

# Clinical Aspects of Chronic Obstructive Pulmonary Disease

**Definition:** "Various clinical entities with multiple causes resulting in airflow limitation that is irreversible or at best poorly reversible".

**Practical definition:** clinical syndrome characterized by chronic respiratory symptoms, structural abnormalities (airways disease, emphysema, or both), lung-function impairment (e.g. poorly reversible airflow limitation), or any combination of these.

Cornerstone of **diagnosis** is spirometry (typically with FEV1 <80% pred, FEV1:FVC <0.7)

### Causes

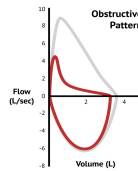
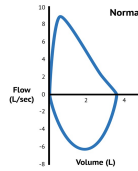
- Smoking
- Genetic
- Environmental
- Biomass
- Occupational
- Air pollution

### Further points

- COPD due to smoking associated with more severe emphysema and more rapid decline in FEV1 than COPD from biomass exposure
- COPD due to biomass characterized by airway-wall thickening and improved lung function after the use of bronchodilators
- Asthma may progress to fixed airways obstruction, and may also co-exist with COPD
  - More symptoms, exacerbations, and hospitalizations than smoking-associated COPD, but have a lower mortality rate

### Physiological testing

Typical findings in COPD  
 ↓ FEV1, FEV1:FVC, DLco  
 ↑ FRC, RV, TLC  
 Coving of flow-volume loop



### Some further points on physiological measurements

- SaO2 <90% at rest requires ABG to assess need for supplemental O2
- RV/TLC >0.35 indicates air trapping
- (inspiratory capacity)/TLC <0.25 associated with increased mortality
  - When accompanied by dynamic hyperinflation, is a determinant of the severity of dyspnea.
- As hyperinflation worsens, both resting IC and inspiratory fraction decrease
- 6MWD <350m associated with increased mortality

### Significance of decreased DLco (or KCO)

- Indirect measure of emphysema
- Predicts desaturation, pulmonary HTN, and lung cancer

### Phenotyping and the role of chest CT

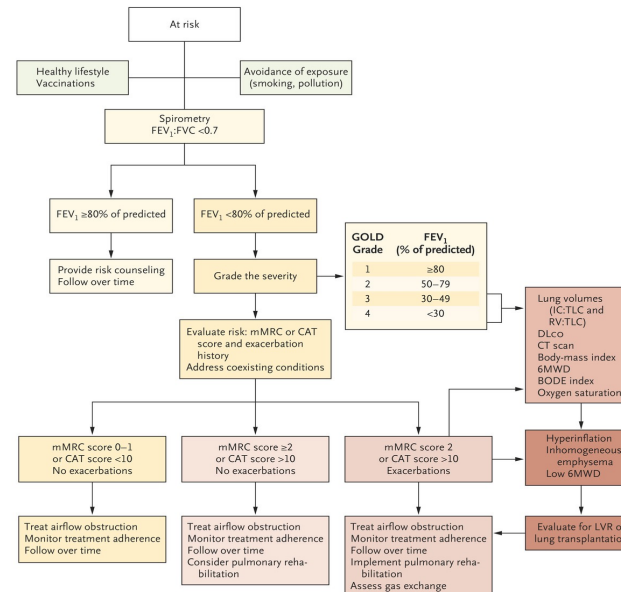
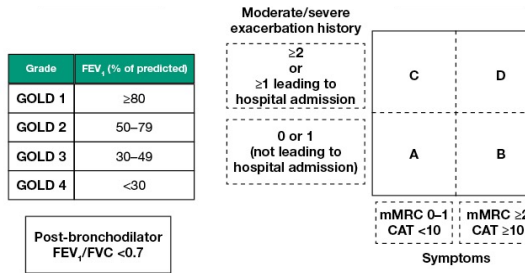
Emphysema phenotype formerly referred to as "pink puffer" now defined by CT as MOLT (multi-organ loss of tissue)

- Associated with loss of mesenchymal tissue (bone, muscle, and fat).
- Increased risk for lung cancer
- Patients with heterogeneous, upper-lobe-predominant emphysema on CT are good candidates for bronchoscopic or surgical LVR

Bronchitic phenotype formerly known as "blue bloater" display airway luminal narrowing and wall thickening on CT

- Increased cough, sputum (volume and purulence) and exacerbations
- Increased incidence of metabolic syndrome and coronary artery disease
- Increased mortality risk

### GOLD ABCD assessment tool



### Prognostic factors

- BODE index
- FEV1 (% pred)
- Intensity of dyspnea
- Cachexia
- Impairment of ADLs
- Exacerbation frequency, duration and need for hospitalization
  - Hx of exacerbations predicts future exacerbations as well as mortality
  - Especially two or more in a year or an episode requiring hospitalization

Prognostic factor	BODE index score		
	+ 1 point	+ 2 points	+ 3 points
Body mass index (BMI)	≤ 21		
Obstruction (FEV <sub>1</sub> )	50–64%	36–49%	≤ 35%
Dyspnoea (MMRC scale)	2	3	4
Exercise capacity (6-minute walk distance)	250–349 metres	150–249 metres	≤ 149 metres

### Exacerbations

30%-50% have a bacterial cause

1. Haemophilus influenza
2. Streptococcus pneumonia
3. Moraxella catarrhalis

Up to 30% are viral

1. Influenza
2. Rhinovirus

Frequent exacerbators identified by:

- Hx of exacerbations
- Severe airflow limitation
- Presence of GORD

### AECOPD management concepts

- Nebulized SABA, short-acting anticholinergics may be added if required
- Systemic steroids (e.g. 40mg pred OD PO for 5d) improve airflow, gas exchange, symptoms
- Benefit of antibiotics highest in patients with severe exacerbations and purulent sputum
- Hospitalize if FEV1 <1L, hypoxemia, hypercapnia, significant comorbidity
- If SaO2 <90%, room air ABG indicated
  - Hypoxemia without hypercapnia → low-flow O2
    - Target Pao2 >8kPa with SaO2 91-94%
  - Persistent hypercapnia with pH <7.35 but >7.15 → consider NIV
    - C/I's to NIV: unstable patient, shock, unprotected airway, agitation, craniofacial deformity
      - Consider invasive mechanical ventilation instead

### Maintenance

