COPD

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.

FEV_1 progression over time

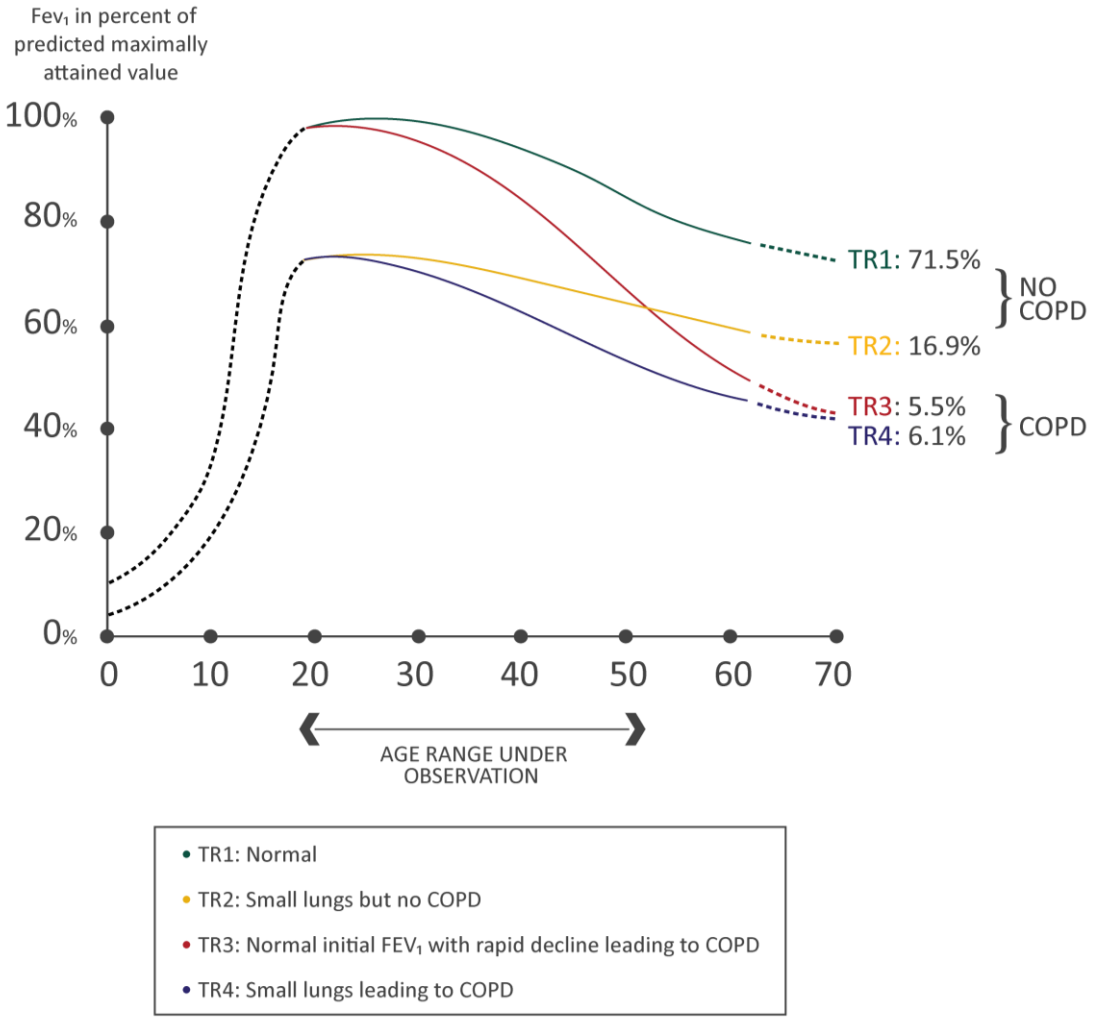


FIGURE 1.2

- 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 FEV1/FVC < 0.70 confirms the presence of persistent airflow limitation.

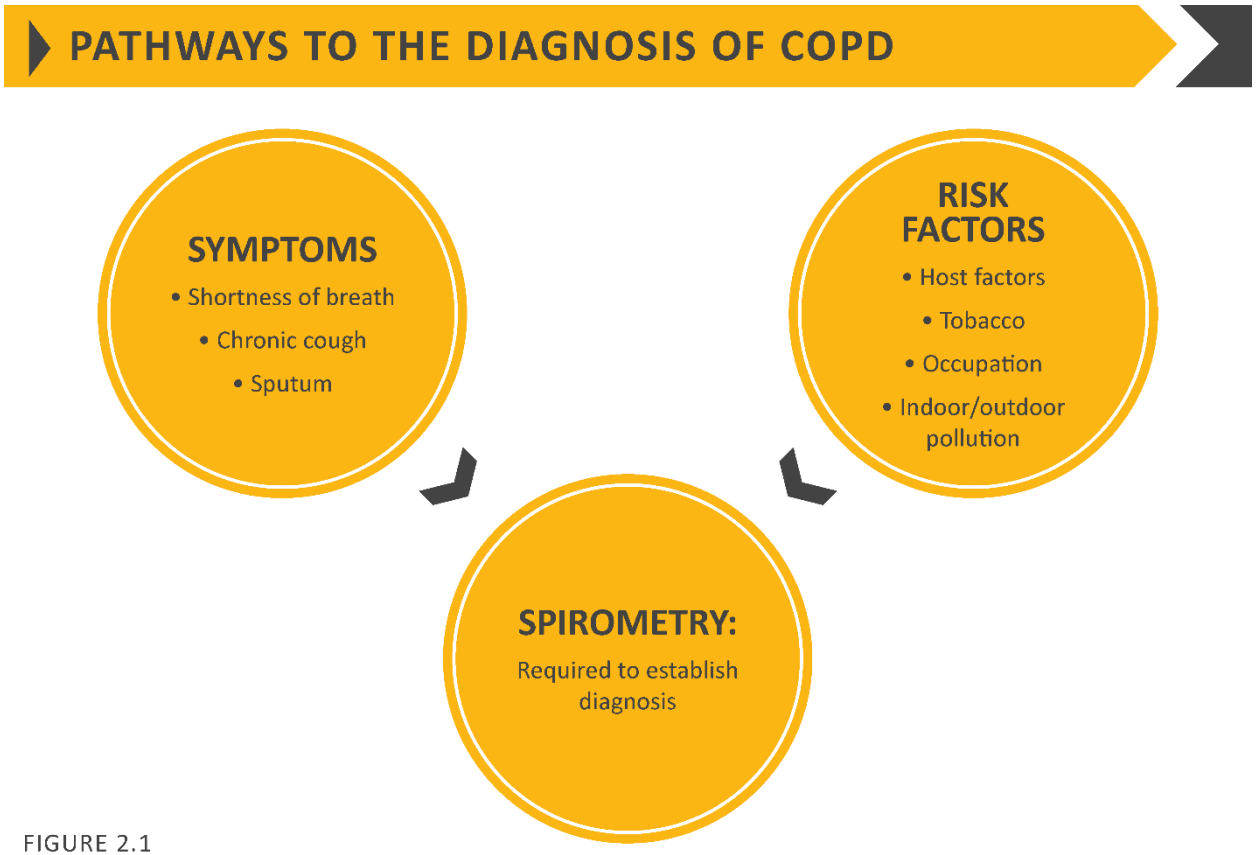

PATHWAYS TO THE DIAGNOSIS OF COPD
SYMPTOMS
• Shortness of breath
• Chronic cough
• Sputum
RISK FACTORS
• Host factors
• Tobacco
• Occupation
• Indoor/outdoor pollution
SPIROMETRY:
Required to establish diagnosis

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.

Dyspnea that is:	Progressive over time. Characteristically worse with exercise. Persistent.
Chronic Cough:	May be intermittent and may be unproductive. Recurrent wheeze.
Chronic Sputum Production:	Any pattern of chronic sputum production may indicate COPD.
Recurrent Lower Respiratory Tract Infections	
History of Risk Factors:	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.
Family History of COPD and/or Childhood Factors:	For example low birthweight, childhood respiratory infections etc.

TABLE 2.1

Proposed Taxonomy (Etiotypes) for COPD

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)	• Exposure to tobacco smoke, including *in utero* or via passive smoking • Vaping or e-cigarette use • Cannabis
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)

SPIROMETRY - NORMAL TRACE

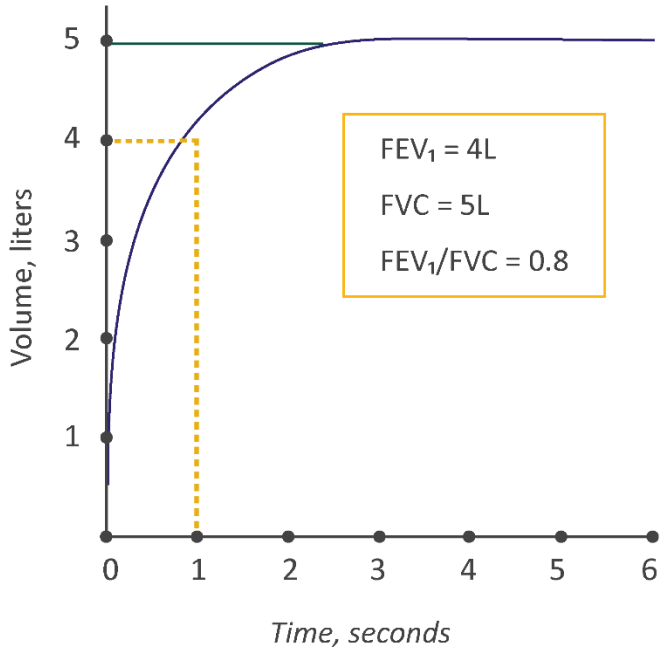


FIGURE 2.2A

SPIROMETRY - OBSTRUCTIVE DISEASE

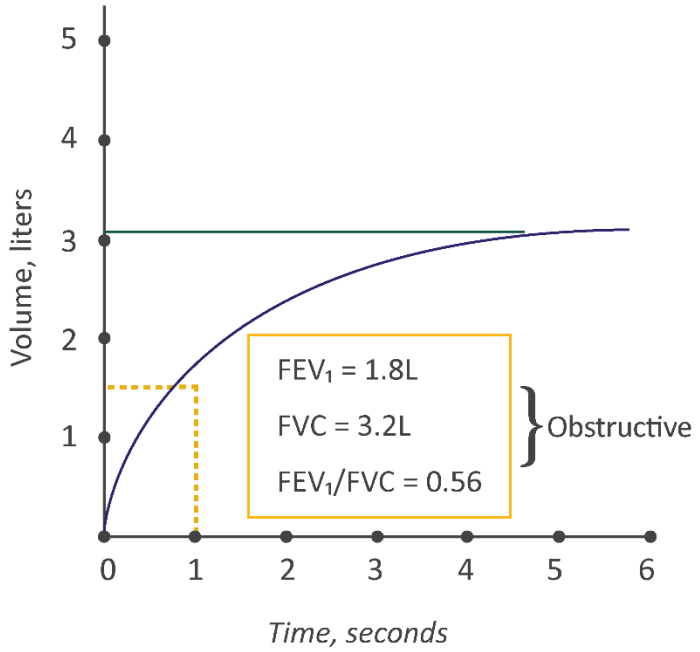


FIGURE 2.2B

FVC =

FEV_1 =

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 (CAT™)

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	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: ◯

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

FIGURE 2.3

Modified MRC dyspnea scale

MODIFIED MRC DYSPNEA SCALE[a]

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

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

[a] Fletcher CM. BMJ 1960; 2: 1662.

TABLE 2.5

CLASSIFICATION OF AIRFLOW LIMITATION SEVERITY IN COPD (BASED ON POST-BRONCHODILATOR FEV_1)

In patients with FEV1/FVC < 0.70:

GOLD 1:	Mild	$FEV_1 \geq 80\%$ predicted
GOLD 2:	Moderate	$50\% \leq FEV_1 < 80\%$ predicted
GOLD 3:	Severe	$30\% \leq FEV_1 < 50\%$ predicted
GOLD 4:	Very Severe	$FEV_1 < 30\%$ predicted

TABLE 2.4

ABCD assessment tool

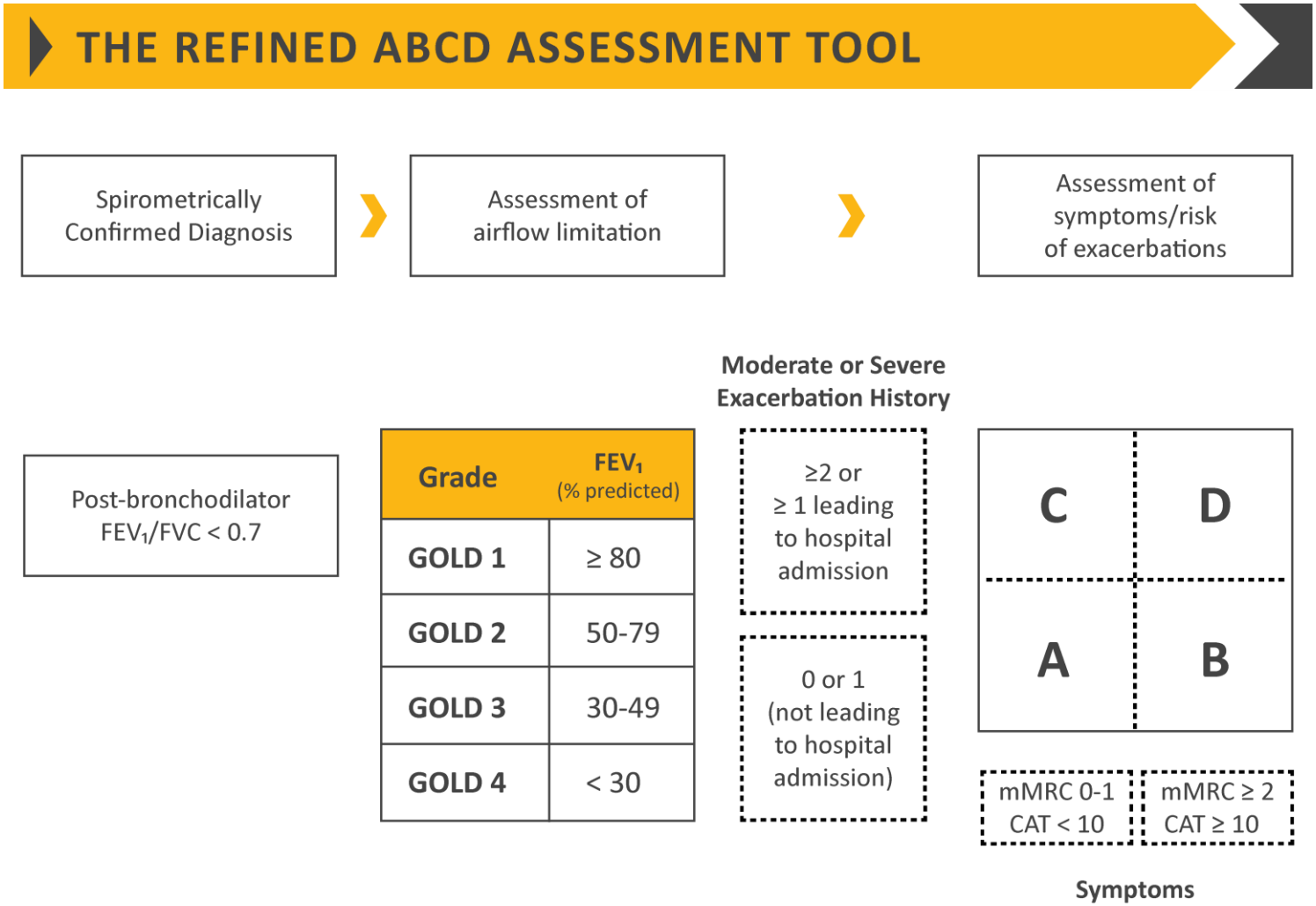


FIGURE 2.4

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

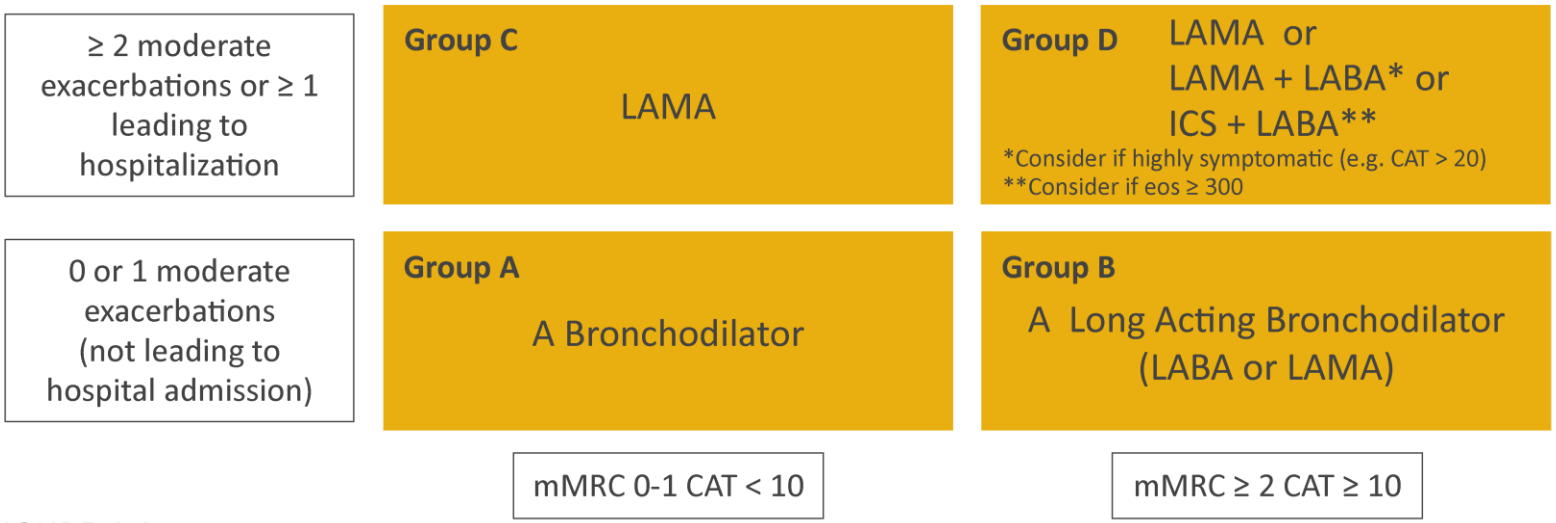
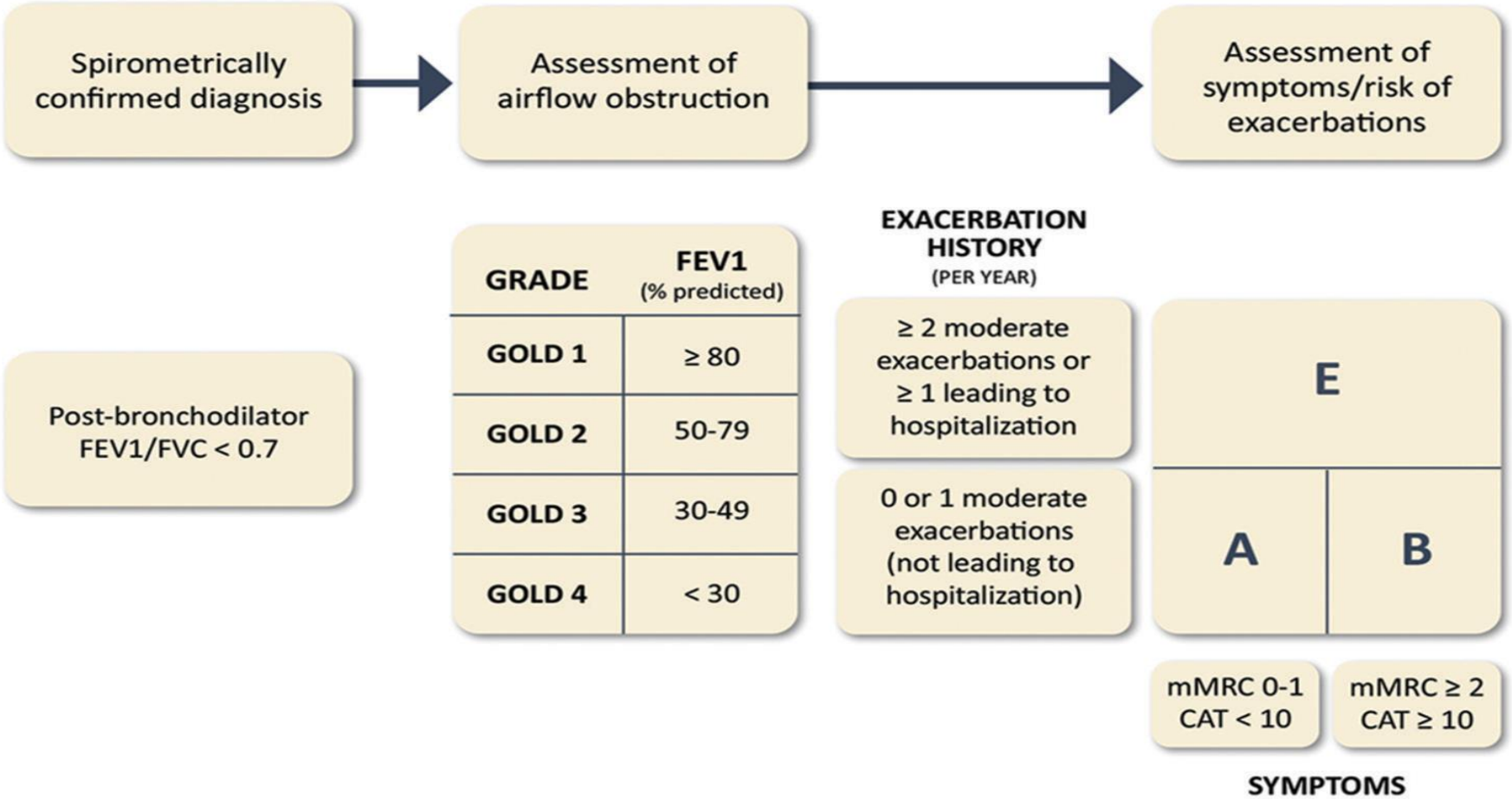


FIGURE 4.1

GOLD ABE Assessment Tool



COMMONLY USED MAINTENANCE MEDICATIONS IN COPD*

		DELIVERY OPTIONS			
Generic Drug Name	**Inhaler Type**	***Nebulizer***	***Oral***	***Injection***	**Duration Of Action**
BETA$_2$-AGONISTS					
SHORT-ACTING (SABA)					
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
LONG-ACTING (LABA)					
Arformoterol		√			12 hours
Formoterol	DPI	√			12 hours
Indacaterol	DPI				24 hours
Olodaterol	SMI				24 hours
Salmeterol	MDI & DPI				12 hours
ANTICHOLINERGICS					
SHORT-ACTING (SAMA)					
Ipratropium bromide	MDI	√			6-8 hours
Oxitropium bromide	MDI				7-9 hours
LONG-ACTING (LAMA)					
Aclidinium 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 Po2 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 Po2 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 FiO2 is needed, simple facemasks can provide an FiO2 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 B2-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 FEV1 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.