

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Management

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■ ***MANAGEMENT OF STABLE COPD***

■ ***MANAGEMENT OF EXACERBATIONS OF COPD***



■ ***MANAGEMENT OF STABLE COPD***

- ✚ ***Nonpharmacologic interventions***

- ✚ ***Pharmacologic interventions***

Therapeutic goals include

- (1) prevention of disease progression**
- (2) Relief of symptoms**
- (3) Improvement in exercise tolerance**
- (4) Improvement in health status**
- (5) Prevention and treatment of exacerbations**
- (6) prevention and treatment of COPD-related complications; and**
- (7) Reduction in mortality**



Nonpharmacologic interventions



Smoking Cessation

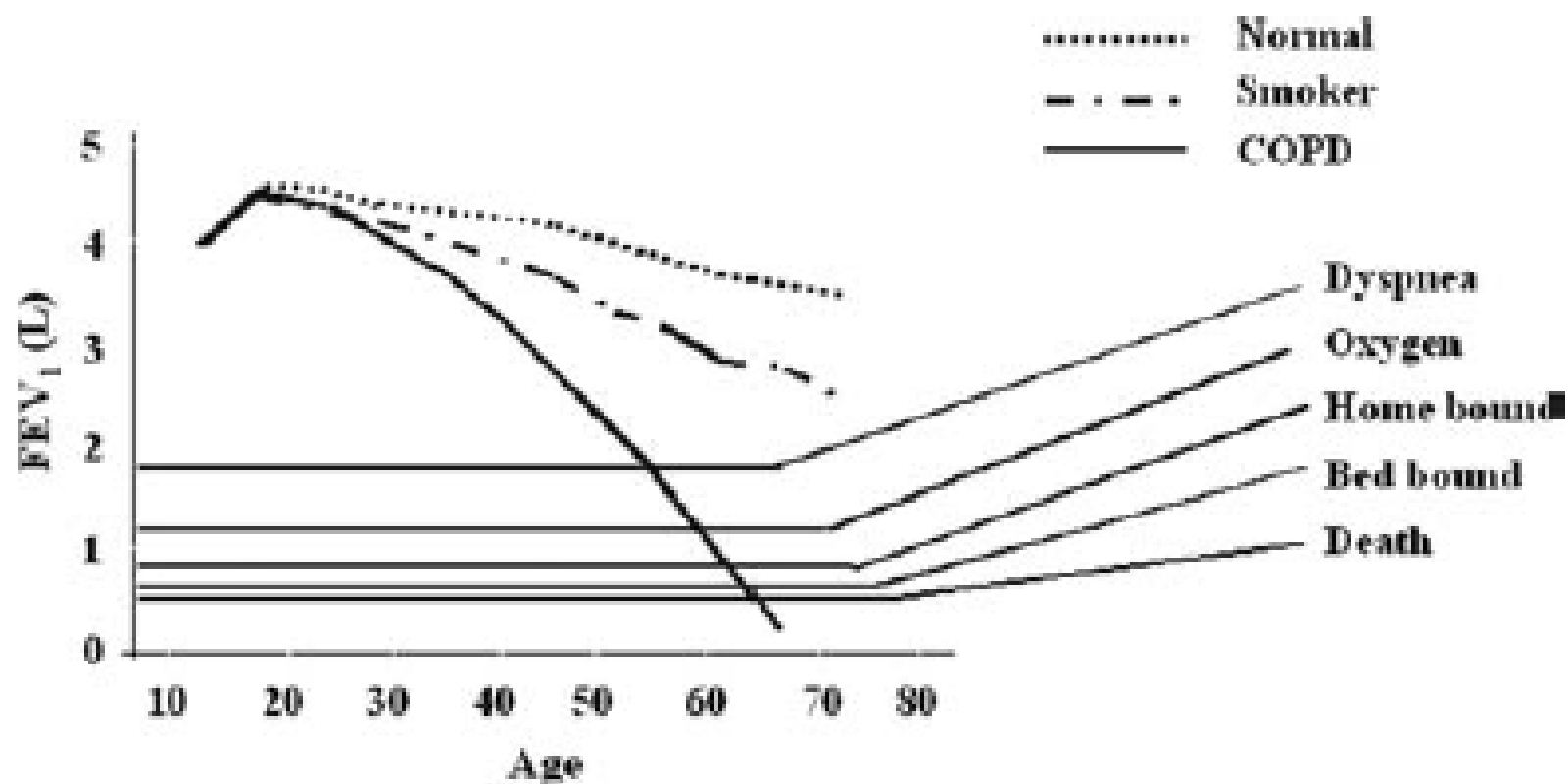



Figure 1. Natural history of COPD. Accelerated decline in lung function (FEV₁) in smoker and “susceptible” smoker in whom the progressive disability of COPD develops.



Thus, all patients with COPD should be strongly urged to quit smoking and educated about the benefits of quitting.



Pharmacotherapy

+

Traditional supportive approaches




Smoking Cessation

pharmacotherapy

✓ **Bupropion**

✓ **Nicotine replacement**

✓ **Varenicline**



All adult, nonpregnant smokers
considering quitting be offered pharmacotherapy, in
the absence of any contraindication to treatment.



➤ Reduction of Risk Factors



➤ Prevention of Respiratory Infections



➤Oxygen Therapy

Indications for Oxygen

Oxygen During Exercise

Oxygen During Sleep

Oxygen for Air Travel

Technical Issues for Oxygen Use



➤ **Pulmonary rehabilitation**

exercise training, smoking cessation
nutrition counseling, and education,
in an attempt to improve the
functional capacity and quality of life .



➤ Pulmonary rehabilitation

improve exercise capacity and quality of life
and to decrease dyspnea and health care utilization.
decreases mortality.

**Pulmonary rehabilitation
should be offered to all patients with
COPD who are symptomatic**

➤ Lung Volume Reduction Surgery (LVRS)

LVRS offers both a mortality benefit and a symptomatic benefit **in certain patients with emphysema.**

Patients with upper lobe–predominant emphysema and a low post-rehabilitation exercise capacity are most likely to benefit from LVRS.

Patients are excluded

significant pleural disease

pulmonary artery systolic pressure >45 mmHg

Extreme deconditioning

CHF or other severe comorbid conditions.

Patients with an $FEV_1 < 20\%$ and either

diffusely distributed emphysema on CT scan

(DLCO) $< 20\%$ of predicted .

➤ Lung Transplantation

That candidates for lung transplantation should have **severe disability despite maximal medical therapy** and be **free of comorbid conditions** such as liver, renal, or cardiac disease.

Lung Transplantation

In contrast to LVRS, the anatomic distribution of emphysema and the presence of pulmonary hypertension are not contraindications to lung transplantation.



PHARMACOTHERAPY



The goal of treatment was once primarily symptom relief.

Now that goal includes an
attempt to **improve lung function**
or **slow the loss of lung function**
prevent exacerbations



Most medications for COPD are administered
by inhalation.



□ Bronchodilators

- **Anticholinergics**
- **β-Agonists**
- **Methylxanthines**

■ Anticholinergics

Short-acting muscarinic antagonists (SAMAs)

Ipratropium

Oxitropium

They increase FEV₁ with an onset of action of 10 to 15 minutes and a duration of action of 4 to 6 hours.



Ipratropium

improves lung function

increases exercise capacity

decreases dyspnea

decreases cough



Long-acting muscarinic antagonists (LAMAs)

Tiotropium



In general, both short- and long-acting muscarinic antagonists have good safety profiles.

The most common side effects are

Dry mouth and

Urinary retention



Side Effects of Anticholinergics

Recent retrospective analyses raised the possibility that anticholinergic use is associated with increased cardiovascular events in the COPD population. This was not demonstrated in a large, prospective randomized trial of tiotropium.



β-Agonists:

“short-acting”:

Salbutamol

Levalbuterol

Terbutaline

Fenoterol



β -Agonists:

Long-acting β -agonists (LABAs)

Salmeterol

Formoterol

Mode of Administration

- Metered-dose inhaler (MDI)
- Dry powder inhaler (DPI)
- Nebulize

These methods are superior to oral administration in improving FEV_1 and produce fewer side effects

Side Effects of β -agonists

Although systemic effects are more common with oral Formulations, they may occur with any β -agonist formulation.

Tremor

palpitations


Anxiety

Insomnia

Ventricular arrhythmias

Hypokalemia

systemic side effects associated with MDI use may be reduced with a spacer device that reduces oral deposition.




Long-acting inhaled β agonists,
such as **salmeterol or formoterol**, have benefits
comparable to **ipratropium bromide**.

Their use is more convenient than short-acting agents



The addition of a β agonist to inhaled anticholinergic therapy has been demonstrated to provide incremental benefit.



A recent report in asthma suggests that using a long-acting β agonist without concomitant inhaled corticosteroids have an increased risk of deaths . applicability of these data to patients with COPD is unclear.


Methylxanthines

Nonselective inhibitors of phosphodiesterase,
and by this mechanism have a modest
bronchodilator effect.

Theophylline

Theophylline

is the most commonly used methylxanthine and, in stable COPD, its effect is greater than that of placebo but less than that of LABAs or LAMAs.



Theophylline produces modest improvements in expiratory flow rates and vital capacity and a slight improvement in arterial oxygen and carbon dioxide levels in patients with moderate to severe COPD.



Methylxanthines:

Theophylline

Anti-inflammatory effects

Modest inotropic and diuretic effects

Augment skeletal muscle strength

Subjective responses may be greater than the objective improvements in FEV_1 .

Methylxanthines:

Adverse effects :

Insomnia

Nausea

Vomiting

Seizures

Arrhythmias



Table 254-4 Factors Affecting Clearance of Theophylline	
Increased Clearance	
• Enzyme induction (rifampicin, phenobarbitone, ethanol)	
• Smoking (tobacco, marijuana)	
• High-protein, low-carbohydrate diet	
• Barbecued meat	
• Childhood	
Decreased Clearance	
• Enzyme inhibition (cimetidine, erythromycin, ciprofloxacin, allopurinol, zileuton, zafirlukast)	
• Congestive heart failure	
• Liver disease	
• Pneumonia	
• Viral infection and vaccination	
• High carbohydrate diet	
• Old age	

Increased Clearance

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Because of its narrow therapeutic index and modest benefits,

Theophylline is not recommended as a first line drug

but can serve as an alternative for patients intolerant of LABAs and LAMAs or in settings where these drugs are too expensive.



The selective phosphodiesterase₄ (PDE₄) inhibitor **Roflumilast** has been demonstrated to **reduce exacerbation** frequency in COPD patients with chronic bronchitis and a prior history of exacerbations.



Roflumilast

Because its effect on exacerbations is much greater than its effect on airway function, **guidelines recommend that roflumilast be used in combination with a long-acting bronchodilator.**



Roflumilast

The most common side effects are
nausea, anorexia, abdominal pain
diarrhea, weight loss
sleep disturbances
and headache.



Inhaled Glucocorticoids

Should be considered in patients with


Frequent exacerbations, defined

As two or more per year, and in patients

who demonstrate a significant

amount of **acute reversibility** in response

to inhaled bronchodilators.



ICS have been shown to improve symptoms,
lung function, and quality of life,
and to **reduce the frequency of COPD
exacerbations**, *especially in patients with an
FEV₁ less than or equal to 60% of predicted.*

Side Effects of ICS:

Local effects include:

Oral candidiasis (thrush)

Dysphonia

Systemic effects include:

Increased bruising


Reduced bone density

pneumonia

Oral Glucocorticoids

The chronic use of oral glucocorticoids for treatment of **COPD is not recommended** because of an unfavorable benefit/risk ratio. significant side effects, including osteoporosis,

Weight gain, cataracts, glucose intolerance, and increased risk of infection.



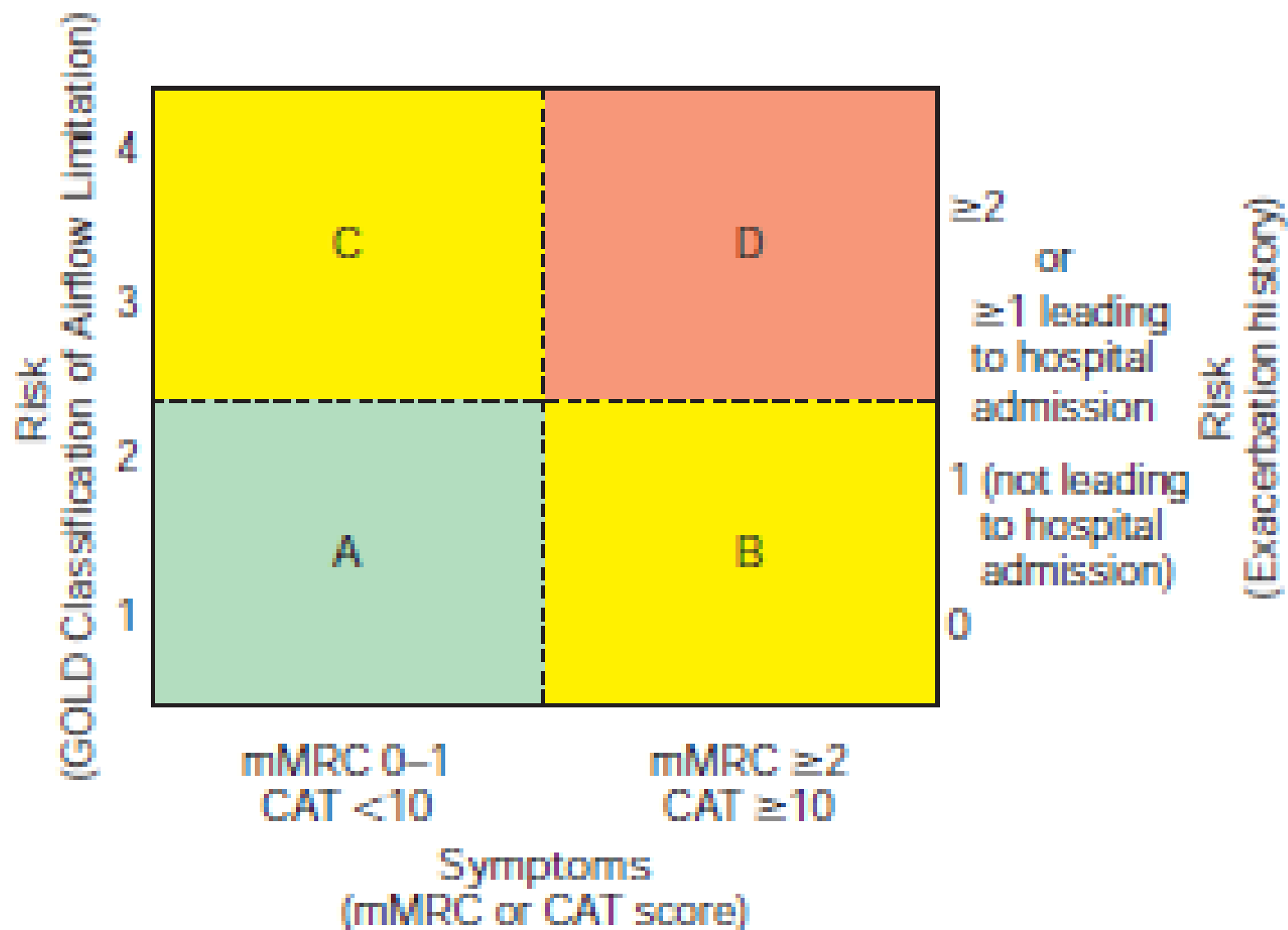
Chronic use of systemic corticosteroids
is associated with increased mortality,
which may reflect corticosteroid effects or the
underlying severity of the COPD.



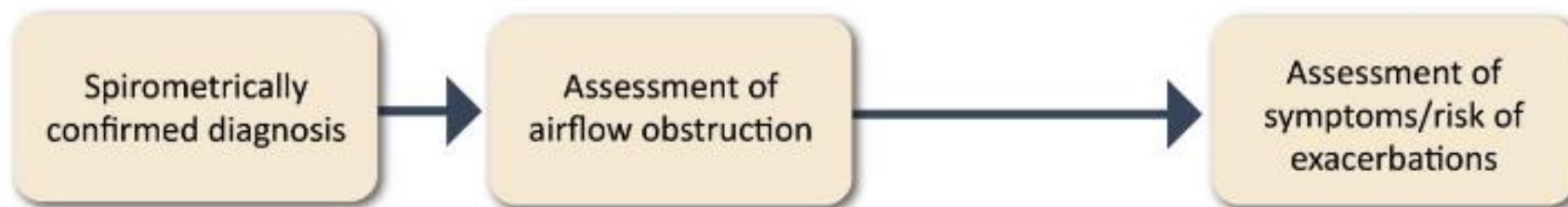
Combination Therapy

THERAPY AT EACH STAGE OF COPD

<i>Stage 1: Mild</i>	<i>Stage 2: Moderate</i>	<i>Stage 3: Severe</i>	<i>Stage 4: Very severe</i>
FEV ₁ /FVC < 0.70 FEV ₁ ≥ 80% predicted	FEV ₁ /FVC < 0.70 50% ≤ FEV ₁ < 80% predicted	FEV ₁ /FVC < 0.70 30% ≤ FEV ₁ < 50% predicted	FEV ₁ /FVC < 0.70 FEV ₁ < 30% predicted or FEV ₁ < 50% predicted plus chronic respiratory failure
Active reduction of risk factors, including smoking cessation and influenza vaccination			
Add short-acting bronchodilator as needed			
	Add one or more daily long-acting bronchodilator		
	Add pulmonary rehabilitation		
		Add inhaled corticosteroids for repeated exacerbations	
			Add O₂ if chronic respiratory failure
			Consider surgical therapy



GOLD ABE Assessment Tool



Post-bronchodilator FEV1/FVC < 0.7	GRADE	FEV1 (% predicted)	EXACERBATION HISTORY (PER YEAR)	E	
	GOLD 1	≥ 80	≥ 2 moderate exacerbations or ≥ 1 leading to hospitalization		
	GOLD 2	50-79			
	GOLD 3	30-49	0 or 1 moderate exacerbations (not leading to hospitalization)	A	B
	GOLD 4	< 30			
				mMRC 0-1 CAT < 10	mMRC ≥ 2 CAT ≥ 10

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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 1 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	

Modified MRC Dyspnea Scale



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



GOLD ABE Assessment Tool



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			E	
			A	B
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Antioxidants and Mucolytics

N-acetyl cysteine



LEUKOTRIENE MODIFIERS

COPD and concurrent cardiac disease

Nonselective β -blockers should be avoided in COPD patients.

Use of selective β_1 -blockers has been reported to improve survival in patients with cardiac disease and does not adversely affect lung function.

COPD and concurrent cardiac disease

The use of bronchodilators other than β -agonists may be preferred in patients with **unstable cardiac** disease

Air Travel:

The arterial PO_2 may fall below 40 mm Hg in some patients with COPD

That flying without supplemental oxygen is safe for most subjects with COPD.

Hypercapnic COPD patients should employ supplemental oxygen while flying




Air Travel:

If the patient has major bullous disease, the physician should always warn the patient that ascent to high altitude can precipitate life-threatening pneumothorax. Such a patient should probably not fly.



❑ EXACERBATIONS OF COPD

Exacerbations are episodes of increased dyspnea and cough and change in the amount and character of sputum.



patients with
moderate to severe airflow obstruction
(GOLD stage III or IV) on average have one to
three episodes per year.

The history of prior exacerbations is a strong
predictor of future exacerbations.

EXACERBATIONS OF COPD

Comorbidities may complicate the clinical picture.


Rib fractures

pneumothorax


Congestive heart failure

pneumonia


DVT PTE




Patients with severe underlying COPD, who are in moderate or severe distress, or those with focal findings should have a chest x-ray.



Approximately 25% of x-rays in this clinical situation will be abnormal, with the most frequent findings being pneumonia and congestive heart failure.



Patients with **advanced COPD**, those with a **history of hypercarbia**, those with mental status changes (**confusion, sleepiness**), or those in **significant distress** should have an **Arterial blood-gas measurement**.



In contrast to its utility in the management of exacerbations of asthma, measurement of pulmonary function has not been demonstrated to be helpful in the diagnosis or management of exacerbations of COPD.



There are no definitive guidelines concerning the need for inpatient treatment of exacerbations.

Patients with **respiratory acidosis** and **hypercarbia**, **significant hypoxemia**, or **severe underlying disease** or those whose living situation is not conducive to careful **observation** and the delivery of prescribed treatment should be **admitted to the hospital**.

TREATMENT OF ACUTE EXACERBATION

➤ Inhaled β agonist often

➤ Anticholinergic agent

➤ methylxanthines (such as theophylline)



Antibiotics

Most practitioners treat patients with moderate or severe exacerbations with antibiotics, even in the absence of data implicating a specific pathogen.



Streptococcus pneumoniae

Haemophilus influenzae

Moraxella catarrhalis


Mycoplasma pneumoniae

Chlamydia pneumoniae




Glucocorticoids

Among patients admitted to the hospital,
the use of glucocorticoids has been demonstrated to
Reduce the length of stay, hasten recovery, and reduce
the chance of subsequent exacerbation or relapse for a
period of up to 6 months.



One study demonstrated
that 2 weeks of glucocorticoid therapy produced
benefit indistinguishable from 8 weeks of therapy.
The GOLD guidelines recommend
30–40 mg of oral prednisolone or its equivalent for
a period of 10–14 days.



Hyperglycemia, particularly in patients with preexisting diagnosis of diabetes, is the most frequently reported acute complication of glucocorticoid treatment.



Oxygen

Mechanical Ventilatory Support

✓ **NIPPV**

in patients with **respiratory failure**

defined as $P_{aCO_2} > 45$ mmHg, results in a significant reduction in mortality rate, need for intubation, complications of therapy, and hospital length of stay.




Contraindications to NIPPV


cardiovascular instability
impaired mental status or
inability to cooperate
copious secretions or the inability to clear
secretions, craniofacial abnormalities
or trauma precluding effective fitting of mask,
extreme obesity and significant burns.

Invasive mechanical ventilation

is indicated for patients with
severe respiratory distress despite initial therapy
life-threatening hypoxemia
severe hypercarbia and/or acidosis
markedly impaired mental status
respiratory arrest, hemodynamic instability,



Factors to consider during MV include
the need to provide **sufficient expiratory time** in
patients with severe airflow obstruction.



The mortality rate of patients requiring mechanical ventilatory support is 17–30% for that particular hospitalization.



Thank you

DDX OF COPD

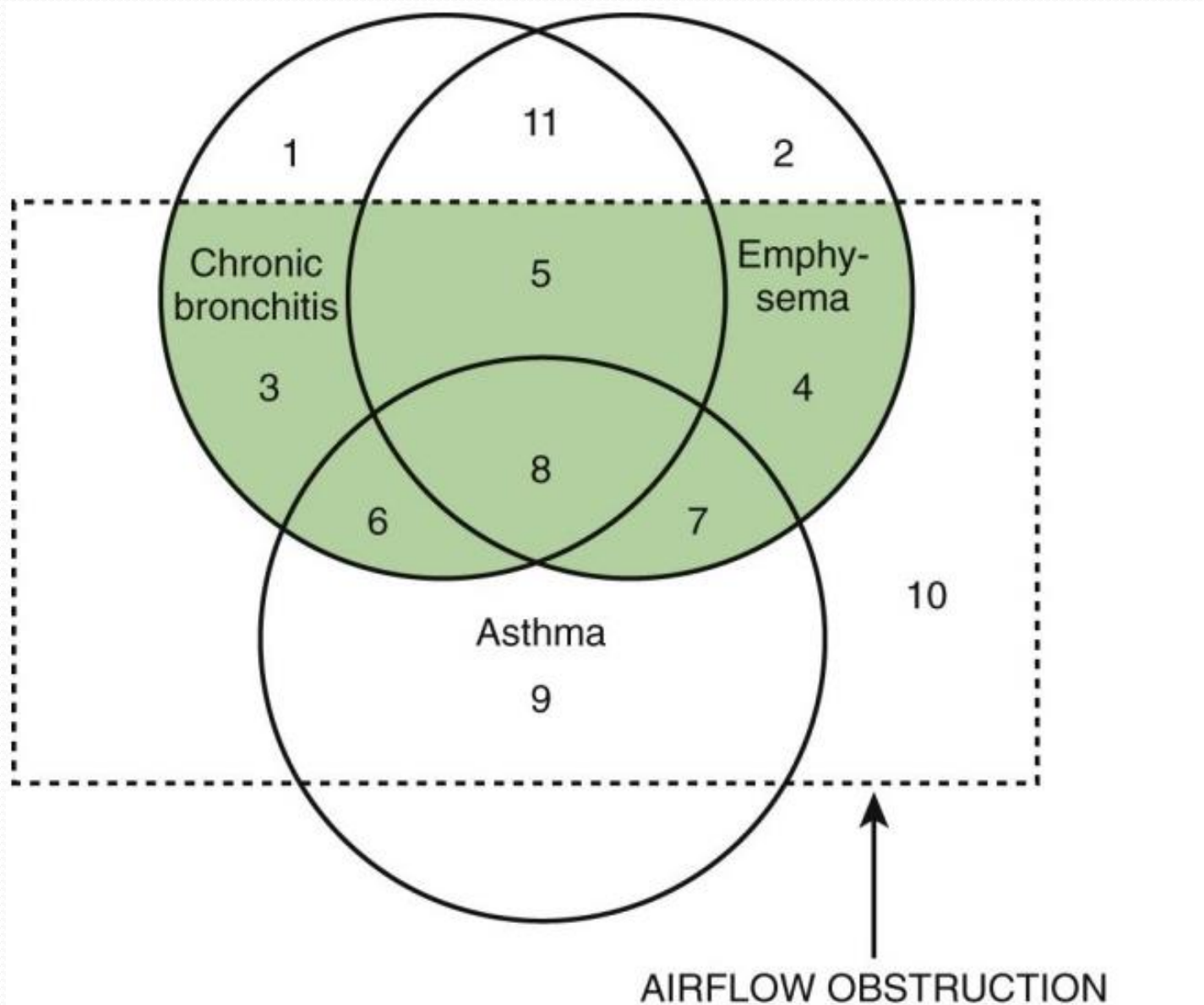


DIFFERENTIAL DIAGNOSIS:

**The most difficult clinical problem is to distinguish
Asthma from COPD**

Table 9. *Distinguishing Features of COPD and Asthma*

COPD	Asthma
Onset in midlife	Onset early in life (often childhood)
Symptoms slowly progressive	Symptoms vary from day to day
Long history of tobacco smoking	Allergic rhinitis and/or eczema history
Dyspnea during exercise	Sudden dyspnea after acute exposure
Largely irreversible airflow limitation	Largely reversible airflow limitation





CHRONIC BRONCHITIS WITHOUT AIRFLOW OBSTRUCTION



BRONCHIECTASIS



BRONCHIOLITIS OBLITERANS



LYMPHANGIOLEIOMYOMATOSIS



Thank you





Combination Therapy with Bronchodilators:

It is current practice to begin bronchodilator therapy with a single agent.

Combination therapy with a second or third bronchodilator from different classes can result in improved bronchodilator and clinical effect



Nonpharmacologic interventions

Smoking Cessation

Reduction of Risk Factors

Prevention of Respiratory Infections.

Oxygen Therapy

Pulmonary rehabilitation

STABLE PHASE COPD TREATMENT:


- smoking cessation
- oxygen therapy in chronically hypoxemic patients
- lung volume reduction surgery
- inhaled glucocorticoids ?



PHARMACOTHERAPY

☐ Smoking Cessation

significant improvement in the rate of decline in pulmonary function
returning to annual changes similar to that of Nonsmoking patients.



All other current therapies are directed at improving symptoms and decreasing the frequency and severity of exacerbations.