

Oxygenation

Function of Respiratory System

See A&P for this

Protectent Defenses

Filtration of air – mostly nose

Warming & humidification of inspired air –

Also mostly nose

Epiglottis closure over the trachea

Cough reflex –

prevents aspiration, brings up flem

Mucociliary escalator mechanism –

cilia beat and secreted mucous is waved

up the lower respiratory tract, carries MOOs and debris away from lungs

Secretion of immunoglobulin A –

prevents pathogens from entering body/tissue

Alveolar macrophages –

clean up crap that makes it to the aveolar

(they don't have cilia or mucous)

Lifespan Considerations

Vital capacity –

↓ starting early middle adult

(lung fxn peaks at 20-25 yo).

↓ chest wall mobility restricts tidal flow

Alveoli –

reduction in numbers as we age, also start to

lose elasticity

Risk Factors

Smoking

Family History – lung disease?

Environmental pollutants

Exposure

MISCELLANEOUS conditions & terms

acute respiratory distress syndrome (ARDS)

Nonspecific response to a variety of pulmonary and nonpulmonary insults to the lung; characterized by interstitial infiltrates, alveolar hemorrhage, atelectasis, decreased compliance, and refractory hypoxemia

Atelectasis

Tachypnea, dyspnea, & mild -moderate hypoxemia are hallmarks of the severity of atelectasis

reduced ventilation or any blockage that obstructs passage of air to and from the alveoli, reducing alveolar ventilation. As a result, the affected portion of the lung becomes airless and the alveoli collapse. Possible causes are altered breathing patterns (hypoventilation), retained secretions, pain, alterations in small airway function, prolonged supine positioning, increased abdominal pressure, reduced lung volumes due to musculoskeletal or neurologic disorders, restrictive defects, and specific surgical procedures (eg, upper abdominal, thoracic, or open heart surgery). Development of atelectasis usually is insidious. S&S include increasing dyspnea, cough, and sputum production, diminished breath sounds and crackles. Predisposes pts infection.

consolidation

lung tissue that has become more solid in nature due to collapse of alveoli or infectious process

cor pulmonale - "heart of the lungs"; enlargement of right ventricle from hypertrophy or dilation or as a secondary response to disorders that affect the lungs

empyema

accumulation of purulent material in the pleural space

pneumothorax

partial or complete collapse of the lung due to positive pressure (gas – air) in the pleural space

hemothorax

partial or complete collapse of the lung due to blood accumulating in the pleural space; may occur after surgery or trauma

Hyperresponsiveness occurs soon after exposure to an allergen and is the first part of an asthma attack.

Normal response to an irritant is for the airways to dilate to facilitate expulsion of the irritant. In asthma and sometimes COPD the airways constrict.

Pleural effusion - an exudation of fluid from the blood or lymph into a pleural cavity

Exudate - exuded matter; *especially* : the material composed of serum, fibrin, and white blood cells that escapes from blood vessels into a superficial lesion or area of inflammation

Consolidation - the process by which an infected lung passes from an aerated collapsible condition to one of airless solid consistency through the accumulation of exudate in the alveoli and adjoining ducts <pneumonic consolidation>; *also* : tissue that has undergone consolidation

Bronchiectasis - chronic dilation of a bronchus or bronchi; dilated airways become saccular & are a medium chronic infection

Severe acute respiratory syndrome (SARS) viral illness caused by a coronavirus. SARS develops in people w/ have close contact with a person who has been dx with the disease or a history of travel or residence in an area with known cases. transmitted via respiratory droplets may also be spread from surfaces

Pleurisy (pleuritis) refers to inflammation of both layers of the pleurae. It may develop in conjunction w/ pneumonia or an URI, TB, or collagen disease; post trauma to chest, pulmonary infarction, or PE; in patients with primary or metastatic cancer; and after thoracotomy. Severe, sharp, knifelike pain (esp on inspiration)

Assessment

History – smoking, work, live w/ smokers, family hx, comorbidities

Signs & Symptoms - major signs and symptoms of respiratory disease are dyspnea, cough, sputum production, chest pain, wheezing, and Hemoptysis (coughed up blood– pneumonia, TB), finger nail clubbing (longterm chronic hypoxia). Need to assess the impact of S&S on pt's ability to perform ADLs

A NOTE ON: Hemoptysis is an S&S of both pulmonary and cardiac disorders. Onset of hemoptysis is usually sudden, and it may be intermittent or continuous.

Varies from blood-stained sputum to a large, sudden hemorrhage, always merit investigation. The most common causes are:

Pulmonary infection Carcinoma of the lung Abnormalities of the heart or blood vessels Pulmonary artery or vein abnormalities Pulmonary embolus and infarction

Diagnostic evaluation to determine the cause includes chest x-ray, chest angiography, and bronchoscopy.

Amount of blood produced is not always proportional to the seriousness of the cause.

Bloody sputum from the nose or the nasopharynx is usually preceded by considerable sniffing, with blood possibly appearing in the nose.

Blood from the lung is usually bright red, frothy, and mixed with sputum. Initial symptoms include a tickling sensation in the throat, a salty taste, a burning or bubbling sensation in the chest, and perhaps chest pain, in which case the patient tends to splint the bleeding side.

If the hemorrhage is in the stomach, the blood is vomited (hematemesis) rather than coughed up from lungs (hemoptysis).

ADL's – how far can they walk, how do they sleep, can they do chores

Auscultation/Percussion – wheezing, crackles, rhonchi

Diminished: pneumonia, COPD, atelectasis

Dullness on percussion: air, masses, fluid

Dyspnea/Orthopnea- common to pulm. & cardiac disorders, esp if ↓ lung compliance or ↑ airway resistance.

- Right ventricle of heart is affected cuz it has to pump blood through lungs against greater resistance.
- Dyspnea may also be assoc. w/ neuro or neuromuscular disorders (myasthenia gravis, Guillain-Barré syndrome, MS, postpolio syndrome) that involve lung function compromise
- Dyspnea can also occur normally after physical exercise.
- Also common at the end of life in patients with a variety of disorders.
- Generally, acute diseases of the lungs produce a more severe grade of dyspnea than do chronic diseases.
- Sudden dyspnea in a healthy person may indicate pneumothorax (air in the pleural cavity), acute respiratory obstruction, allergic reaction, or myocardial infarction.
- In immobilized patients, sudden dyspnea may denote pulmonary embolism.
- Dyspnea and tachypnea accompanied by progressive hypoxemia in a person who has recently experienced lung trauma, shock, cardiopulmonary bypass, or multiple blood transfusions may signal acute respiratory distress syndrome (ARDS).
- Orthopnea may be found in patients with heart disease and occasionally in patients with COPD;
- Dyspnea with an expiratory wheeze occurs with COPD.
- Noisy breathing may result from a narrowing of the airway or localized obstruction of a major bronchus by a tumor or foreign body.
- High-pitched sound heard (usually on inspiration) when someone is breathing through a partially blocked upper airway is called stridor.
- Presence of both inspiratory and expiratory wheezing usually signifies asthma if the patient does not have heart failure.
- Dyspnea can occur with other disorders (eg, cardiac disease, anaphylactic reactions, severe anemia)

ASK: Dyspnea: when, what causes it, what accompanies it, how often, what helps, makes it worse

Cough – quality of sputum (do C&S), dry cough, worse at night etc

Cyanosis- ↓ tissue O₂ - central (worst) or peripheral

Diagnostics

PFT's – Pulmonary Function Tests –

For chronic resp. disorders – determine extent of dysfunction based on deviation from normals

For eval of meds

Peak flow rate is most important value

ABG's - determine resp alkalosis or acidosis

PaO₂ normal 80-100, if < 80 then need O₂

Oxygen saturation –

noninvasive, good for sudden changes

BUT if ↓ hemoglobin then not reliable

Normal 95-100, if less than investigate cause

If COPD 92 then ask if this is normal for them

Xray/ Cat Scan/MRI

Characterizes pulmonary nodules, stage CA, inflammation

Xray – to show consolidation (pneumonia)

CT – cross section

MRI – thin slices

Thoracentesis- numb injection site RISK: pneumothorax

Pre-op: informed consent; obtain VS; assist in positioning; best position is as shown

For xtra pleural fluid (shouldn't be bloody) – can be for dx or tx

Position – orthopneic

Post procedure – assess breath sounds, post op chest xray

Fluoroscopy – used to visualize & take pictures (like for needle biopsy)

Angiogram (pulmonary) – RISK: bleeding

For thrombolytic disease and general abnormalities of pulmonary vasculature

Nuclear Scans (VQ Scans)

Not most reliable but cost effective

Gallium scan – inflammation

PET – advanced dx capabilities

Bronchoscopy – sedation, gag reflex numbed, 6 hr NPO

RISKS: aspiration, bronchospasm, hypoxia, pneumothorax (air or other gas in the pleural cavity), occurs spontaneously as a result of disease or injury of lung tissue, rupture of air-filled pulmonary cysts, or puncture of the chest wall or is induced as a therapeutic measure to collapse the lung), bleeding, perforation

For determine location and extent of disease process,

For dx bleeding

For determine if condition can be treated w/ sx (resection)

Uses fiber scope like endoscopy

Post procedure: assess breathsounds, then gag reflex

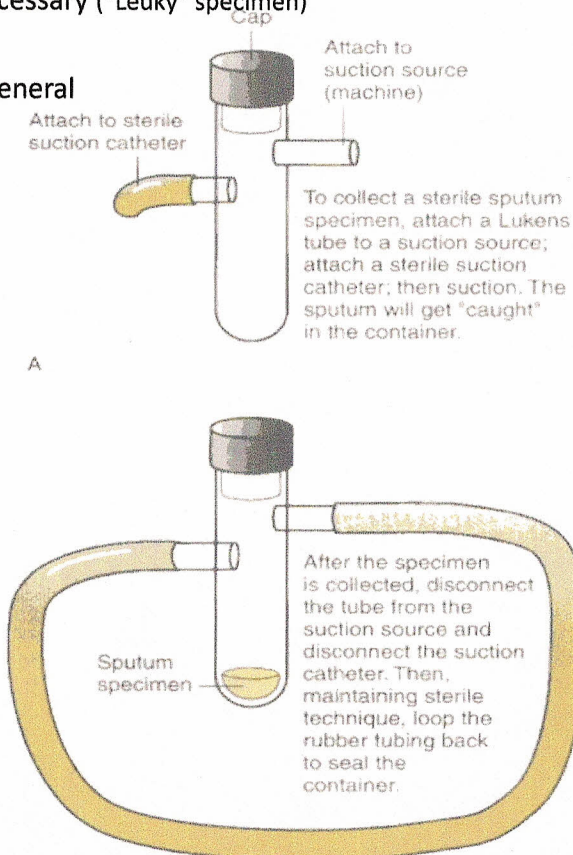
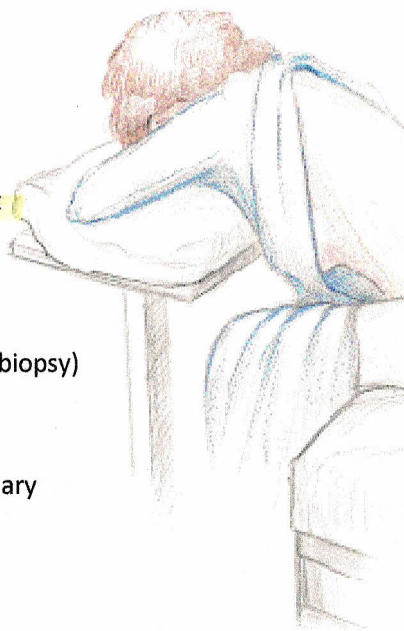
Labs

Cultures – sputum, blood, thoracentesis fluid,

Sputum – obtain via suction if necessary (“Leuky” specimen)

CBC – WBC, platelets, H&H

Chem 7 – metabolic process in general



Sterile Sputum Specimen for clients that are not able to expectorate