

# COPD

## LAST CLINICAL GUIDELINES DIAGNOSIS AND MANAGEMENT

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## What is COPD??????

- ▶ **Chronic Obstructive Pulmonary Disease (COPD):**
- ▶ is a common, preventable and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases.



## What causes COPD???????????

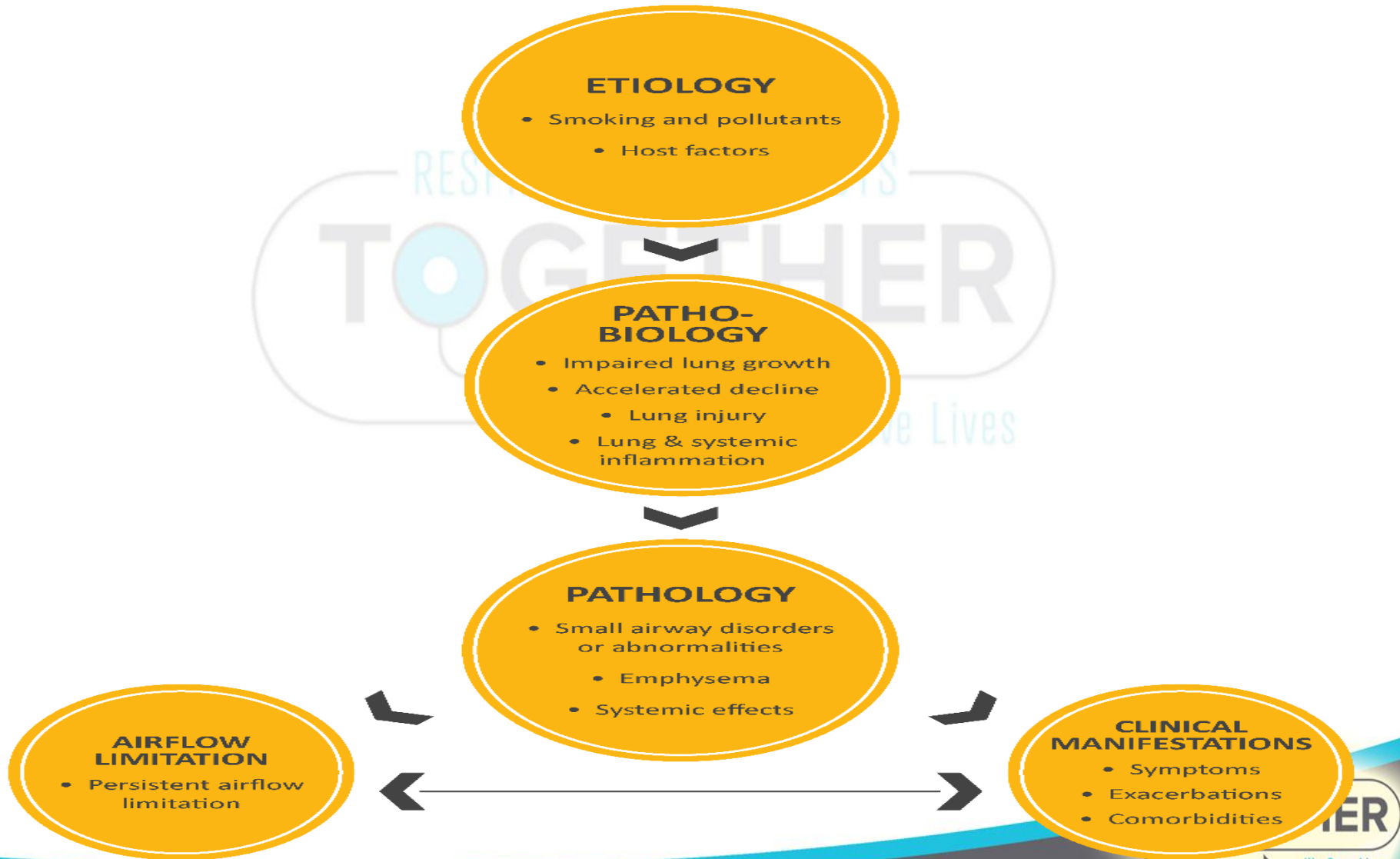
Worldwide, the most commonly encountered risk factors for COPD are:

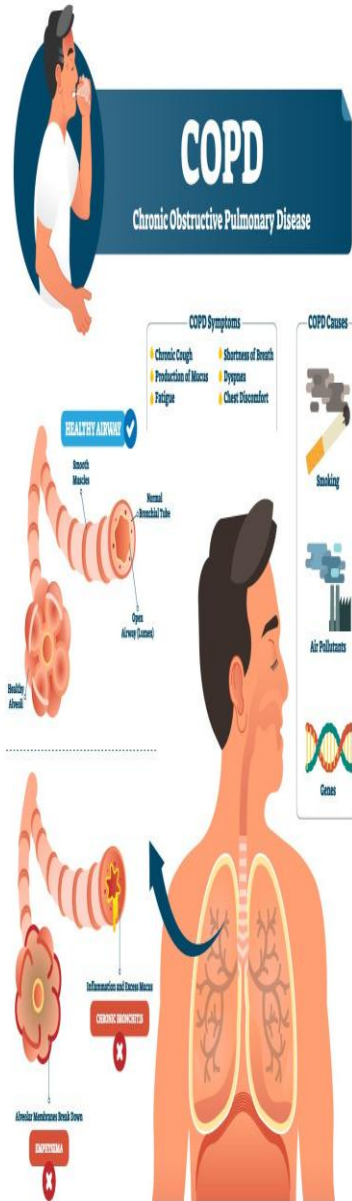
- ❖ Indoor air pollution.
- ❖ Outdoor air pollution.
- ❖ Occupational exposures.
- ❖ Genetic factors.
- ❖ Age and sex.
- ❖ Lung growth and development.
- ❖ Socioeconomic status.
- ❖ Asthma and airway hyper-reactivity.
- ❖ Chronic bronchitis.
- ❖ Infections.





## Etiology, pathobiology & pathology of COPD leading to airflow limitation & clinical manifestations





## 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.

## PATHWAYS TO THE DIAGNOSIS OF COPD

### Symptoms



### SYMPTOMS

- Shortness of breath
- Chronic cough
- Sputum

### RISK FACTORS

- Host factors
- Tobacco
- Occupation
- Indoor/outdoor pollution

### SPIROMETRY:

Required to establish diagnosis

FIGURE 2.1

## Diagnosis and Initial Assessment

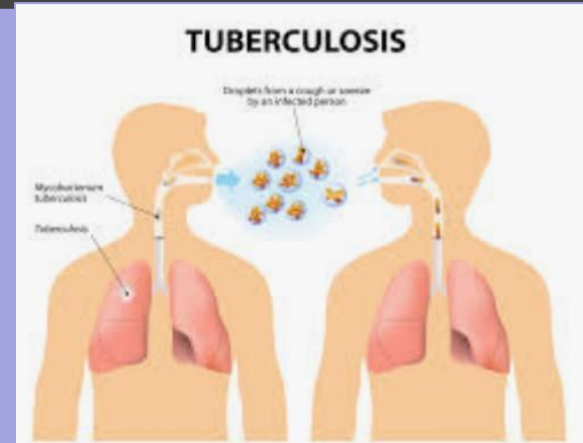
### OVERALL KEY POINTS: ❖

- ❖ COPD should be considered in any patient who has dyspnea, chronic cough or sputum production, and/or a history of exposure to risk factors for the disease.
- ❖ 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.
- ❖ The goals of COPD assessment are to determine the level of airflow limitation, the impact of disease on the patient's health status, and the risk of future events (such as exacerbations, hospital admissions, or death), in order to guide therapy.
- ❖ Concomitant chronic diseases occur frequently in COPD patients, including cardiovascular disease, skeletal muscle dysfunction, metabolic syndrome, osteoporosis, depression, anxiety, and lung cancer. These comorbidities should be actively sought and treated appropriately when present as they can influence mortality and hospitalizations independently.

## ▶ OTHER CAUSES OF CHRONIC COUGH

### 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)

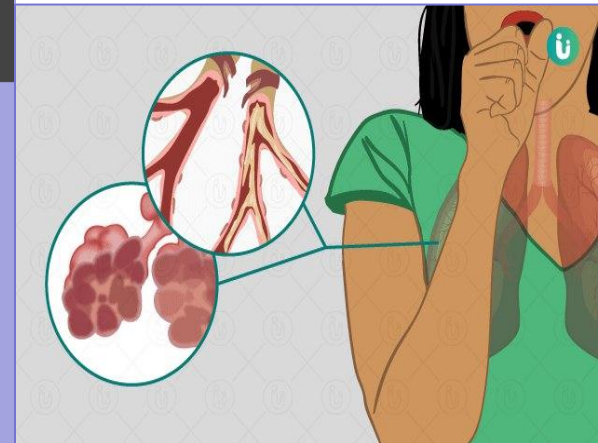


TABLE 2.2

## 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

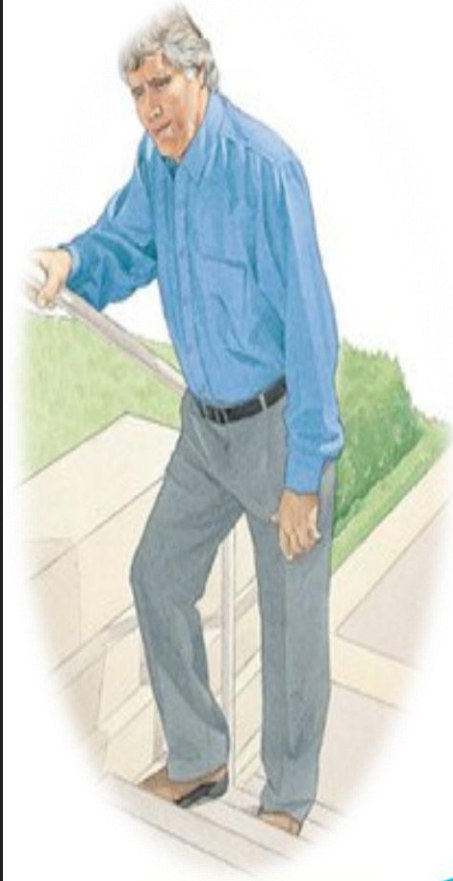
TABLE 2.4



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

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.	<input type="checkbox"/>
mMRC Grade 1.	I get short of breath when hurrying on the level or walking up a slight hill.	<input type="checkbox"/>
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.	<input type="checkbox"/>
mMRC Grade 3.	I stop for breath after walking about 100 meters or after a few minutes on the level.	<input type="checkbox"/>
mMRC Grade 4.	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.



## ► 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	<input checked="" type="radio"/>	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	

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

TOTAL SCORE:

**▶ THE REFINED ABCD ASSESSMENT TOOL**

Spirometrically  
Confirmed Diagnosis



Assessment of  
airflow limitation



Assessment of  
symptoms/risk  
of exacerbations

Post-bronchodilator  
FEV<sub>1</sub>/FVC < 0.7

Grade	FEV <sub>1</sub> (% predicted)
<b>GOLD 1</b>	≥ 80
<b>GOLD 2</b>	50-79
<b>GOLD 3</b>	30-49
<b>GOLD 4</b>	< 30

Moderate or Severe  
Exacerbation History

≥2 or  
≥ 1 leading  
to hospital  
admission

0 or 1  
(not leading  
to hospital  
admission)

<b>C</b>	<b>D</b>
<b>A</b>	<b>B</b>

mMRC 0-1  
CAT < 10

mMRC ≥ 2  
CAT ≥ 10

Symptoms



FIGURE 2.4

## ▶ ROLE OF SPIROMETRY

- 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.



## DIFFERENTIAL DIAGNOSIS OF COPD

DIAGNOSIS	SUGGESTIVE FEATURES
<b>COPD</b>	Onset in mid-life. Symptoms slowly progressive. History of tobacco smoking or exposure to other types of smoke.
<b>Asthma</b>	Onset early in life (often childhood). Symptoms vary widely from day to day. Symptoms worse at night/early morning. Allergy, rhinitis, and/or eczema also present. Family history of asthma. Obesity coexistence.
<b>Congestive Heart Failure</b>	Chest X-ray shows dilated heart, pulmonary edema. Pulmonary function tests indicate volume restriction, not airflow limitation.
<b>Bronchiectasis</b>	Large volumes of purulent sputum. Commonly associated with bacterial infection. Chest X-ray/CT shows bronchial dilation, bronchial wall thickening.
<b>Tuberculosis</b>	Onset all ages. Chest X-ray shows lung infiltrate. Microbiological confirmation. High local prevalence of tuberculosis.
<b>Obliterative Bronchiolitis</b>	Onset at younger age, nonsmokers. May have history of rheumatoid arthritis or acute fume exposure. Seen after lung or bone marrow transplantation. CT on expiration shows hypodense areas.
<b>Diffuse Panbronchiolitis</b>	Predominantly seen in patients of Asian descent. Most patients are male and nonsmokers. Almost all have chronic sinusitis. Chest X-ray & HRCT show diffuse small centrilobular nodular opacities & hyperinflation.

*These features tend to be characteristic of the respective diseases, but are not mandatory. For example, a person who has never smoked may develop COPD (especially in the developing world where other risk factors may be more important than cigarette smoking); asthma may develop in adult and even in elderly patients.*

TABLE 2.7



# Prevention and maintenance therapy:

## I. Smoking cessation:

### ► BRIEF STRATEGIES TO HELP THE PATIENT WILLING TO QUIT

- |                   |   |
|-------------------|---|
| • <b>ASK:</b>     | Systematically identify all tobacco users at every visit.<br><i>Implement an office-wide system that ensures that, for EVERY patient at EVERY clinic visit, tobacco-use status is queried and documented.</i>   |
| • <b>ADVISE:</b>  | Strongly urge all tobacco users to quit.<br><i>In a clear, strong, and personalized manner, urge every tobacco user to quit.</i>  |
| • <b>ASSESS:</b>  | Determine willingness and rationale of patient's desire to make a quit attempt.<br><i>Ask every tobacco user if he or she is willing to make a quit attempt at this time (e.g., within the next 30 days).</i>   |
| • <b>ASSIST:</b>  | Aid the patient in quitting.<br><i>Help the patient with a quit plan; provide practical counseling; provide intra-treatment social support; help the patient obtain extra-treatment social support; recommend use of approved pharmacotherapy except in special circumstances; provide supplementary materials.</i> |
| • <b>ARRANGE:</b> | Schedule follow-up contact.<br><i>Schedule follow-up contact, either in person or via telephone.</i>  |

TABLE 3.1

**Prevention and maintenance therapy:**

**II. Vaccination for stable COPD:**

## VACCINATION FOR STABLE COPD

- Influenza vaccination reduces serious illness and death in COPD patients (**Evidence B**).
- The 23-valent pneumococcal polysaccharide vaccine (PPSV23) has been shown to reduce the incidence of community - acquired pneumonia in COPD patients aged < 65 years with an  $FEV_1 < 40\%$  predicted and in those with comorbidities (**Evidence B**).
- In the general population of adults  $\geq 65$  years the 13-valent conjugated pneumococcal vaccine (PCV13) has demonstrated significant efficacy in reducing bacteremia & serious invasive pneumococcal disease (**Evidence B**).

TABLE 3.2

## Prevention and maintenance therapy:

### III. Medical treatments:



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## ► BRONCHODILATORS IN STABLE COPD

- Inhaled bronchodilators in COPD are central to symptom management and commonly given on a regular basis to prevent or reduce symptoms **(Evidence A)**.
- Regular and as-needed use of SABA or SAMA improves FEV<sub>1</sub> and symptoms **(Evidence A)**.
- Combinations of SABA and SAMA are superior compared to either medication alone in improving FEV<sub>1</sub> and symptoms **(Evidence A)**.
- LABAs and LAMAs significantly improve lung function, dyspnea, health status, and reduce exacerbation rates **(Evidence A)**.
- LAMAs have a greater effect on exacerbation reduction compared with LABAs **(Evidence A)** and decrease hospitalizations **(Evidence B)**.
- Combination treatment with a LABA and LAMA increases FEV<sub>1</sub> and reduces symptoms compared to monotherapy **(Evidence A)**.
- Combination treatment with a LABA/LAMA reduces exacerbations compared to monotherapy **(Evidence B)**.
- Tiotropium improves the effectiveness of pulmonary rehabilitation in increasing exercise performance **(Evidence B)**.
- Theophylline exerts a small bronchodilator effect in stable COPD **(Evidence A)** and that is associated with modest symptomatic benefits **(Evidence B)**.

TABLE 3.4

## ▶ ANTI-INFLAMMATORY THERAPY IN STABLE COPD

### INHALED CORTICOSTEROIDS

- An ICS combined with a LABA is more effective than the individual components in improving lung function and health status and reducing exacerbations in patients with exacerbations and moderate to very severe COPD (**Evidence A**).
- Regular treatment with ICS increases the risk of pneumonia especially in those with severe disease (**Evidence A**).
- Triple inhaled therapy of ICS/LAMA/LABA improves lung function, symptoms and health status and reduces exacerbations compared to ICS/LABA, LABA/LAMA or LAMA monotherapy (**Evidence A**).

### ORAL GLUCOCORTICIDS

- Long-term use of oral glucocorticoids has numerous side effects (**Evidence A**) with no evidence of benefits (**Evidence C**).

### PDE4 INHIBITORS

- In patients with chronic bronchitis, severe to very severe COPD and a history of exacerbations:
  - » A PDE4 inhibitor improves lung function and reduces moderate and severe exacerbations (**Evidence A**).
  - » A PDE4 inhibitor improves lung function and decreases exacerbations in patients who are on fixed-dose LABA/ICS combinations (**Evidence A**).

### ANTIBIOTICS

- Long-term azithromycin and erythromycin therapy reduces exacerbations over one year (**Evidence A**).
- Treatment with azithromycin is associated with an increased incidence of bacterial resistance (**Evidence A**) and hearing test impairments (**Evidence B**).

### MUCOREGULATORS AND ANTIOXIDANT AGENTS

- Regular treatment with mucolytics such as erdosteine, carbocysteine and NAC reduces the risk of exacerbations in select populations (**Evidence B**).

### OTHER ANTI-INFLAMMATORY AGENTS

- Simvastatin does not prevent exacerbations in COPD patients at increased risk of exacerbations and without indications for statin therapy (**Evidence A**). However, observational studies suggest that statins may have positive effects on some outcomes in patients with COPD who receive them for cardiovascular and metabolic indications (**Evidence C**).
- Leukotriene modifiers have not been tested adequately in COPD patients.

TABLE 3.5

## ▶ THE INHALED ROUTE

- When a treatment is given by the inhaled route, the importance of education and training in inhaler device technique cannot be over-emphasized.
- The choice of inhaler device has to be individually tailored and will depend on access, cost, prescriber, and most importantly, patient's ability and preference.
- It is essential to provide instructions and to demonstrate the proper inhalation technique when prescribing a device, to ensure that inhaler technique is adequate and re-check at each visit that patients continue to use their inhaler correctly.
- Inhaler technique (and adherence to therapy) should be assessed before concluding that the current therapy is insufficient.



TABLE 3.6

## Prevention and maintenance therapy:

### IV. Oxygen therapy and ventilation support:

#### OXYGEN THERAPY AND VENTILATORY SUPPORT IN STABLE COPD

##### OXYGEN THERAPY

- The long-term administration of oxygen increases survival in patients with severe chronic resting arterial hypoxemia (**Evidence A**).
- In patients with stable COPD and moderate resting or exercise-induced arterial desaturation, prescription of long-term oxygen does not lengthen time to death or first hospitalization or provide sustained benefit in health status, lung function and 6-minute walk distance (**Evidence A**).
- Resting oxygenation at sea level does not exclude the development of severe hypoxemia when traveling by air (**Evidence C**).

##### VENTILATORY SUPPORT

- NPPV may improve hospitalization-free survival in selected patients after recent hospitalization, particularly in those with pronounced daytime persistent hypercapnia ( $\text{PaCO}_2 \geq 52 \text{ mmHg}$ ) (**Evidence B**).

TABLE 3.10



## Prevention and maintenance therapy:

### V. Interventional therapy:

#### INTERVENTIONAL THERAPY IN STABLE COPD

##### LUNG VOLUME REDUCTION SURGERY

- Lung volume reduction surgery improves survival in severe emphysema patients with an upper-lobe emphysema and low post-rehabilitation exercise capacity (**Evidence A**).

##### BULLECTOMY

- In selected patients, bullectomy is associated with decreased dyspnea, improved lung function and exercise tolerance (**Evidence C**).

##### TRANSPLANTATION

- In appropriately selected patients with very severe COPD, lung transplantation has been shown to improve quality of life and functional capacity (**Evidence C**).

##### BRONCHOSCOPIC INTERVENTIONS

- In select patients with advanced emphysema, bronchoscopic interventions reduce end-expiratory lung volume and improve exercise tolerance, health status and lung function at 6-12 months following treatment. Endobronchial valves (**Evidence A**); Lung coils (**Evidence B**); Vapor ablation (**Evidence B**).



## MANAGEMENT OF COPD

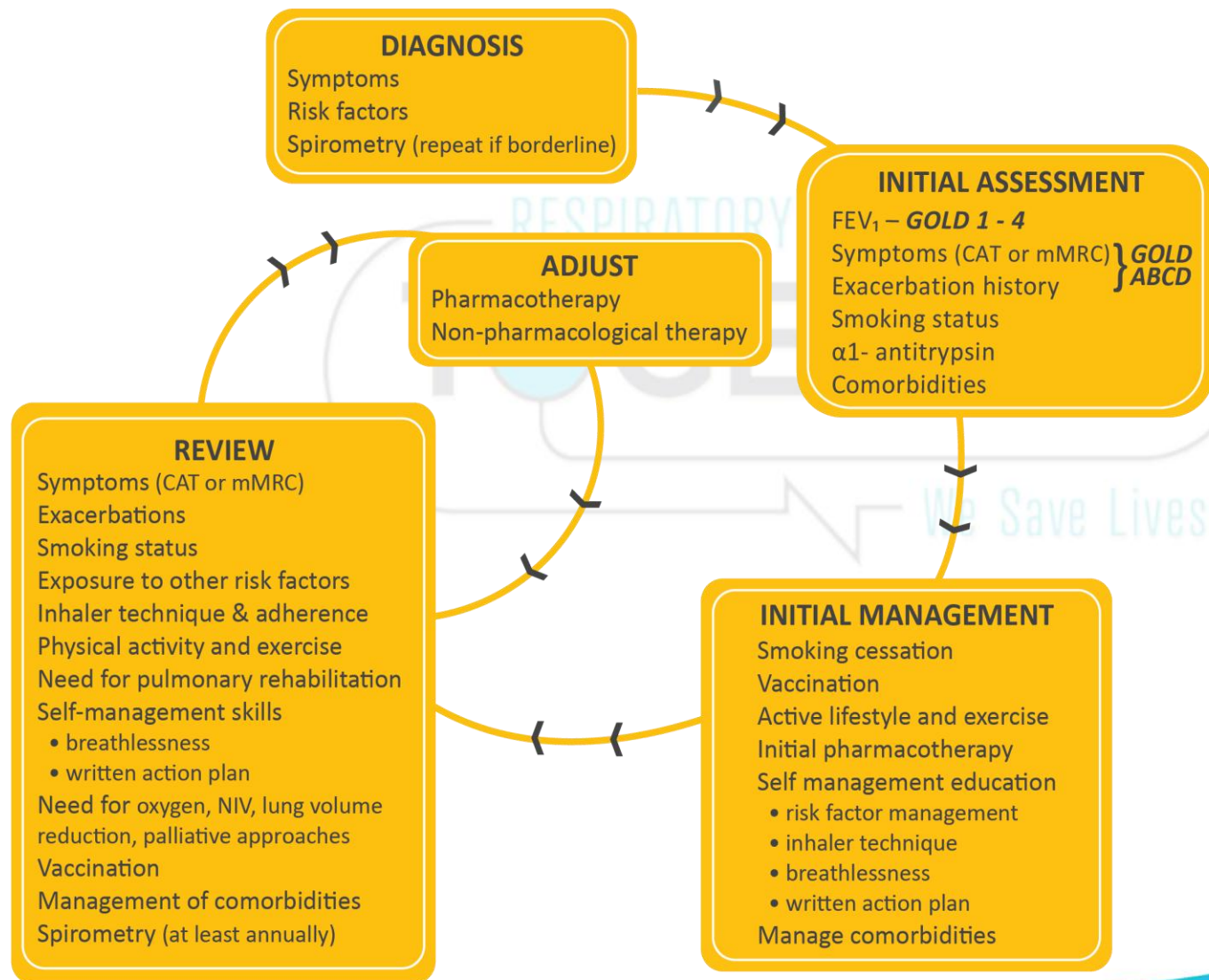
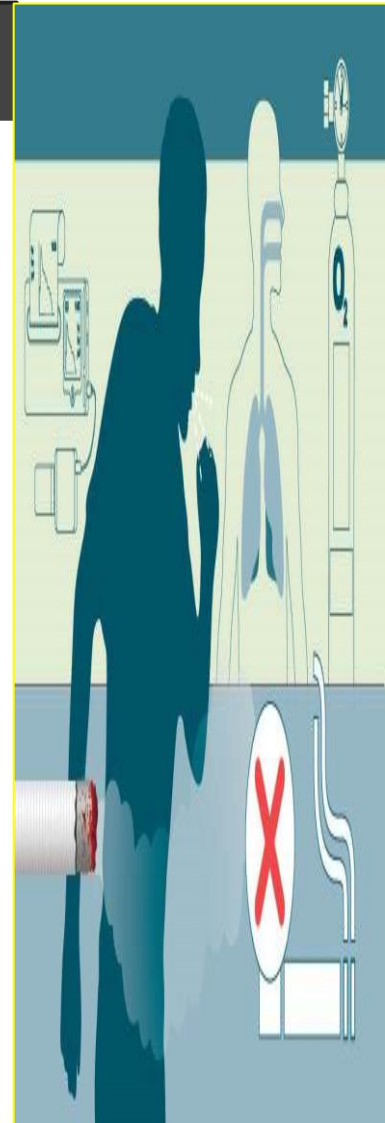


FIGURE 4.1

## TREATING TOBACCO USE AND DEPENDENCE: A CLINICAL PRACTICE GUIDELINE — MAJOR FINDINGS & RECOMMENDATIONS

- Tobacco dependence is a chronic condition that warrants repeated treatment until long-term or permanent abstinence is achieved.
- Effective treatments for tobacco dependence exist and all tobacco users should be offered these treatments.
- Clinicians and health care delivery systems must operationalize the consistent identification, documentation, and treatment of every tobacco user at every visit.
- Brief smoking cessation counseling is effective and every tobacco user should be offered such advice at every contact with health care providers.
- There is a strong dose-response relation between the intensity of tobacco dependence counseling and its effectiveness.
- Three types of counseling have been found to be especially effective: practical counseling, social support of family and friends as part of treatment, and social support arranged outside of treatment.
- First-line pharmacotherapies for tobacco dependence — varenicline, bupropion sustained release, nicotine gum, nicotine inhaler, nicotine nasal spray, and nicotine patch—are effective and at least one of these medications should be prescribed in the absence of contraindications.
- Financial incentive programs for smoking cessation may facilitate smoking cessation.
- Tobacco dependence treatments are cost effective interventions.





## IDENTIFY & REDUCE RISK FACTOR EXPOSURE

- Smoking cessation interventions should be actively pursued in all COPD patients (**Evidence A**).
- Efficient ventilation, non-polluting cooking stoves and similar interventions should be recommended (**Evidence B**).
- Clinicians should advise patients to avoid continued exposures to potential irritants, if possible (**Evidence D**).

TABLE 4.3

## ▶ KEY POINTS FOR THE USE OF BRONCHODILATORS

- LABAs and LAMAs are preferred over short-acting agents except for patients with only occasional dyspnea (**Evidence A**), and for immediate relief of symptoms in patients already on long-acting bronchodilators for maintenance therapy.
- Patients may be started on single long-acting bronchodilator therapy or dual long-acting bronchodilator therapy. In patients with persistent dyspnea on one bronchodilator treatment should be escalated to two (**Evidence A**).
- Inhaled bronchodilators are recommended over oral bronchodilators (**Evidence A**).
- Theophylline is not recommended unless other long-term treatment bronchodilators are unavailable or unaffordable (**Evidence B**).

TABLE 4.5

## ▶ KEY POINTS FOR THE USE OF ANTI-INFLAMMATORY AGENTS

- Long-term monotherapy with ICS is not recommended **(Evidence A)**.
- Long-term treatment with ICS may be considered in association with LABAs for patients with a history of exacerbations despite appropriate treatment with long-acting bronchodilators **(Evidence A)**.
- Long-term therapy with oral corticosteroids is not recommended **(Evidence A)**.
- In patients with severe to very severe airflow limitation, chronic bronchitis and exacerbations the addition of a PDE4 inhibitor to a treatment with long acting bronchodilators with/without ICS can be considered **(Evidence B)**.
- Preferentially, but not only in former smokers with exacerbations despite appropriate therapy, macrolides, in particular azithromycin, can be considered **(Evidence B)**.
- Statin therapy is not recommended for prevention of exacerbations **(Evidence A)**.
- Antioxidant mucolytics are recommended only in selected patients **(Evidence A)**.

TABLE 4.6

## ▶ KEY POINTS FOR THE USE OF OTHER PHARMACOLOGICAL TREATMENTS

- Patients with severe hereditary alpha-1 antitrypsin deficiency and established emphysema may be candidates for alpha-1 antitrypsin augmentation therapy **(Evidence B)**.
- Antitussives cannot be recommended **(Evidence C)**.
- Drugs approved for primary pulmonary hypertension are not recommended for patients with a pulmonary hypertension secondary to COPD **(Evidence B)**.
- Low-dose long acting oral and parenteral opioids may be considered for treating dyspnea in COPD patients with severe disease **(Evidence B)**.

TABLE 4.7

## INITIAL PHARMACOLOGICAL TREATMENT

≥ 2 moderate exacerbations or ≥ 1 leading to hospitalization

Group C

LAMA

Group D

LAMA or  
LAMA + LABA\* or  
ICS + LABA\*\*

\*Consider if highly symptomatic (e.g. CAT > 20)

\*\*Consider if eos ≥ 300

0 or 1 moderate exacerbations  
(not leading to hospital admission)

Group A

A Bronchodilator

Group B

A Long Acting Bronchodilator  
(LABA or LAMA)

mMRC 0-1, CAT < 10

mMRC ≥ 2, CAT ≥ 10



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FIGURE 4.2

# MANAGEMENT CYCLE

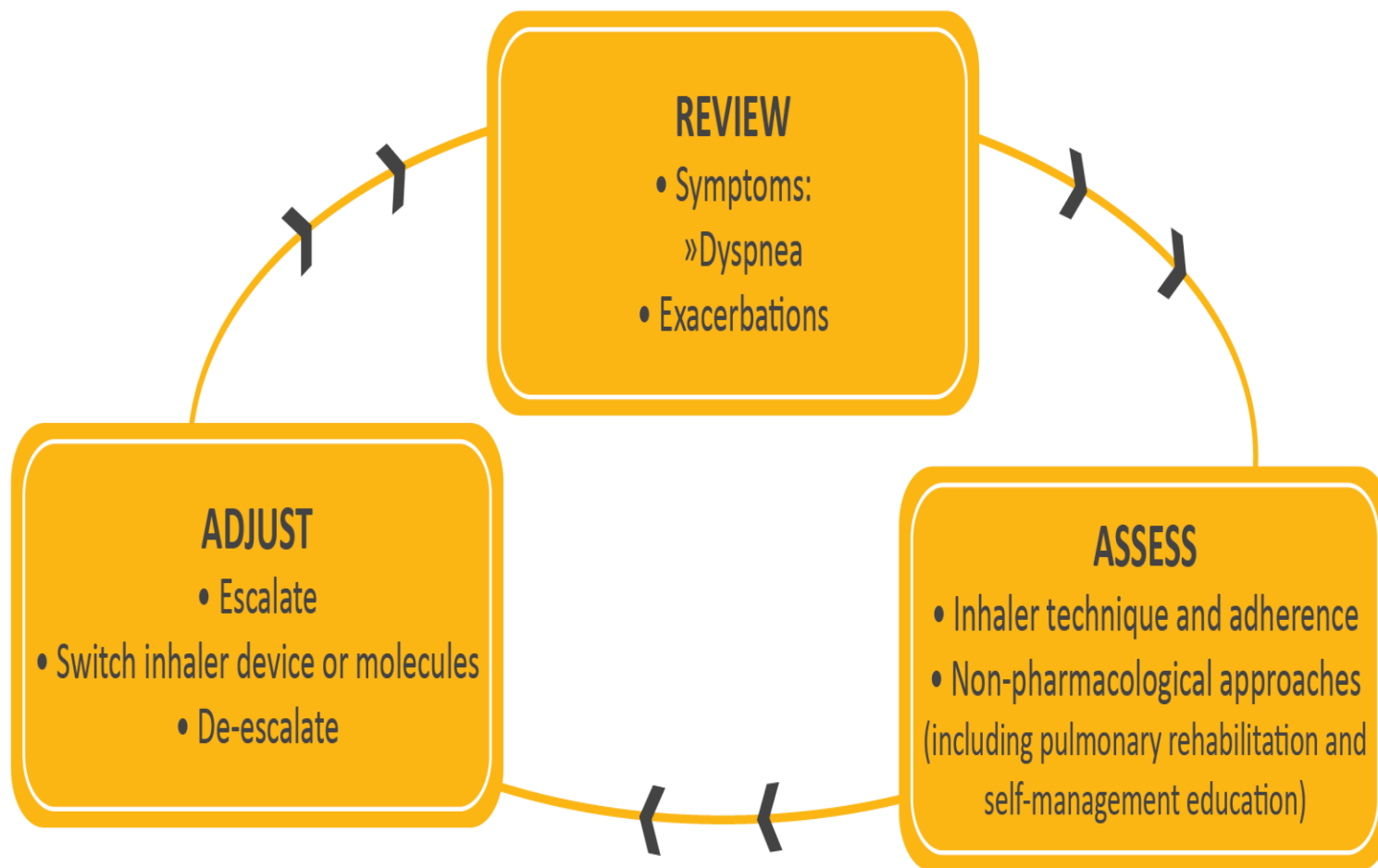


FIGURE 4.3

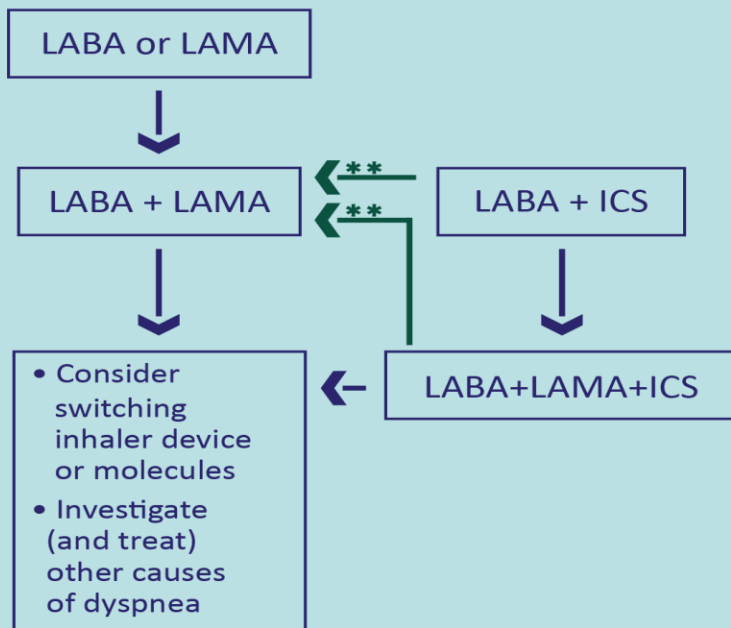


## FOLLOW-UP PHARMACOLOGICAL TREATMENT

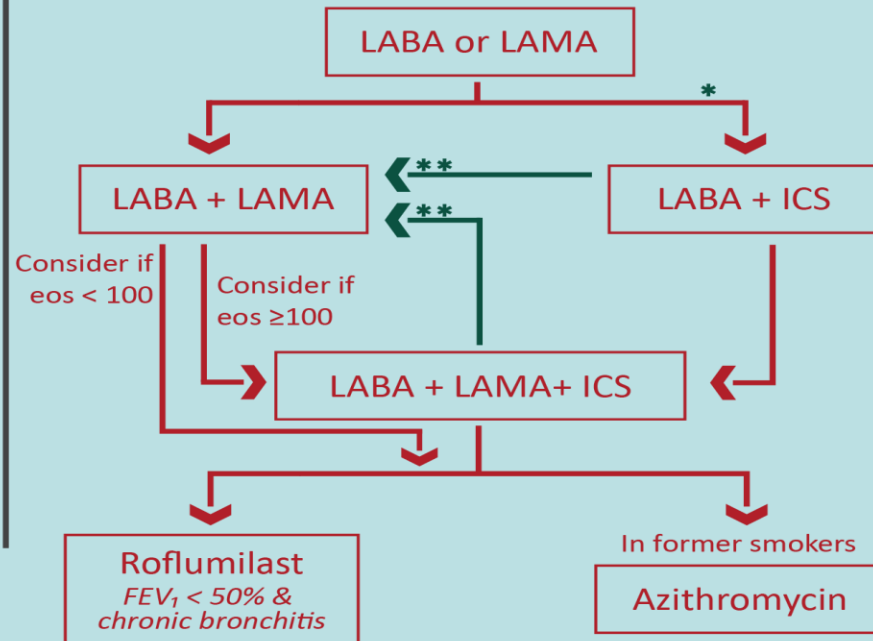
1. IF RESPONSE TO INITIAL TREATMENT IS APPROPRIATE, MAINTAIN IT.

2. IF NOT:
- ✓ Consider the predominant treatable trait to target (dyspnea or exacerbations)
  - Use exacerbation pathway if both exacerbations and dyspnea need to be targeted
  - ✓ Place patient in box corresponding to current treatment & follow indications
  - ✓ Assess response, adjust and review
  - ✓ These recommendations do not depend on the ABCD assessment at diagnosis

### • DYSPNEA •



### • EXACERBATIONS •



eos = blood eosinophil count (cells/ $\mu$ L)

\* Consider if eos ≥ 300 or eos ≥ 100 AND ≥ 2 moderate exacerbations / 1 hospitalization

\*\* Consider de-escalation of ICS or switch if pneumonia, inappropriate original indication or lack of response to ICS



## PRESCRIPTION OF SUPPLEMENTAL OXYGEN TO COPD PATIENTS

Arterial hypoxemia defined as:  
 $\text{PaO}_2 < 55 \text{ mmHg (7.3 kPa)}$  or  $\text{SaO}_2 < 88\%$

or

$\text{PaO}_2 > 55 \text{ but } < 60 \text{ mmHg (> 7.3 kPa but } < 8 \text{ kPa)}$   
with right heart failure or erythrocytosis

Prescribe supplemental oxygen and  
titrate to keep  $\text{SaO}_2 \geq 90\%$

Recheck in 60 to 90 days to assess:

- » If supplemental oxygen is still indicated
- » If prescribed supplemental oxygen is effective



FIGURE 4.5

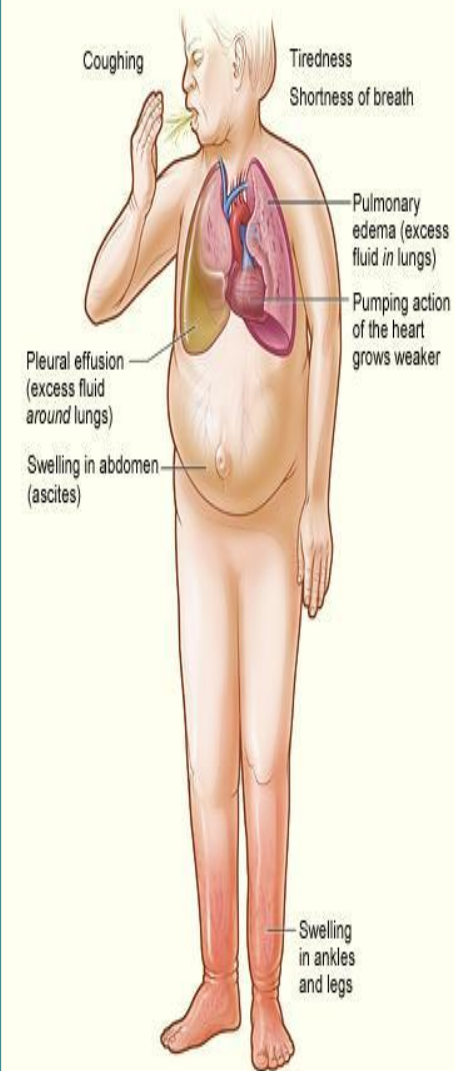


## POTENTIAL INDICATIONS FOR HOSPITALIZATION ASSESSMENT\*

- 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.

TABLE 5.2



## MANAGEMENT OF SEVERE BUT NOT LIFE-THREATENING EXACERBATIONS\*

- Assess severity of symptoms, blood gases, chest radiograph.
- Administer supplemental oxygen therapy, obtain serial arterial blood gas, venous blood gas and pulse oximetry measurements.
- Bronchodilators:
  - » Increase doses and/or frequency of short-acting bronchodilators.
  - » Combine short-acting beta 2-agonists and anticholinergics.
  - » Consider use of long-active bronchodilators when patient becomes stable.
  - » Use spacers or air-driven nebulizers when appropriate.
- Consider oral corticosteroids.
- Consider antibiotics (oral) when signs of bacterial infection are present.
- Consider noninvasive mechanical ventilation (NIV).
- At all times:
  - » Monitor fluid balance.
  - » Consider subcutaneous heparin or low molecular weight heparin for thromboembolism prophylaxis.
  - » Identify and treat associated conditions (e.g., heart failure, arrhythmias, pulmonary embolism etc.).

\*Local resources need to be considered.

TABLE 5.3

medical  
history

physical  
exam

spirometry



pulse oximetry



CT scan

## KEY POINTS FOR THE MANAGEMENT OF EXACERBATIONS

- Short-acting inhaled beta<sub>2</sub>-agonists, with or without short-acting anticholinergics, are recommended as the initial bronchodilators to treat an acute exacerbation (**Evidence C**).
- Systemic corticosteroids can improve lung function (FEV<sub>1</sub>), oxygenation and shorten recovery time and hospitalization duration. Duration of therapy should not be more than 5-7 days (**Evidence A**).
- Antibiotics, when indicated, can shorten recovery time, reduce the risk of early relapse, treatment failure, and hospitalization duration. Duration of therapy should be 5-7 days (**Evidence B**).
- Methylxanthines are not recommended due to increased side effect profiles (**Evidence B**).
- Non-invasive mechanical ventilation should be the first mode of ventilation used in COPD patients with acute respiratory failure who have no absolute contraindication because it improves gas exchange, reduces work of breathing and the need for intubation, decreases hospitalization duration and improves survival (**Evidence A**).

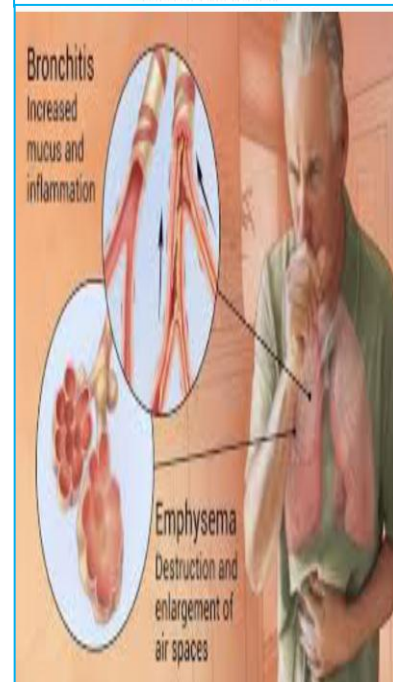


TABLE 5.4

## INDICATIONS FOR RESPIRATORY OR MEDICAL INTENSIVE CARE UNIT ADMISSION\*

- Severe dyspnea that responds inadequately to initial emergency therapy.
- Changes in mental status (confusion, lethargy, coma).
- Persistent or worsening hypoxemia ( $\text{PaO}_2 < 5.3 \text{ kPa}$  or  $40 \text{ mmHg}$ ) and/or severe/worsening respiratory acidosis ( $\text{pH} < 7.25$ ) despite supplemental oxygen and noninvasive ventilation.
- Need for invasive mechanical ventilation.
- Hemodynamic instability - need for vasopressors.

\*Local resources need to be considered.

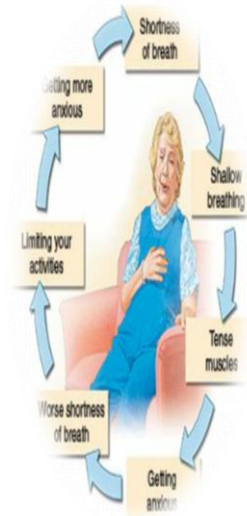
TABLE 5.5

## INDICATIONS FOR NONINVASIVE MECHANICAL VENTILATION (NIV)

At least one of the following:

- Respiratory acidosis ( $\text{PaCO}_2 \geq 6.0 \text{ kPa}$  or  $45 \text{ mmHg}$  and arterial  $\text{pH} \leq 7.35$ ).
- Severe dyspnea with clinical signs suggestive of respiratory muscle fatigue, increased work of breathing, or both, such as use of respiratory accessory muscles, paradoxical motion of the abdomen, or retraction of the intercostal spaces.
- Persistent hypoxemia despite supplemental oxygen therapy.

TABLE 5.6





## ► DISCHARGE CRITERIA AND RECOMMENDATIONS FOR FOLLOW-UP

- Full review of all clinical and laboratory data.
- Check maintenance therapy and understanding.
- Reassess inhaler technique.
- Ensure understanding of withdrawal of acute medications (steroids and/or antibiotics).
- Assess need for continuing any oxygen therapy.
- Provide management plan for comorbidities and follow-up.
- Ensure follow-up arrangements: early follow-up < 4weeks, and late follow-up < 12weeks as indicated.
- All clinical or investigational abnormalities have been identified.

### 1 – 4 WEEKS FOLLOW-UP

- Evaluate ability to cope in his/her usual environment.
- Review and understanding treatment regimen.
- Reassessment of inhaler techniques.
- Reassess need for long-term oxygen.
- Document the capacity to do physical activity and activities of daily living.
- Document symptoms: CAT or mMRC.
- Determine status of comorbidities.

### 12 – 16 WEEKS FOLLOW-UP

- Evaluate ability to cope in his/her usual environment.
- Review understanding treatment regimen.
- Reassessment of inhaler techniques.
- Reassess need for long-term oxygen.
- Document the capacity to do physical activity and activities of daily living.
- Measure spirometry: FEV<sub>1</sub>.
- Document symptoms: CAT or mMRC.
- Determine status of comorbidities.

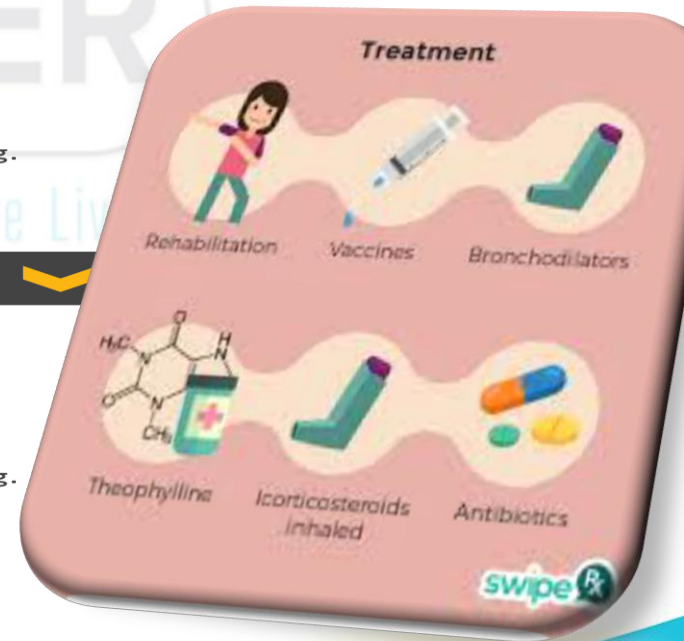
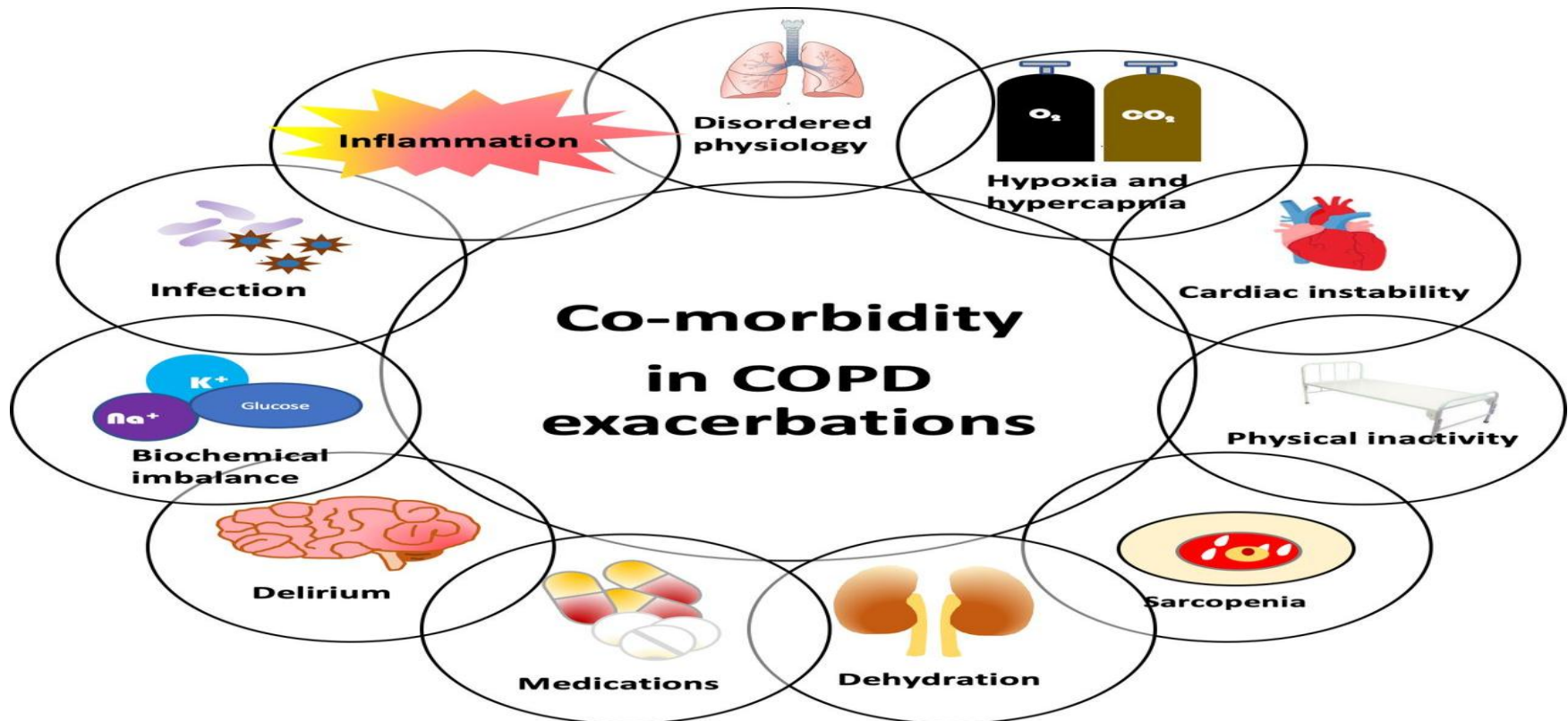


TABLE 5.8

# COPD and comorbidities







**Thank you for your attention**