.
- Other host factors : genetic abnormalities, abnormal lung development and accelerated aging.

## Diagnosis and Initial Assessment

- The possibility of COPD should be considered and spirometry should be performed in patients 40 years of age or older with progressive dyspnea, chronic cough, or chronic sputum production, particularly in the presence of known risk factors for the disease, especially smoking.
- Spirometry is required to make the diagnosis; the presence of a post-bronchodilator  $FEV_1/FVC < 0.70$  confirms the presence of persistent airflow limitation.

## ▶ PATHWAYS TO THE DIAGNOSIS OF COPD

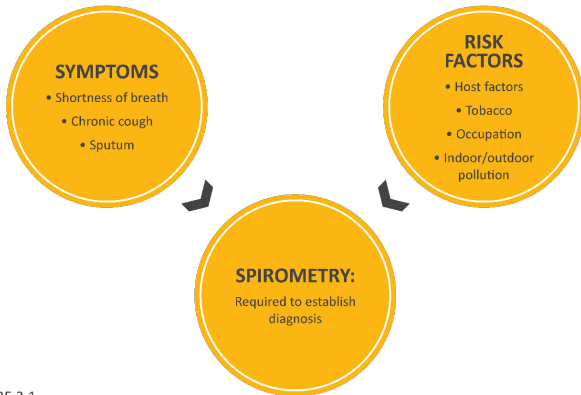


FIGURE 2.1

## KEY INDICATORS FOR CONSIDERING A DIAGNOSIS OF COPD

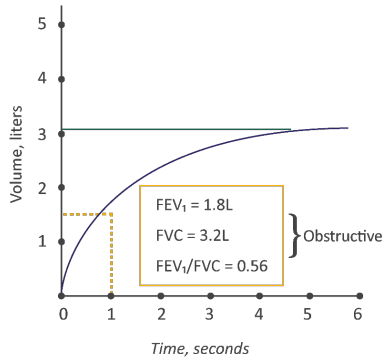
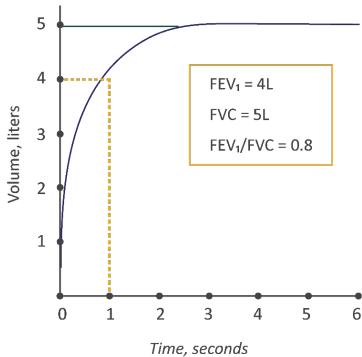
*Consider COPD, and perform spirometry, if any of these indicators are present in an individual over age 40. These indicators are not diagnostic themselves, but the presence of multiple key indicators increases the probability of a diagnosis of COPD. Spirometry is required to establish a diagnosis of COPD.*

<b>Dyspnea that is:</b>	Progressive over time. Characteristically worse with exercise. Persistent.
<b>Chronic Cough:</b>	May be intermittent and may be unproductive. Recurrent wheeze.
<b>Chronic Sputum Production:</b>	Any pattern of chronic sputum production may indicate COPD.
<b>Recurrent Lower Respiratory Tract Infections</b>	
<b>History of Risk Factors:</b>	Host factors (such as genetic factors, congenital/developmental abnormalities etc.). Tobacco smoke (including popular local preparations). Smoke from home cooking and heating fuels. Occupational dusts, vapors, fumes, gases and other chemicals.
<b>Family History of COPD and/or Childhood Factors:</b>	For example low birthweight, childhood respiratory infections etc.

TABLE 2.1

▶ SPIROMETRY - NORMAL TRACE

▶ SPIROMETRY - OBSTRUCTIVE DISEASE



FVC = ———

FEV<sub>1</sub> = - - - - -

FIGURE 2.2A

FIGURE 2.2B

The initial assessment focuses on disease severity, which is determined using a combination of :

- Symptoms

- Degree of airflow obstruction on spirometry

- History of acute exacerbations, and presence of comorbid condition.

# COPD Assessment Test (CATTM)

## CAT™ ASSESSMENT

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

Reference: Jones et al. ERJ 2009; 34 (3); 648-54.  
FIGURE 2.3

TOTAL SCORE:



# Modified MRC dyspnea scale

## MODIFIED MRC DYSPNEA SCALE<sup>a</sup>

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

<b>mMRC Grade 0.</b>	I only get breathless with strenuous exercise.	<input type="checkbox"/>
<b>mMRC Grade 1.</b>	I get short of breath when hurrying on the level or walking up a slight hill.	<input type="checkbox"/>
<b>mMRC Grade 2.</b>	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.	<input type="checkbox"/>
<b>mMRC Grade 3.</b>	I stop for breath after walking about 100 meters or after a few minutes on the level.	<input type="checkbox"/>
<b>mMRC Grade 4.</b>	I am too breathless to leave the house or I am breathless when dressing or undressing.	<input type="checkbox"/>

<sup>a</sup> Fletcher CM. BMJ 1960; 2: 1662.

TABLE 2.5

## CLASSIFICATION OF AIRFLOW LIMITATION SEVERITY IN COPD (BASED ON POST-BRONCHODILATOR FEV<sub>1</sub>)

In patients with FEV<sub>1</sub>/FVC < 0.70:

<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

TABLE 2.4

# ABCD assessment tool

## THE REFINED ABCD ASSESSMENT TOOL

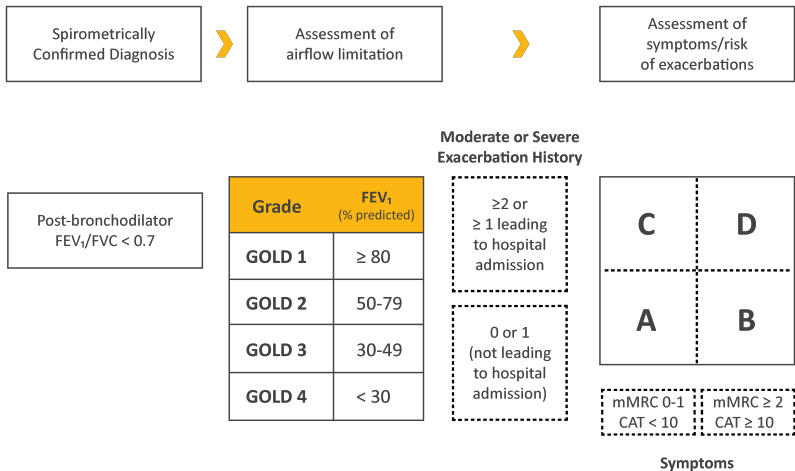


FIGURE 2.4

# Management of Stable COPD

## ▶ GOALS FOR TREATMENT OF STABLE COPD

- Relieve Symptoms
- Improve Exercise Tolerance
- Improve Health Status



**REDUCE SYMPTOMS**

*and*

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



**REDUCE RISK**

TABLE 4.1

## INITIAL PHARMACOLOGICAL TREATMENT

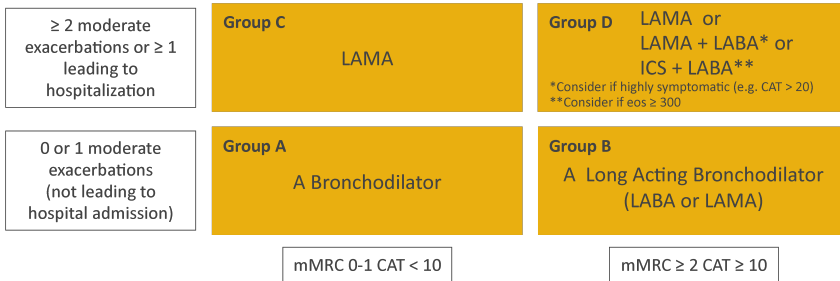


FIGURE 4.1

## COMMONLY USED MAINTENANCE MEDICATIONS IN COPD\*

### DELIVERY OPTIONS

Generic Drug Name	Inhaler Type	Nebulizer	Oral	Injection	Duration Of Action
<b>BETA<sub>2</sub>-AGONISTS</b>					
<b>SHORT-ACTING (SABA)</b>					
Fenoterol	MDI	√	pill, syrup		4-6 hours
Levalbuterol	MDI	√			6-8 hours
Salbutamol (albuterol)	MDI & DPI	√	pill, syrup, extended release tablet	√	4-6 hours 12 hours (ext. release)
Terbutaline	DPI		pill	√	4-6 hours
<b>LONG-ACTING (LABA)</b>					
Arformoterol		√			12 hours
Formoterol	DPI	√			12 hours
Indacaterol	DPI				24 hours
Olodaterol	SMI				24 hours
Salmeterol	MDI & DPI				12 hours
<b>ANTICHOLINERGICS</b>					
<b>SHORT-ACTING (SAMA)</b>					
Ipratropium bromide	MDI	√			6-8 hours
Oxipropium bromide	MDI				7-9 hours
<b>LONG-ACTING (LAMA)</b>					
Acclidinium bromide	DPI, MDI				12 hours
Glycopyrronium bromide	DPI		solution	√	12-24 hours
Tiotropium	DPI, SMI				24 hours
Umeclidinium	DPI				24 hours

# Non-Pharmacological Treatment

▶ Smoking cessation is essential in the management of COPD, as it can slow the decline of FEV1

▶ Education and self-management

▶ Physical activity

▶ Pulmonary rehabilitation programs

▶ Exercise training

▶ Self-management education

▶ End of life and palliative care

▶ Nutritional support

▶ Vaccination, all COPD patients should have annual influenza immunization and the pneumococcal vaccine

▶ Oxygen therapy

## Oxygen Therapy

- The use of supplemental oxygen has been shown to improve quality of life and decrease mortality in patients with COPD and resting hypoxemia with an arterial  $P_{O_2}$  of 55 mm Hg or less, or oxygen saturation as measured by pulse oximetry of 88% or less.
- Patients with cor pulmonale, heart failure, or erythrocytosis should be offered the use of supplemental oxygen if the  $P_{O_2}$  is 59 mm Hg or less or the oxygen saturation is 89% or less



# **ACUTE EXACERBATION**

## Definition

- An acute exacerbation of COPD is a change in a patient's typical symptoms that leads to a change in medical therapy or requires hospitalization.
- Most commonly, exacerbations are manifested by an increase in the severity or frequency of cough, worsening dyspnea, and an increase in the amount or change in the character of sputum produced.
- Most exacerbations are triggered by a respiratory infection (either viral or bacterial), smoking, and environmental exposures.

# Medical history

- Time course of the symptoms
- Comparison to baseline level of symptoms
- Severity of respiratory compromise (eg, dyspnea at rest, dyspnea climbing stairs)
- Delineation of sputum characteristics (eg, amount, purulence, blood)

# Physical exam

- wheezing
- tachypnea
- May include features of respiratory compromise such as :  
difficulty speaking due to respiratory effort, use of accessory  
respiratory muscles, and paradoxical  
chest wall/abdominal movements
- Decreased mental status could reflect hypercapnia or hypoxemia  
and asterixis could indicate increased hypercapnia.

# Evaluation

- Pulse oxygen saturation
- Chest XR to exclude pneumonia, pneumothorax, pulmonary edema, pleural effusion
- Laboratory studies ( complete blood count and differential, serum electrolytes and glucose)
- Electrocardiogram
- ABG , can determine the presence of hypercapnia or hypoxemia

## Goals and Therapeutic Management

The management goals during an acute exacerbation are to :

- Relieve acute symptoms

AND

- Prevent future exacerbations.

## Therapeutic Management

### OXYGEN THERAPY

Supplemental oxygen should be used to maintain oxygen saturation between 89% and 92%.

- Venturi masks are the preferred
- Nasal cannula
- When a higher  $FiO_2$  is needed, simple facemasks can provide an  $FiO_2$  up to 55% using flow rates of 6 to 10 L per minute
- Noninvasive mechanical ventilation may be required if oxygenation or ventilation cannot be maintained

## Therapeutic Management

### Mechanical intubation:

- If they cannot tolerate noninvasive mechanical ventilation
- Have an altered mental status
- Have worsening hypercapnic or hypoxemic respiratory failure despite the use of noninvasive mechanical ventilation
- Profound acidemia



## Therapeutic Management

- Short-acting B<sub>2</sub>-agonists with or without anticholinergic agents should be used to relieve acute symptoms.
- The use of glucocorticoids during acute exacerbations has been shown to decrease the frequency of treatment failures, length of stay, and the time to subsequent exacerbations while improving FEV<sub>1</sub> and hypoxemia.
- Antibiotics should be prescribed in cases of moderate or severe exacerbations or for patients with mild exacerbations who have noted an increase or change in sputum production.
- The most common infectious triggers are viruses, but bacterial causes include *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Moraxella catarrhalis*, and *Mycoplasma pneumoniae*.

THANK YOU.