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**Target Audience:** Physicians, Residents, Medical Students

# CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Pathophysiology, GOLD Classification, Assessment & Clinical Management

**Primary Evidence Base:** GOLD 2026 Report, NICE NG115
**Review Cycle:** Biennial (Next: Nov 2028)
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## 1. DEFINITION & GLOBAL EPIDEMIOLOGY

Chronic Obstructive Pulmonary Disease (COPD) is a heterogeneous lung condition characterized by chronic respiratory symptoms (dyspnoea, cough, sputum production) due to abnormalities of the airways (bronchitis, bronchiolitis) and/or alveoli (emphysema) that cause persistent, often progressive, airflow obstruction **(GOLD Report, 2026)**.

COPD is the third leading cause of death worldwide, responsible for over 3.2 million deaths annually **(WHO, 2026)**. Major risk factors include tobacco smoking, environmental biomass fuel exposure, occupational dusts, and genetic predispositions such as Alpha-1 Antitrypsin Deficiency (AATD).

## 2. PATHOPHYSIOLOGY & STRUCTURAL CHANGES

COPD results from chronic inflammatory responses to inhaled toxic particles:

- **Small Airway Disease (Obstructive Bronchiolitis):** Chronic inflammation, airway wall fibrosis, goblet cell hyperplasia, and luminal mucus plugging increase airway resistance.
- **Parenchymal Destruction (Emphysema):** Elastase-antielastase imbalance and oxidative stress lead to destruction of alveolar walls, loss of elastic recoil, gas trapping, and hyperinflation.
- **Systemic Manifestations:** Persistent systemic inflammation contributing to muscle wasting, cardiovascular disease, osteoporosis, and metabolic dysfunction.

## 3. DIAGNOSTIC CRITERIA & SPIROMETRY

Diagnosis must be considered in any patient with dyspnoea, chronic cough, or sputum production, and a history of exposure to risk factors. Post-bronchodilator spirometry is mandatory to establish diagnosis.

**DIAGNOSTIC GOLD STANDARD**

A post-bronchodilator **$FEV_1/FVC < 0.70$** confirms persistent airflow limitation. Unlike asthma, this obstruction is typically not fully reversible.

| GOLD Grade | $FEV_1$ (% Predicted) | Severity Impression |
|---|---|---|
| **GOLD 1** | $FEV_1 \geq 80\%$ predicted | Mild airflow limitation |
| **GOLD 2** | $50\% \leq FEV_1 < 80\%$ predicted | Moderate airflow limitation |
| **GOLD 3** | $30\% \leq FEV_1 < 50\%$ predicted | Severe airflow limitation |
| **GOLD 4** | $FEV_1 < 30\%$ predicted | Very severe airflow limitation |

## 4. ASSESSMENT OF SYMPTOMS & RISK (GOLD ABE TOOL)

Patient classification guides pharmacological initiation based on symptom burden (mMRC or CAT score) and exacerbation history **(GOLD Report, 2026)**.

| Exacerbation History | mMRC 0–1, CAT < 10 | mMRC ≥ 2, CAT ≥ 10 |
|---|---|---|
| **≥ 2 moderate OR ≥ 1 leading to hospital admission** | **Group E** (High Exacerbation Risk — LABA + LAMA, consider ICS if eosinophils ≥ 300) | |
| **0 or 1 moderate (no hospital admission)** | **Group A** (Single Bronchodilator: LAMA or LABA) | **Group B** (Dual Bronchodilator: LABA + LAMA) |

## 5. PHARMACOLOGICAL MAINTENANCE THERAPY

- **LAMA / LABA:** Long-acting muscarinic antagonists (e.g., Tiotropium) and long-acting $\beta_2$-agonists (e.g., Indacaterol) form the cornerstone of chronic therapy. Dual LAMA/LABA is superior to monotherapy in reducing exacerbations.
- **Triple Therapy (LABA + LAMA + ICS):** Recommended for Group E patients with blood eosinophils ≥ 300 cells/mcL or persistent exacerbations despite dual bronchodilation **(NICE NG115, 2024)**.
- **PDE4 Inhibitors (Roflumilast):** Add-on option in patients with $FEV_1$ < 50%, chronic bronchitis, and frequent exacerbations despite long-acting bronchodilators.

## 6. ACUTE EXACERBATIONS OF COPD (AECOPD)

An exacerbation is defined as an acute event characterized by a worsening of the patient's respiratory symptoms beyond normal day-to-day variations.

> **CLINICAL ALERT — CONTROLLED OXYGEN THERAPY**
> High-flow oxygen in hypercapnic respiratory failure risks abolishing hypoxic drive. Target oxygen saturation is **88–92%** via Venturi mask until arterial blood gas (ABG) analysis is available.

| Intervention | Standard Regimen | Clinical Notes |
|---|---|---|
| **Bronchodilators** | Nebulized Salbutamol 2.5–5mg + Ipratropium 500mcg q4–6h. | Driven by compressed air, not oxygen (to avoid worsening hypercapnia). |
| **Systemic Corticosteroids** | Oral Prednisolone 30–40 mg daily for 5 days. | Shortens recovery time, improves $FEV_1$, reduces risk of early relapse. |
| **Antibiotic Therapy** | Amoxicillin, Doxycycline, or Clarithromycin for 5 days. | Indicated if 2+ Anthonisen criteria present (increased dyspnoea, sputum volume, sputum purulence). |
| **Non-Invasive Ventilation (NIV)** | BiPAP for acute hypercapnic respiratory failure (pH < 7.35, $PaCO_2$ > 6.0 kPa). | First-line ventilatory support; reduces intubation rates and mortality. |

## 7. REFERENCES & EVIDENCE BASE


1. Global Initiative for Chronic Obstructive Lung Disease (GOLD). *Global Strategy for the Diagnosis, Management, and Prevention of COPD*, 2026. Available from: goldcopd.org
2. National Institute for Health and Care Excellence (NICE). *Chronic obstructive pulmonary disease in over 16s: diagnosis and management (NG115)*, updated 2024.
3. World Health Organization. *Chronic Obstructive Pulmonary Disease (COPD) Fact Sheet*, 2026.