

Pulmonary Disorders & Diseases — High-Yield Master Outline (Chapter 29 Style)

1) Big Picture: How Pulmonary Disease Presents

Pulmonary disease disrupts **ventilation, diffusion, perfusion, or mechanics**, producing characteristic **signs and symptoms** that often point to the underlying pathology.

Core symptom clusters

- Dyspnea (most common)
 - Cough
 - Abnormal sputum
 - Hemoptysis
 - Abnormal breathing patterns
 - Hypo-/hyperventilation
 - Cyanosis
 - Clubbing
 - Chest pain
-

2) Dyspnea (Breathing Discomfort)

Definition: Subjective sensation of difficult or uncomfortable breathing.

Mechanisms

Dyspnea arises from **integration of multiple inputs**:

- CNS respiratory centers
- Chemoreceptors (central & peripheral)
- Lung sensory receptors
- Chest wall mechanoreceptors
- Psychological influences

Triggers

- Lung parenchymal damage (pneumonia, fibrosis)
- Ventilation disturbances (effusion, pneumothorax, asthma)
- Increased ventilatory demand (hypoxia, anemia, fever)
- Gas exchange impairment (PE, pneumonia)
- ↓ lung compliance (pulmonary edema, fibrosis)

Types

- **Dyspnea on exertion (DOE)**: earliest sign
- **Orthopnea**: worse when supine (↑ pulmonary blood volume → ↓ compliance)
- **Paroxysmal nocturnal dyspnea (PND)**: delayed orthopnea during sleep

Severe dyspnea signs (RED FLAGS)

- Accessory muscle use
- Tripod positioning
- Nasal flaring

- Retractions

Evaluation & Management

- Pulse oximetry, spirometry, ECG
 - Imaging, labs as needed
 - Treat underlying cause
 - Refractory disease: pulmonary rehab, opioids, benzodiazepines, corticosteroids
-

3) Cough

Purpose: Protective reflex to clear airways.

Cough Reflex Sequence

1. Inspiration
2. Glottis closure
3. Forceful expiratory muscle contraction
4. Sudden glottis opening → explosive expiration

Types

- **Acute (<3 weeks):**
 - URIs, pneumonia, CHF, aspiration
- **Chronic (>8 weeks adults):**
 - Postnasal drip
 - Asthma

- GERD
- Chronic bronchitis
- ACE inhibitors
- Smoking / inhaled irritants

Treatment

- Treat underlying cause
 - **Antitussives**
 - Central: dextromethorphan
 - Peripheral: benzonatate
 - Refractory cough: opioids, gabapentin, amitriptyline
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4) Abnormal Sputum

Changes in **color, consistency, volume** suggest etiology:

- Clear/foamy → pulmonary edema
- Purulent (yellow/green) → infection
- Bloody → hemoptysis

Used for **diagnosis + therapy guidance**

5) Hemoptysis

Definition: Coughing up blood from tracheobronchial tree
Common causes

- Lung cancer
- Bronchiectasis
- Pulmonary embolism
- Pneumonia

Dx: imaging + bronchoscopy
Differentiate from hematemesis

6) Abnormal Breathing Patterns

Normal

- **Eupnea:** effortless, rhythmic
- RR: 8–16/min
- VT: 400–800 mL

Abnormal patterns

- **Kussmaul respirations:** metabolic acidosis
 - **Labored breathing:** accessory muscles, wheezing
 - **Restricted breathing:** stiff lungs → tachypnea + small VT
 - **Gasping respirations:** shock, cerebral hypoxia
 - **Cheyne-Stokes:** cyclic apnea & hyperpnea → ↓ brainstem perfusion
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7) Hypoventilation vs Hyperventilation

Hypoventilation

- ↓ minute ventilation
- ↑ PaCO₂ → **hypercapnia**
- → respiratory acidosis

Hyperventilation

- ↑ ventilation beyond metabolic needs
- ↓ PaCO₂ → **hypocapnia**
- → respiratory alkalosis
- Seen in anxiety, pain, hypoxemia

Dx: ABGs

8) Cyanosis

Types

- **Peripheral:** ↓ circulation (cold, HF)
- **Central:** ↑ deoxygenated hemoglobin (hypoxemia)

Key point

- Cyanosis appears late → unreliable indicator
 - Anemia & CO poisoning → hypoxia **without cyanosis**
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9) Clubbing

Definition: Bulbous enlargement of distal digits

Causes

- Lung cancer (most common)
- Chronic hypoxemia (CF, fibrosis)
- Congenital heart disease

Mechanism

- PDGF & VEGF → connective tissue proliferation
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10) Pulmonary Pain

- **Pleural pain:** sharp, worse with inspiration (pleuritis)
 - **Bronchial/tracheal pain:** after coughing
 - **Pulmonary HTN:** exertional chest pain
 - **Chest wall pain:** costochondritis, trauma, surgery
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CONDITIONS CAUSED BY PULMONARY DISEASE

11) Hypercapnia

$\text{PaCO}_2 > 44 \text{ mm Hg}$ → respiratory acidosis

Causes

- ↓ respiratory drive (drugs, CNS injury)

- Neuromuscular disease
- Chest wall abnormalities
- Airway obstruction (sleep apnea, tumors)
- ↑ dead space (emphysema)

Effects

- Cerebral vasodilation → somnolence/coma
 - Dysrhythmias
 - Secondary hypoxemia
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12) Hypoxemia

↓ PaO₂ (arterial oxygen)

Mechanisms

1. ↓ alveolar O₂ (↓ FiO₂, hypoventilation)
2. Diffusion impairment
3. V/Q mismatch (MOST COMMON)
4. ↓ pulmonary perfusion (shunts)

Key Concepts

- **Low V/Q:** shunting (edema, atelectasis)
- **High V/Q:** dead space (PE, emphysema)
- **Hypoxic pulmonary vasoconstriction:** compensatory but → pulmonary HTN if widespread

13) Acute Respiratory Failure

Criteria

- $\text{PaO}_2 \leq 60 \text{ mm Hg}$
- $\text{PaCO}_2 \geq 50 \text{ mm Hg}$ with $\text{pH} \leq 7.25$

Types

- Hypoxemic
- Hypercapnic
- Mixed (most common)

Management

- Oxygen therapy
- Ventilatory support
- Prevent complications (atelectasis, pneumonia)

CHEST WALL & PLEURAL DISORDERS

14) Chest Wall Restriction

Effect: ↓ tidal volume → hypoventilation

Causes

- Kyphoscoliosis
- Ankylosing spondylitis
- Flail chest
- Neuromuscular disease

Dx & Tx

- ↓ FVC on PFTs
 - Treat cause, pain control, incentive spirometry
 - Ventilation if severe
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15) Pneumothorax

Air in pleural space → lung collapse

Types

- Primary spontaneous (blebs)
- Secondary spontaneous (lung disease)
- Traumatic / iatrogenic

Tension pneumothorax (EMERGENCY)

- One-way valve
- Mediastinal shift
- Severe hypoxemia + hypotension

Tx

- Chest tube
 - Pleurodesis if recurrent
-

16) Pleural Effusion

Fluid in pleural space

Types

1. Transudative
2. Exudative
3. Empyema
4. Hemothorax
5. Chylothorax

S/S

- Dyspnea
- Dullness to percussion
- ↓ breath sounds

Tx

- Treat cause
 - Thoracentesis or chest tube if large
-

RESTRICTIVE LUNG DISEASES (STIFF LUNGS)

17) Aspiration

- Gastric or oral contents enter lungs
- → pneumonitis or pneumonia
- Right lower lobe most affected

Prevention

- Semi-recumbent positioning
 - Swallow evaluation
 - Oral hygiene
-

18) Atelectasis

Collapse of alveoli → hypoxemia

Types

1. Obstructive
2. Compression
3. Surfactant impairment

Prevention

- Incentive spirometry
 - Early ambulation
 - Deep breathing
-

19) Bronchiectasis

Permanent bronchial dilation

- Chronic productive cough
- Purulent sputum
- Hemoptysis
- Clubbing

Tx: antibiotics, chest PT, bronchodilators

20) Bronchiolitis

- Inflammation & fibrosis of bronchioles
 - Severe form: **bronchiolitis obliterans**
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21) Pulmonary Fibrosis

- ↓ diffusion
- ↓ compliance
- Progressive hypoxemia

Idiopathic Pulmonary Fibrosis (IPF)

- Honeycombing
 - Poor prognosis
 - Tx: antifibrotics, transplant
-

22) Inhalation Disorders

- Toxic gases
 - Pneumoconiosis
 - Hypersensitivity pneumonitis
-

23) Pulmonary Edema

Fluid in interstitium/alveoli

- Cardiogenic (HF)
 - Noncardiogenic (ARDS)
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24) Acute Respiratory Distress Syndrome (ARDS)

Diffuse alveolar injury

Phases

1. Exudative
2. Proliferative

3. Fibrotic

Hallmarks

- Refractory hypoxemia
 - ↓ compliance
 - Bilateral infiltrates
-

OBSTRUCTIVE LUNG DISEASES

25) Asthma

- Reversible airflow obstruction
- Type I hypersensitivity
- Early & late phase reactions

Key features

- Wheezing
 - Dyspnea
 - Status asthmaticus = emergency
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26) Chronic Obstructive Pulmonary Disease (COPD)

Phenotypes

- Chronic bronchitis
- Emphysema
- A1-antitrypsin deficiency

Hallmarks

- Air trapping
 - Hypercapnia
 - Hypoxemia
 - Cor pulmonale
-

RESPIRATORY INFECTIONS

27) Acute Bronchitis

- Viral most common
 - Self-limiting
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28) Pneumonia

Types

- Community-acquired
- Hospital-acquired

- Ventilator-associated

Pathophysiology

- Alveolar inflammation
- Consolidation
- V/Q mismatch

Pneumonia: Prevention, Treatment, and Special Types (Expanded)

Prevention of Pneumonia

Community-Acquired Pneumonia (CAP)

- Smoking cessation
- Avoidance of sedating medications (↓ aspiration risk)
- **Pneumococcal vaccination** recommended for older adults

Hospital-Acquired Pneumonia (HAP)

- Head-of-bed elevation
- Strict oral hygiene
- Hand hygiene

Ventilator-Associated Pneumonia (VAP)

- Use of **specialized endotracheal tubes**
 - Ventilator bundles to reduce aspiration and biofilm formation
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Antibiotic Therapy for Bacterial Pneumonia

- **Prompt antibiotic administration is essential**
 - **Outpatient CAP:** empiric **macrolide antibiotics**
 - **Severe CAP, HAP, VAP:** combination broad-spectrum antibiotics
 - Antibiotic selection guided by:
 - Severity
 - Risk factors
 - Local resistance patterns
 - **New antibiotics** continue to be developed for resistant organisms
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Fungal Pneumonia (New Dedicated Section)

Epidemiology

- 300 fungal species pathogenic to humans
- **Uncommon cause of CAP** except in **severely immunocompromised individuals**

Common Pathogens

Immunocompromised

- *Pneumocystis jirovecii*
- *Aspergillus*
- *Candida albicans*
- *Cryptococcus*

Immunocompetent

- *Coccidioidomycosis*
- *Blastomycosis*
- *Histoplasmosis*

Pathophysiology

- Inhalation of spores or reactivation of latent infection
- Intense inflammatory response
- Pulmonary lesions may be **localized or diffuse**

Clinical Manifestations

- Fever
- Cough
- Dyspnea
- Night sweats
- Weight loss
- Fatigue

Evaluation

- Chest x-ray (often nonspecific)
- Sputum or tissue cultures
- Antigen testing
- Serologic or molecular testing

- Bronchoscopy ± biopsy when indicated

Treatment

- **Empiric antifungal therapy** in high-risk individuals
 - **Extended-spectrum triazoles**
 - **Liposomal amphotericin B** for severe disease
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Tuberculosis (TB) — Expanded & High-Yield

Epidemiology

- Caused by *Mycobacterium tuberculosis*
- 10.6 million cases worldwide annually
- Second leading infectious killer worldwide
- ~13 million Americans with latent TB

Risk Factors

- HIV/immunosuppression
 - Immigration from high-prevalence countries
 - Crowded institutions
 - Homelessness
 - Substance use
 - Limited access to care
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Pathophysiology

- **Airborne transmission**
- Macrophages ingest bacilli but cannot destroy them
- **Granuloma (tubercle) formation**
- Caseation necrosis + collagen scar
- Results in **latent TB infection (LTBI)**
- Immunosuppression → reactivation → disseminated disease

Extrapulmonary spread

- Lymph nodes
- Skin
- Eyes
- CNS
- Bones/joints
- Genitourinary system
- Abdomen

Clinical Manifestations

Latent TB

- Asymptomatic

Active TB

- Night sweats

- Weight loss
- Fatigue
- Anorexia
- Low-grade fever
- Chronic productive cough
- Hemoptysis
- Dyspnea
- Chest pain

Extrapulmonary

- Neurologic deficits
- Bone pain
- Urinary symptoms
- Meningitis

Evaluation

- **Screening indications**
 - Exposure
 - High-prevalence regions
 - Health care, LTC, corrections
- **Testing**
 - PPD (limitations: false +/-)

- **IGRA preferred** for:
 - Prior BCG vaccination
 - Employment screening
 - Positive test → repeat testing
 - Active TB confirmation:
 - Sputum stain & culture
 - Chest x-ray
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Treatment

- **BCG vaccine** (only TB vaccine)
 - **LTBI:** antituberculosis therapy for high-risk individuals
 - **Active TB**
 - Respiratory isolation
 - CDC-recommended **4-month two-drug regimen**
 - Monitoring for adherence and toxicity
 - **Multidrug-resistant TB**
 - Drug susceptibility testing
 - New emerging therapies
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Lung Abscess & Cavitation (Expanded)

Pathophysiology

- Localized liquefactive necrosis
- Commonly due to **aspiration**
 - Alcohol abuse
 - Seizures
 - General anesthesia
 - Swallowing disorders
- Alveoli fill with pus → necrosis
- Abscess drains into bronchus → **cavitation**

Clinical Manifestations

- Copious **malodorous sputum**
- Fever
- Chills
- Cough
- Pleuritic chest pain
- Hemoptysis (sometimes)

Diagnosis

- Chest x-ray
- Sputum analysis

Treatment

- Prolonged antibiotics

- Chest physiotherapy
 - Bronchoscopy for drainage if needed
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Pulmonary Vascular Disease (Expanded)

Pulmonary Embolism (PE)

Epidemiology

- 370,000 VTE cases annually in U.S.
- High mortality; sudden death common
- COVID-19 significantly ↑ VTE risk

Risk Factors

- Venous stasis
 - Endothelial injury
 - Hypercoagulability
 - Surgery
 - Infection
 - Pregnancy
 - Hormones
 - Malignancy
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Pathophysiology

- Thrombus lodges in pulmonary vasculature
 - Release of:
 - Serotonin
 - Histamine
 - Endothelin
 - Leukotrienes
 - Results in:
 - Vasoconstriction
 - V/Q mismatch
 - Hypoxemia
 - Pulmonary HTN
 - Massive PE → shock, RV failure, death
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Clinical Manifestations

- Sudden dyspnea
- Pleuritic chest pain
- Tachypnea
- Tachycardia
- Anxiety
- Hemoptysis (sometimes)

- Syncope (large PE)
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Evaluation

- Clinical probability scoring
 - **D-dimer**
 - CT pulmonary angiography
 - V/Q SPECT (young patients)
 - ABGs: hypoxemia + respiratory alkalosis
 - BNP/troponin for RV strain
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Treatment

- **Anticoagulation (primary)**
 - LMWH
 - DOACs (apixaban, rivaroxaban)
- Severe PE:
 - Hospitalization
 - Oxygen
- Hemodynamic instability:
 - Thrombolytics (alteplase)
 - Thrombectomy
- IVC filter if anticoagulation contraindicated

Pulmonary Hypertension (PH)

Definition

- Mean pulmonary artery pressure >20 mm Hg

Causes

- PAH (idiopathic, heritable, drugs)
- Left heart disease (most common)
- Lung disease/hypoxia
- Chronic thromboembolic disease

Pathophysiology

- Endothelial dysfunction
- ↑ vasoconstrictors (endothelin)
- ↓ vasodilators (NO, prostacyclin)
- Vascular remodeling → RV hypertrophy → failure

Clinical Manifestations

- Fatigue
- Dyspnea on exertion
- Chest discomfort

- Peripheral edema
 - JVD
 - Loud P2
-

Treatment

- Oxygen
 - Diuretics
 - Anticoagulation
 - Vasodilators:
 - CCBs
 - Prostacyclins
 - PDE-5 inhibitors
 - Endothelin antagonists
 - Avoid pregnancy, tobacco, NSAIDs
 - Treat underlying cause
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Cor Pulmonale

Definition

- RV enlargement/failure due to PH

Clinical Manifestations

- Exercise intolerance
- JVD
- Hepatosplenomegaly
- Peripheral edema
- Tricuspid regurgitation murmur

Treatment

- Reduce pulmonary pressures
 - Treat underlying lung disease
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Respiratory Tract Malignancies (Expanded)

Laryngeal Cancer

- Strongly linked to smoking + alcohol
- HPV (types 6 & 11)
- **Key symptom:** progressive hoarseness

Diagnosis

- Laryngoscopy + biopsy
- TNM staging

Treatment

- Surgery
 - Radiation
 - Chemotherapy
 - Speech/swallow therapy post-treatment
-

Lung Cancer

Risk Factors

- Smoking (80–90%)
 - Radon
 - Asbestos
 - Air pollution
 - Genetic mutations
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Types

Non–Small Cell Lung Cancer (80–85%)

- Squamous cell
- Adenocarcinoma
- Large cell

Neuroendocrine

- Small cell (aggressive, early metastasis)

- Carcinoid tumors
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Clinical Manifestations

- New cough
 - Dyspnea
 - Hemoptysis
 - Weight loss
 - Bone pain
 - Paraneoplastic syndromes
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Evaluation

- LDCT screening (50–80 yrs, ≥ 20 pack-years)
 - CT, PET
 - Bronchoscopy + biopsy
 - TNM staging (NSCLC)
 - Limited vs extensive (SCLC)
-

Treatment

- Surgery (early NSCLC)
- Chemotherapy
- Radiation

- Immunotherapy
- Targeted molecular therapy

Key Terms + Definitions

Abscess

A localized, pus-filled cavity in lung tissue caused by infection and **liquefactive necrosis**; often linked to aspiration and anaerobes.

Acute bronchitis

Acute inflammation/infection of the bronchi (usually viral) causing cough ± sputum, **without** lung consolidation/infiltrates on chest x-ray.

Acute respiratory distress syndrome (ARDS)

Severe, diffuse inflammatory lung injury causing **increased capillary permeability**, noncardiogenic pulmonary edema, ↓lung compliance, and **refractory hypoxemia**.

Adenocarcinoma

A type of **non–small cell lung cancer (NSCLC)** arising from glandular cells; often **peripheral** lung tumors.

Alveolar dead space

Alveoli that are **ventilated but not perfused**, resulting in wasted ventilation (classic cause: pulmonary embolism).

Aspiration

Entry of gastric contents/oropharyngeal secretions/foreign material into the airway/lungs, leading to pneumonitis, pneumonia, obstruction, or abscess.

Asthma

Chronic inflammatory airway disease with **bronchial hyperresponsiveness** and **reversible** airflow obstruction (wheeze, cough, dyspnea).

Atelectasis

Collapse of alveoli/lung tissue causing **V/Q mismatch and hypoxemia**; can be obstructive, compression, or surfactant impairment type.

Bronchial carcinoid tumor

Slow-growing **neuroendocrine** lung tumor; can be central; may cause obstruction; usually better prognosis than small cell carcinoma.

Bronchiectasis

Permanent abnormal dilation of bronchi due to chronic infection/inflammation → chronic productive cough, copious purulent sputum, recurrent infections.

Bronchiolitis

Inflammation of bronchioles causing narrowing/obstruction (often viral in children; in adults linked to smoking/irritants).

Bronchiolitis obliterans

Severe bronchiolar injury leading to **fibrosis and airway obliteration**, often after transplantation or severe inhalational injury.

Cavitation

Formation of an empty space/cavity in lung tissue, commonly when an abscess drains into a bronchus.

Cheyne-Stokes respiration

Cyclic breathing pattern of **waxing/waning depth** with periods of apnea, often due to reduced brainstem perfusion (e.g., heart failure, neurologic injury).

Chronic bronchitis

COPD phenotype defined by **productive cough** for ≥ 3 months/year for ≥ 2 consecutive years; caused by mucus hypersecretion + airway inflammation.

Chronic obstructive pulmonary disease (COPD)

Progressive, largely irreversible airflow limitation caused by airway/alveolar damage (chronic bronchitis and/or emphysema), commonly from inhaled toxins.

Chylothorax

Pleural effusion of **lymphatic fluid (chyle)** due to thoracic duct injury/obstruction; classically milky fluid.

Clubbing

Bulbous enlargement of distal fingers/toes with loss of nail-bed angle; associated with chronic hypoxemia and lung cancer.

Collagen vascular disease–associated interstitial lung disease (CVD-ILD)

Interstitial lung fibrosis/inflammation caused by autoimmune connective tissue diseases (e.g., scleroderma, RA, SLE).

Community-acquired pneumonia (CAP)

Pneumonia acquired outside the hospital; common causes include **S. pneumoniae** and respiratory viruses.

Cor pulmonale

Right ventricular hypertrophy/dilation/failure caused by **pulmonary hypertension** from chronic lung disease/hypoxia.

Cough

Protective reflex to clear airways; triggered by airway irritants → inspiration, glottis closure, forceful expiration.

Cyanosis

Bluish/gray discoloration from increased deoxygenated hemoglobin (central) or poor perfusion/vasoconstriction (peripheral).

Dyspnea

Subjective sensation of difficult or uncomfortable breathing (e.g., “air hunger,” shortness of breath).

Emphysema

COPD phenotype with **destruction of alveolar walls** and loss of elastic recoil → air trapping, hyperinflation, impaired gas exchange.

Empyema

Infected pleural effusion (pus in the pleural space), often a complication of pneumonia or thoracic surgery.

Exudative effusion

Pleural effusion due to **inflammation/infection/malignancy** with ↑protein and ↑cells from increased capillary permeability.

Flail chest

Multiple adjacent rib fractures causing a free-floating segment → **paradoxical chest movement** and impaired ventilation.

Hemoptysis

Coughing up blood originating from the respiratory tract (trachea/bronchi/lungs), not GI bleeding.

Hemothorax

Blood in the pleural space, commonly from trauma, surgery, malignancy, PE, or TB.

Hospital-acquired pneumonia

Pneumonia developing ≥48 hours after hospital admission, often caused by more resistant organisms.

Hypercapnia

Elevated PaCO_2 due to **hypoventilation** → respiratory acidosis; can cause somnolence, dysrhythmias, coma.

Hypersensitivity pneumonitis (extrinsic allergic alveolitis)

Immune-mediated lung inflammation from inhaled organic antigens (not IgE) → can progress to fibrosis with chronic exposure.

Hyperventilation

Alveolar ventilation exceeding metabolic demand → ↓ PaCO_2 (hypocapnia) → respiratory alkalosis.

Hypocapnia

Low PaCO_2 (typically <36 mm Hg) due to hyperventilation → respiratory alkalosis.

Hypoventilation

Inadequate alveolar ventilation relative to metabolic demand → $\uparrow\text{PaCO}_2$ (hypercapnia) and often secondary hypoxemia.

Hypoxemia

Low arterial oxygenation ($\downarrow\text{PaO}_2$) caused by respiratory problems (low FiO_2 , hypoventilation, V/Q mismatch, diffusion defect, shunt).

Hypoxic pulmonary vasoconstriction

Protective reflex constricting pulmonary vessels in poorly ventilated areas to redirect blood to better-ventilated alveoli.

Idiopathic pulmonary fibrosis (IPF)

Progressive fibrotic interstitial lung disease of unknown cause → $\downarrow$ diffusion, $\downarrow$ compliance, DOE, dry cough, “honeycombing.”

Kussmaul respiration (hyperpnea)

Deep, rapid breathing pattern seen in metabolic acidosis (e.g., DKA) to blow off CO_2 .

Large cell carcinoma

A type of NSCLC composed of poorly differentiated malignant epithelial cells; tends to be aggressive.

Latent TB infection (LTBI)

TB infection contained in granulomas with **no symptoms** and no clinical evidence of active disease (not contagious).

Malignant mesotheliomas

Aggressive pleural tumors strongly linked to asbestos exposure; often present with pleural effusion and chest pain/dyspnea.

Neuroendocrine neoplasms

Lung tumors arising from neuroendocrine cells (includes small cell carcinoma, large cell neuroendocrine carcinoma, carcinoid tumors).

Open (communicating) pneumothorax

Air enters pleural space and **can exit** during expiration → partial lung collapse (air movement both ways).

Orthopnea

Dyspnea when lying flat (supine), relieved by sitting up.

Paroxysmal nocturnal dyspnea (PND)

Sudden nighttime episodes of severe dyspnea/air hunger that awaken the patient and improve with sitting/standing.

Pleural effusion

Abnormal accumulation of fluid in the pleural space (can be transudate, exudate, empyema, hemothorax, chylothorax).

Pneumoconiosis

Chronic lung disease from inhaled inorganic dusts (e.g., coal, silica, asbestos) causing inflammation and pulmonary fibrosis.

Pneumonia

Infection of the lung parenchyma causing inflammation, alveolar filling/consolidation, and impaired gas exchange.

Pneumothorax

Air in the pleural space causing loss of negative pressure and lung collapse.

Pulmonary artery hypertension (PAH)

A subgroup of pulmonary hypertension involving pulmonary arteriolar disease (vasoconstriction + remodeling) causing elevated pressures.

Pulmonary edema

Fluid accumulation in interstitium/alveoli due to $\uparrow$ hydrostatic pressure (HF), $\uparrow$ permeability (ARDS), or lymphatic obstruction $\rightarrow$ hypoxemia.

Pulmonary embolism (PE)

Obstruction of pulmonary arteries by an embolus (usually from DVT) $\rightarrow$ V/Q mismatch, hypoxemia, chest pain, dyspnea, possible shock.

Pulmonary hypertension (PH)

Mean pulmonary artery pressure >20 mm Hg at rest; leads to RV strain and may progress to cor pulmonale.

Pulsus paradoxus

Exaggerated drop in systolic BP (>10 mm Hg) during inspiration; seen in severe asthma, tamponade, and severe airway obstruction.

Respiratory failure

Inadequate gas exchange: $\text{PaO}_2 \leq 60$ mm Hg and/or $\text{PaCO}_2 \geq 50$ mm Hg with $\text{pH} \leq 7.25$ (hypoxemic and/or hypercapnic).

Shunting

Perfusion without ventilation (low V/Q): blood passes through lungs without being oxygenated (e.g., atelectasis, pulmonary edema).

Small cell lung carcinoma (SCLC)

Highly aggressive neuroendocrine lung cancer, usually central, rapid growth with early metastasis; associated with paraneoplastic syndromes.

Squamous cell carcinoma

NSCLC often central/hilar; strongly associated with smoking; can cause cough, hemoptysis, and obstructive pneumonia/atelectasis.

Status asthmaticus

Severe, persistent asthma exacerbation not responding to usual therapy; risk of respiratory failure (silent chest is ominous).

Tension pneumothorax

Life-threatening pneumothorax where air enters pleural space but **cannot escape** → increasing pressure, mediastinal shift, hypotension.

Transudative effusion

Pleural effusion due to ↑hydrostatic pressure or ↓oncotic pressure (e.g., CHF, cirrhosis) with low protein/low cells.

Tuberculosis (TB)

Airborne infection by *M. tuberculosis*; may be latent or active; active disease causes chronic cough, weight loss, fevers, night sweats.

Venous thromboembolism (VTE)

Includes **DVT + PE**; clot formation in veins with possible embolization to lungs.

Ventilator-associated pneumonia

Hospital pneumonia occurring ≥48 hours after intubation/mechanical ventilation; commonly due to resistant organisms.