

Chronic Obstructive Pulmonary Disease (COPD)

Mamdouh Souleymane, MD

Definition:

COPD is characterized by progressive expiratory airflow limitation due to airway and/or alveolar inflammation usually caused by exposure to noxious stimuli. It is a mixture of small airways disease (chronic bronchitis) and parenchymal destruction (emphysema).

Epidemiology:

COPD is the fourth leading cause of death in the world

Pathophysiology:

- Airflow limitation and gas trapping
- Impaired gas exchange
- Mucus hypersecretion
- Pulmonary hypertension

Clinical presentation:

- Dyspnea, chronic cough, sputum production, and chest tightness
- Tachypnea, respiratory muscle use, barrel chest, hyperresonance, increased expiratory phase, wheezing, decreased breath sound and cyanosis

Assessment:

GOLD classification of severity of airflow limitation

- GOLD1: Mild, $FEV_1 \geq 80\%$ predicted
- GOLD2: Moderate, $50\% \leq FEV_1 < 80\%$ predicted
- GOLD3: Severe, $30\% \leq FEV_1 < 50\%$ predicted
- GOLD4: Very Severe, $FEV_1 < 30\%$ predicted

The Refined ABCD Assessment Tool		
	0 or 1 exacerbation with no hospitalization	≥ 2 exacerbation or ≥ 1 with hospitalization
mMRC 0-1 or CAT <10	A	C
mMRC ≥ 2 or CAT ≥ 10	B	D

mMRC = modified Medical Research Council

CAT = COPD Assessment Test

Investigations:

ABG: \downarrow PH, \downarrow PaO₂, \uparrow PaCO₂

CXR: flattened diaphragm, lungs hyperlucency, valuable in excluding alternative diagnoses

Spirometry: post-bronchodilator $FEV_1/FVC < 0.70$

Management of stable COPD:

- Smoking cessation
- Treatment based on ABCD risk assessment:
 - A: Bronchodilator
 - B: Long-Acting Muscarinic Antagonist (LAMA) (e.g. Tiotropium) or Long-Acting Beta₂ Agonist (LABA) (e.g. Salmeterol)
 - C: LAMA
 - D: LAMA or LAMA+LABA (severe symptoms), or Inhaled Corticosteroids ICS (e.g. Fluticasone) +LABA (consider if eos > 300)
- Oxygen therapy: PaO₂ <55mmHg or SaO₂ <88%
- Flu/pneumococcal vaccine
- Chronic macrolide therapy: consider if persistent symptoms despite optimal treatment

Management of COPD exacerbation:

- Short-Acting Beta₂ Agonist (SABA) (e.g. Albuterol) +/- Short-Acting Muscarinic Antagonist (SAMA) (e.g. Ipratropium)
- Systemic glucocorticoids
- Antibiotics: empirically based on patient characteristics and prior exposure, for example, respiratory fluoroquinolones (i.e. moxifloxacin) or 3rd generation cephalosporin (i.e. ceftriaxone), if risk for pseudomonas consider antipseudomonal agent (i.e. cefepime)
- Oxygen therapy: target SaO₂ 88-92% (excessive O₂ administration worsens V/Q mismatch and causes rightward shift of CO₂ dissociation curve (Haldane effect) leading to ↑ PaCO₂)
- Indications for Non-Invasive Ventilation (NIV):
 - Respiratory acidosis
 - Severe dyspnea
 - Persistent hypoxemia despite supplemental oxygen
- Indications for mechanical intubation:
 - Unable to tolerate NIV or NIV failure
 - Severe hemodynamic instability
 - Severely impaired consciousness
 - Unable to clear secretions

Clinical Pearls:

- Use CXR to exclude alternative diagnoses
- Smoking cessation is key intervention for all smokers with COPD
- Bronchodilators are the centerpiece of pharmacological management
- Initial management of stable COPD should be guided by ABCD assessment scheme
- Avoid overcorrecting hypoxemia to prevent worsening hypercapnia

References:

GOLD pocket Guide to COPD Diagnosis, Management and prevention, 2020 Report