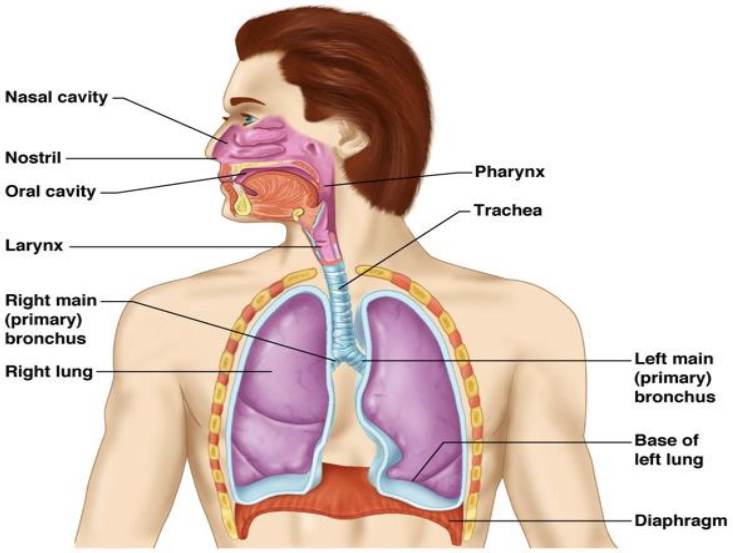
Chapter 4
RESPIRATORY EMERGENCIES

Learning Objective:

- Early identification and management of respiratory emergencies

INTRODUCTION

Pulmonary emergencies are quite common presentations to the Emergency room. The early identification and management of these patients are critical. Facilities that are not capable of dealing with advanced respiratory care should be able to refer to the higher health facility. Pulmonary symptoms and signs usually occur when lung is unable to meet the metabolic demand of the body leading to inadequate tissue oxygenation and carbon dioxide homeostasis.



RESPIRATORY DISTRESS

The most common symptoms that brings the patient to ER includes dyspnoea, wheezing and cough.

Clinical Features: Tachypnoea, difficulty breathing, stridor, wheezing and use of accessory muscle, inability to speak, agitation or lethargy.

First 5 Minutes:

- ✓ Vital signs: RR, HR, BP, TEMP
- ✓ Pulse oximetry
- ✓ Cardiac monitor

Note: Work of Breathing - Apnea? Labored? Fast? Shallow? Tripoding?

- ✓ Color - Cyanotic, Pale, Diaphoretic
- ✓ Oxygen: If SpO2 < 92%
- ✓ (Check for good Waveform)

Impending Respiratory Failure:

- ✓ Altered mental status or ALOC
- ✓ 2-3-word sentences
- ✓ Severe dyspnea
- ✓ Cyanosis
- ✓ Low RR or other signs of fatigue
- ✓ History of intubation for the same

Diagnosis is important to differentiate cardiac from pulmonary cause of dyspnoea. Pulse oximetry are rapid screening tool for hypoxia. Arterial blood gas analysis can evaluate impaired gas exchange. Chest radiograph may indicate infiltrates, effusion or pneumothorax. Other test like ECG and determination of haemoglobin level. Point of care lung ultrasound help in differentiating cardiac from pulmonary cause of respiratory distress.

History Features:

- **Onset and Timing**

  - When did it start? How progressed?
  - Acute? Chronic? Recurrent?
- **Course**
  - *New onset?* Think: Pneumonia, PE, trauma, ingestion
  - *Recurrent episodes?* Think: Asthma, COPD, cardiac
  - *Recurrent progressive?* Think: ILD, malignancy, CV, COPD, and TB
- **Provocation/Palliation**
  - Anything make it worse?
  - Anything make it better?
- **Associated symptoms**
  - Fever? Cough? Hemoptysis?
  - Chest pain? Leg swelling?
- **Risk factors**
  - Smoking?
  - Trauma?
  - Occupational history: inhalation of particles or substances?
  - Constitutional symptoms: Fever, weight loss, night sweats
  - Think: Malignancy, TB, HIV
  - Ingestion or drug use?
- Associated conditions
  - Heart disease?

Physical Exam:

LOOK:

- ✓ Work of Breathing
- ✓ Accessory muscle use
- ✓ Chest rise: symmetric
- ✓ Tracheal deviation?
- ✓ Signs of trauma?

LISTEN:

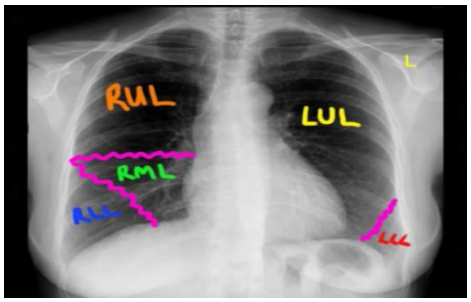
WHEEZE- High pitched *Expiratory*-Bronchospasm
CRACKLES/RALES- Best heard over bases- Fluid
RHONCHI- Coarse, snoring sound-LRTI
STRIDOR- High pitched Inspiratory-Upper Airway

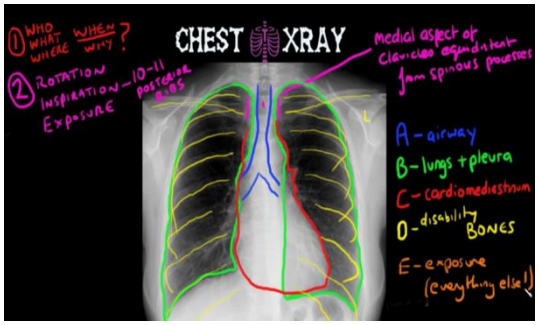
PALPATION:

- ✓ Point tenderness - rib fracture?
- ✓ Flail Segment
- ✓ Crepitus - pneumothorax?

✓ Diaphoresis - working hard to breathe?

Chest X-RAY:





DIFFERENTIAL DIAGNOSIS BY LOCATION

Upper Airway– *ALL TRUE-LIFE THREATENING EMERGENCIES - May Require Definitive Airway or Need Rapid Treatment and possible Transfer*

- Tracheal Foreign Body / Choking
- Anaphylaxis
- Angioedema
- Airway Trauma
- Neck/Throat Infections

Pulmonary - Emergencies *IF* Causing Compromised Oxygenation

- Asthma/COPD
- Pulmonary Embolus
- Pneumothorax
- Pulmonary Hemorrhage or Injury
- Pneumonia
- Pulmonary Edema: ARDS or HAPE

Cardiac – Don't Forget as Possible Causes of Respiratory Distress

- ACS: STEMI
- Decompensated Heart Failure
- Cardiomyopathy
- Valvular Dysfunction
- Flash Pulmonary Edema
- Arrhythmia
- Cardiac Tamponade

Neurologic – Rare

- Stroke
- Neuromuscular Disease
- Botulism
- Guillan-Barre
- Multiple Sclerosis
- ALS
- Myasthenia Gravis

Toxic/Metabolic – COMMON – DON'T FORGET TO THINK ABOUT - Tachypnea ButNl SpO2

- Metabolic Acidosis!!
- Sepsis!!
- DKA / AKA

- Poisonings: Organophosphates, Salicylates, Carbon monoxide
- Anemia

Table 4.1 Differential by Symptom:	
Lower airway (lung)	Asthma, COPD, anaphylaxis, aspiration
Hemoptysis	TB, bronchitis, pneumonia, PE, malignancy
"Cardiac" wheeze	Volume overload: CCF, end-stage renal disease, end-stage liver disease
Fever	Pneumonia, bronchitis, epiglottitis, TB, HIV-associated
Vomiting	Aspiration, Boerhaave/œsophage rupture, pertusis
Stridor or upper airway	Epiglottitis, choking, upper airway mass or malignancy
Rash, Itching, Swelling	Anaphylaxis, angio-oedema

TREATMENT

General Principles

- Ensure patent airway and provide supplemental oxygen goal to maintain SpO2 > 92 %.
- Non-invasive ventilation for increased work of breathing
- Endotracheal Intubation and ventilation for severe failure of oxygenation or ventilation

Restore Oxygenation:

- ✓ Position upright
- ✓ Supplemental oxygen: NC vs facemask
- ✓ COPD? DON'T OVER CORRECT HYPOXIA (Normal Baseline may be 86-92%)
- ✓ Does the patient need an airway adjunct? OR Positive pressure ventilation? OR Definitive airway?

Restore Ventilation: (Work of Breathing and CO2 Balance)

- ✓ Altered mental status? Can you correct it?
- ✓ Interventions : BVM ? OR Positive pressure ventilation ? OR Definitive airway?

TREATMENT OF COMMON RESPIRATORY EMERGENCIES

ANAPHYLAXIS:

All simultaneously and may require repeat dosing

- Epinephrine: 0.5mg IM
- Steroids: Hydrocortisone 200mg IV
- Bronchodilators: Salbutamol Nebulization

- Anti-histamines
- IV fluids: NS/RL – large volume STAT bolus if Hypotensive.

CROUP/EPIGLOTTIS:

- Nebulize Epinephrine
- Steroids: Dexamethasone 0.6mg/kg IV (max 10mg)
- Antibiotics?
- IV fluid resuscitation?

CRONIC OBSTRUCTIVE PULMONARY DISEASE/ASTHMA:

- Salbutamol Nebulization
- Steroids: Hydrocortisone 200mg IV
- Magnesium 2g IV - if severe or unresponsive
- Antibiotics for COPD - Not Asthma, unless Infiltrate

PNEUMONIA:

- Supplemental oxygen to Keep SpO2 > 92%
- Antibiotics: Broad AND Atypical Coverage *If* no focal infiltrate (Doxycycline or Azithromycin).
- IV fluid resuscitation for Tachycardia or Hypotension.
- Thoracentesis - If Large Pleural Effusion and Persistent Hypoxia.

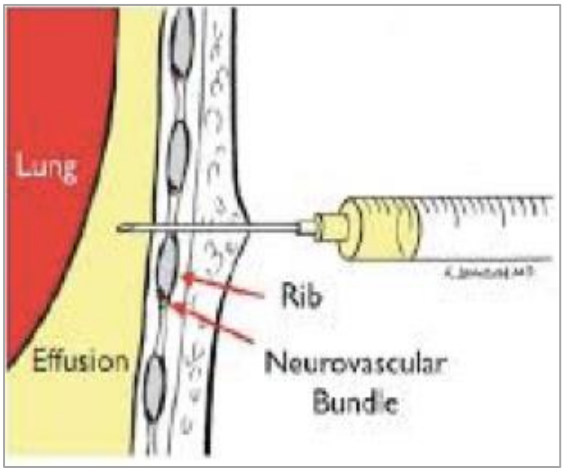
PULMONARY EMBOLUS:

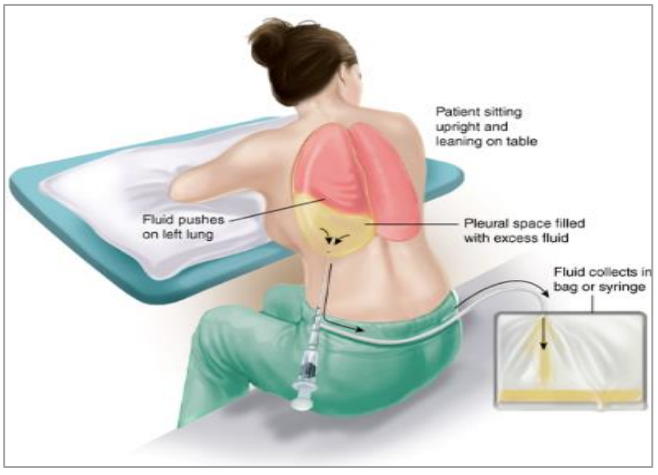
- Think About If: Hypoxic without Etiology.
- Signs and Symptoms: Tachycardia, Signs of DVT, Pts with Malignancy/ Estrogens/Recent Survey or Trauma.
- EKG: Sinus Tachycardia or S1Q3T3

PERC RULE: If ALL negative then safely RULE OUT PE

EMERGENCY RESPIRATORY PROCEDURES

THORACOCENTESIS:





CHEST TUBE:

Sizes:

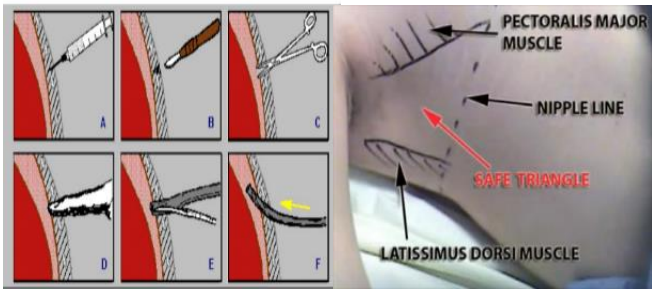
Pneumothorax = Small Chest Tube - 16-24 Fr

Traumatic Pneumothorax = Medium - 28-36

Hemothorax = Large - 32-40

Risks: Pain, Placement in Soft Tissue.

Insertion of chest tube



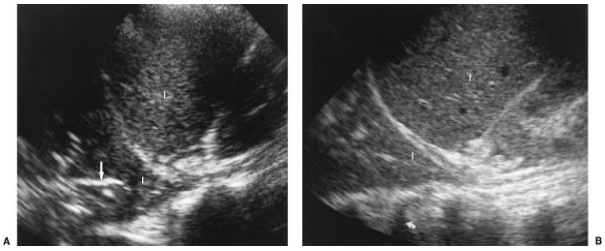
Point of care Lung Ultrasound: Bedside ultrasound by the emergency doctor can be used for immediate diagnosis and management of patients in ER. The images that are seen during lung US are the artefacts.

Position of the probe: Longitudinally at the inter-costal space. Which forms a "Batwing sign".

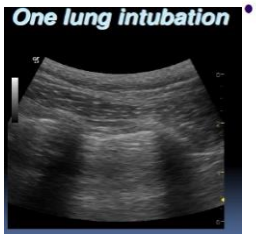
Area: As lung is a huge organ, all lobes of lung are scanned.

Lung sliding sign: When the parietal and the visceral pleura slides on each other.

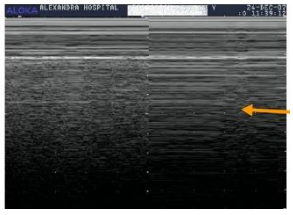
A. Lines for Dry Lung as seen in normal lung, asthma, COPD, Pulmonary embolism.
B. Lines for Wet Lung as seen in Pneumonia, ARDS, and Pulmonary edema.



Pneumothorax: Absence of Lung sliding sign and "stratosphere sign".

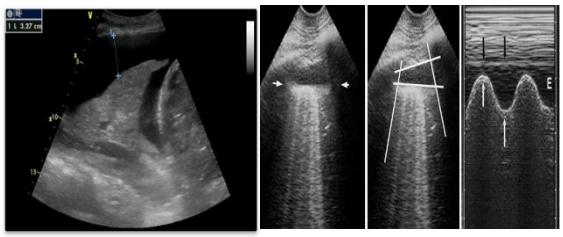


• "Seashore vs. Stratosphere"

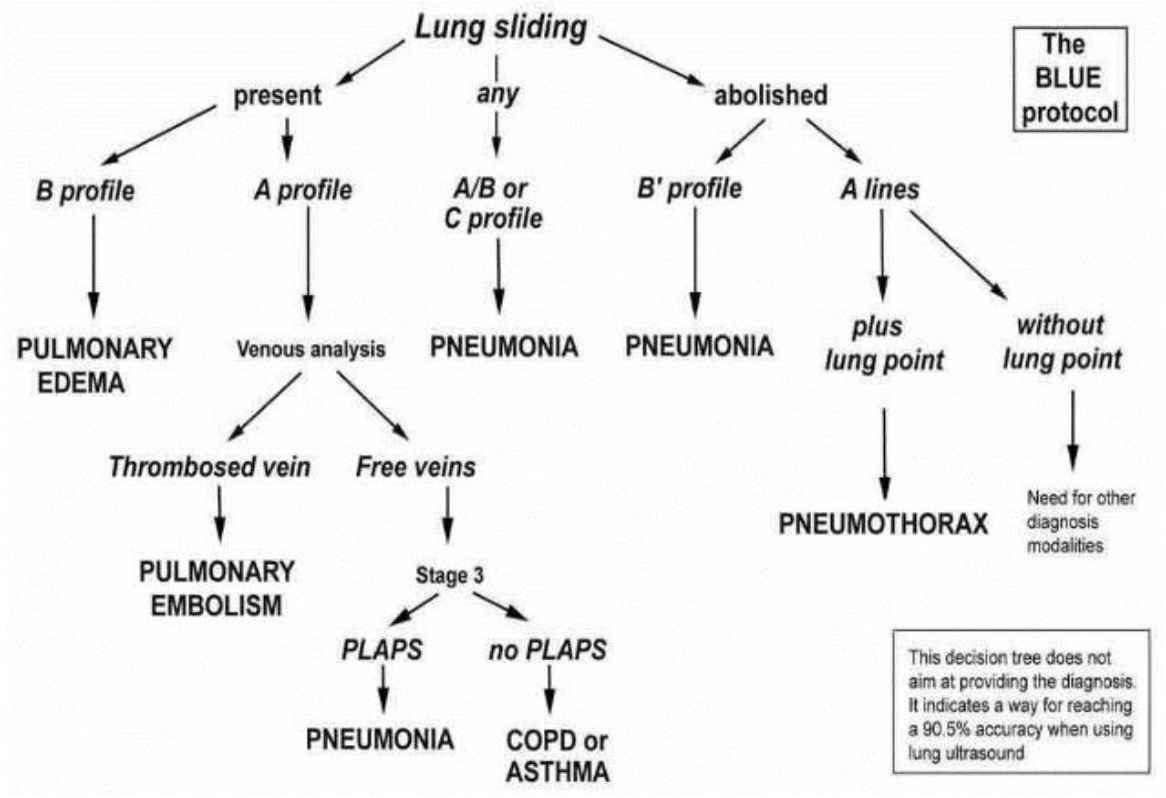


Pleural effusion/Hemothorax: Place the probe at mid axillary line with probe marker pointing towards head.

Lung consolidation: Same way we note for "hepatization".



The Blue Protocol



References

1. Tintinalle`s, Emergency Medicine, A Comprehensive Study Guide
2. Relevance of Lung Ultrasound in the Diagnosis of Acute Respiratory Failure the BLUE Protocol, Chest 2008;134;117-125; Prepublished online April 10, 2008; DOI 10.1378/chest.07-2800.