OXYGENATION *presentations*

PULMONARY EMBOLISM
LOWER AIRWAY

blockage of 1+ pulmonary arteries by a thrombus, fat or air emboli or tumor tissue

RF:
- ✓ immobility
- ✓ surgery
- ✓ Hx DVT
- ✓ cancer
- ✓ HF
- ✓ clotting dis.
- ✓ obesity
- ✓ oral contra.
- ✓ smoking
- ✓ air travel
- ✓ pregnancy
- ✓ hormone therapy

PATHOPHYS:
- clot forms in body
- clot travels to artery of lung
- obstruct alveolar perfusion
- most due to DVT in lower extremities

O_2 ADMINISTRATION:
mask → 2L O_2 ; nasal cannula

DIAGNOSTIC TESTS:
- ✓ D-Dimer lab test
- ✓ spiral CT scan
- ✓ ventilation-perfusion scanning

PULMONARY HYGIENE
- ✓ turning
- ✓ coughing
- ✓ incentive-spirometry
- ✓ deep breathing

EMPHYSEMA

branch of COPD; damage to alveoli d/t inflammation → permanent damage to gas exchange airways

RF:
- ✓ cigarette smoking
- ✓ air pollution
- ✓ occupational exposures
- ✓ inherited α1-antitrypsin
- ✓ childhood respiratory infect.

PATHOPHYS:
- imbalance of lung structural cells leads to destruction of alveoli; breakdown of elastic tissue in lungs
- alveoli rupture; no effective gas exchange
  - ↳ ventilation (airflow) - perfusion (blood flow) mismatch
  - ↳ hypoxemia
- lack of elastic recoil → air trapped in lungs

DX TESTS
- ✓ PFT
- ✓ spirometry

O_2 ADMIN
- low levels therapeutic
- too much causes dependency

PULMONARY HYGIENE
- ✓ breathing exercises
- ✓ incentive spirometry
- ✓ percussion

ASTHMA

chronic lung disease; inflamed airways, broncho-constriction, obstructed airway

RF:
- ✓ respiratory infections
- ✓ environmental triggers
- ✓ exercise
- ✓ genetics

PATHOPHYS:
- inflammation of airways
- broncho constriction
- airway hyperreactivity
- edema of airways
- cannot exhale completely
- trapped CO_2
- unable to breathe sufficient O_2

O_2 ADMIN:
- ✓ nasal can.
- ✓ simple mask
- ✓ non-rebreather

Dx TESTS:
- ✓ H & P
- ✓ spirometry
- ✓ oximetry
- ✓ X-ray
- ✓ allergen skin/blood test

PULMONARY HYGIENE: none necessary

EPIGLOTTITIS

inflammation of epiglottis d/t bacterial infection; Hib — "4D's" (dysphagia, dysphonia, dyspnea, drooling); an airway emergency, preventable by vaccine

RF:
- ✓ vaccination status
- ✓ exposure to Hib
- ✓ compromised immunity
- ✓ congenital malformations

DIAGNOSTIC TESTS
- ✓ laryngoscopy
- ✓ X-ray
- ✓ blood culture
- ✓ CBC (WBC's)
- ✓ throat culture

O_2 ADMIN: endotracheal intubation prn (24-72 hrs) or O_2 via mask prn
* child will sit tripod pos.

PULMONARY HYGIENE
N/A unless concomitant lower airway infection

PERTUSSIS

"Whooping cough"; B. pertussis – bactercial, vaccine preventable

RF:
- ✓ vaccination status
- ✓ smoking
- ✓ environmental smoke
- ✓ cough suppressants/anti histamine

Dx TEST:
- ✓ H & P
- ✓ nasopharyngeal culture
- ✓ PCR Test
- ✓ serology

PATHOPHYS:
- B. pertussis – air
- occur in stages

O_2 ADMIN:
- ✓ BiPap machine
- ✓ prevent resp. failure
- ✓ PNA can develop

PULMONARY HYGIENE:
- coughing & suction
- position head & body

BRONCHITIS

inflammatory disease of bronchial tubules; mucus blocks air in/out of lungs —
acute → bronch. tubules inflamed ~2 weeks
chronic → never goes away; manageable

PATHOPHYS: - bronch. tube. inflamed, coughing & mucus production
- acute; virus/bacteria
- chronic; smokers w/ COPD → 3 mo. over 2 yrs.

RF: ✓ cold/flu/bacteria
✓ breathing irritants
✓ weak immunity
✓ asthma; COPD

Dx TESTS: ✓ H&P
✓ CBC w/ diff
✓ CXR
✓ pulse oxi.
(acute)
✓ PFT
✓ CXR
✓ CT scan
(chronic)

O_2 ADMIN:
- albuterol
- humidified air
- nebulizer

PULMONARY HYGIENE:
- exercises to clear airways
- relaxed breathing
- percussion
- huffing
- suction
- incentive spirometry

PNEUMONIA

infection of lungs; bacterial, viral, or fungal; lung tissue swells — fluid/pus in lungs

RF: ✓ viral upper respiratory tract infection
✓ prolonged immobility
✓ chronic diseases
✓ smoking
✓ malnutrition
✓ alcohol abuse
✓ long-term care facility
✓ immunosuppressive disorders

PATHOPHYS: - lower respiratory infection → inflamed alveoli sacs
- alveoli fill w/ fluid & pus; impaired gas exchange

O_2 ADMIN:
- for hypoxemia
- depends on severity

PULMONARY HYGIENE
✓ deep breathing/coughs
✓ incentive spirometer
✓ chest PT

DIAGNOSTIC TESTS
✓ chest X-ray
✓ blood work
✓ sputum cultures

CYSTIC FIBROSIS

autosomal recessive; upper & lower; thick & sticky mucus

RF: CFTR gene mutation

PATHOPHYS: - altered transport of Na & Cl via CFTR mutation
- starts in small airways; progresses to larger
- cilia motility decreased
- bronchioles obstructed (scarring)

PULMONARY HYGIENE:
✓ nebulizing tx
✓ suction

Dx TESTS:
✓ sweat chloride
✓ genetic test
✓ blood samp.
✓ cheek swab

O_2 ADMIN:
✓ simple mask or blow-by
✓ nebulization

OXYGENATION scenarios

This method of oxygenation has one way valves. What is it & why does it have the valves?

- nonrebreather
- valves allow exhaling CO_2 out of the mask & close to breathe O_2

- It must be inflated
- suffocation

What is important for the nurse to remember regarding the oxygen reservoir? What is the risk outcome r/t the reservoir?

- pt. is low on O_2 & has inhaled toxic substances from items burning.
- use nonrebreather; deliver high O_2, prevent rebreathing CO_2 + toxic substance

A patient has experienced smoke inhalation. Pulse ox is low. Name the method of oxygenation and why that choice.

What is the advantage of using a nonrebreather?

- delivers high concentration of O_2 compared to other masks

A set of O_2 mixes w/ a set amount of air to produce a fixed percentage of oxygen. Which method is this?

- Venturi mask

A venti mask states to use 4L/min of O_2. How do you calculate % of O_2 the patient will be receiving?

- it tells you the % being delivered

- cannula

A great method to deliver O_2 long term —

OXYGENATION scenarios

A common disease that requires a low % of O_2. What is it? What is the method?

- Emphysema
- COPD
- cannula

What risk does an oxygen cannula create & where?

- wounds from tubing
  - ↳ ears & nose

What is it called when a patient inhales their secretions?

- aspiration

A patient has a simple mask w/ 4L/min O_2.

What is wrong w/ this scenario; what is the risk?

- oxygen is too low for a mask; will re-breathe CO_2
- mask should be @ 6L/min minimum

This draws in atmospheric air & filters it of Nitrogen & other gases, providing pure oxygen to patients suffering w/ low O_2 levels. What is this?

- oxygen concentrator

When a patient is receiving oxygen, what position is best, if tolerated, to allow for adequate chest expansion?

- head of bed elevated at least 45°

Continued...

Nasal Cannula

- short + long term
- 24-44%
- 1-6L/min
- high + low flow

* if >4L/min, supplement w/ humidity

REMEMBER! air is 21% oxygen

Simple Mask

- short term
- 40-60%
- 4L avg. (can order more)
- low flow

* used post-op; anesthetic expelled through lungs

Venturi Mask

- short term
- customizable
- 4-12L/min
- high flow

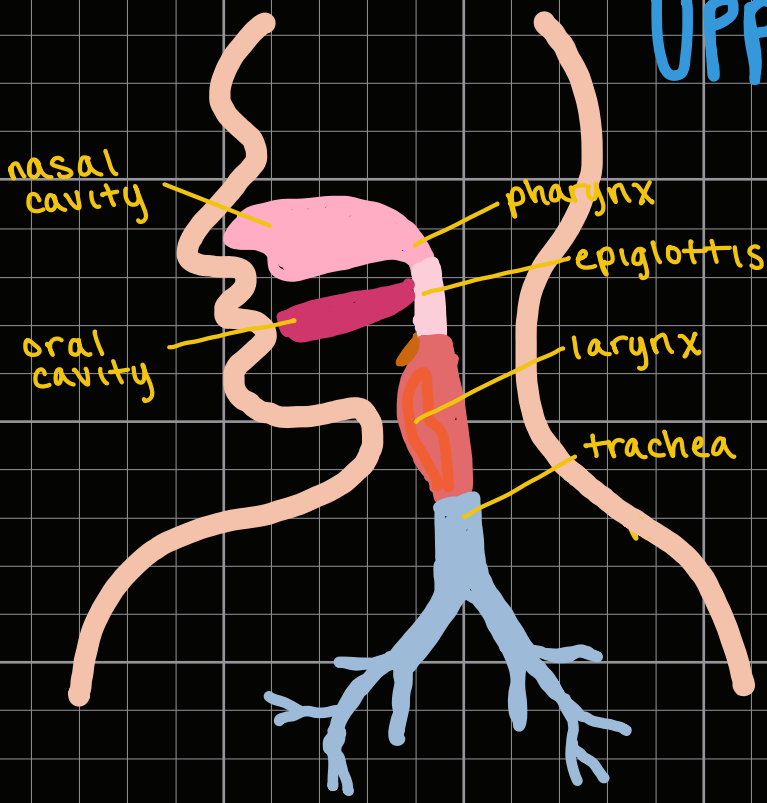
* color-coded caps to control O_2 %

Nonrebreather Mask

- short term
- 60-90%
- 15L/min
- high flow

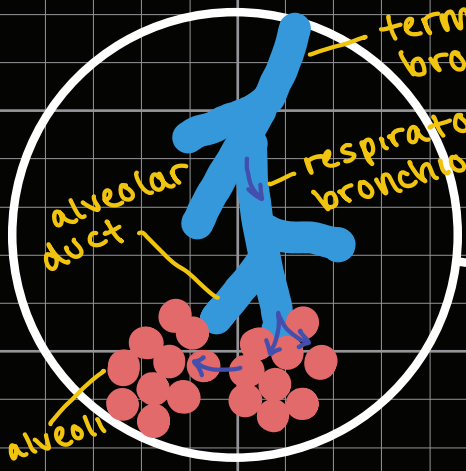
* bag must be inflated to avoid suffocation

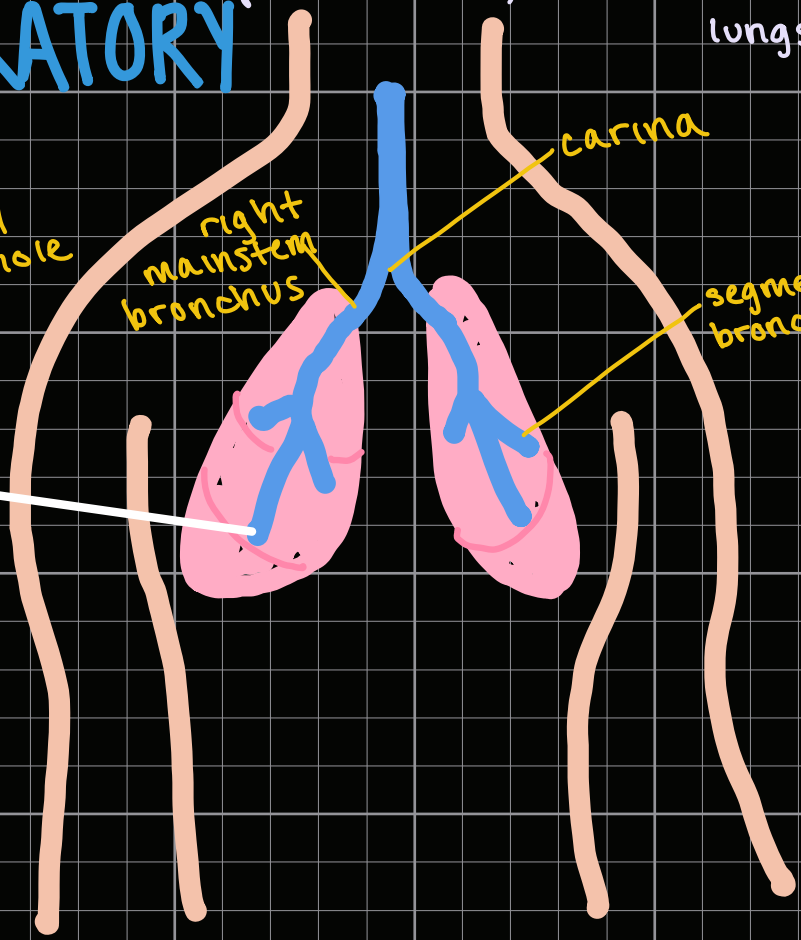
UPPER RESPIRATORY TRACT



* DIAPHRAGM — major muscle of respiration
  ↳ inspiration = contract, move down, ↑ volume
  ↳ when chest wall expands, intrathoracic pressure ↓, pulling air into the lungs
* EXPIRATION — passive
  ↳ elastic recoil = lungs return to original size after expanding
  ↳ chest passively decrease in size (volume); when intrathoracic pressure rises, air moves out lungs

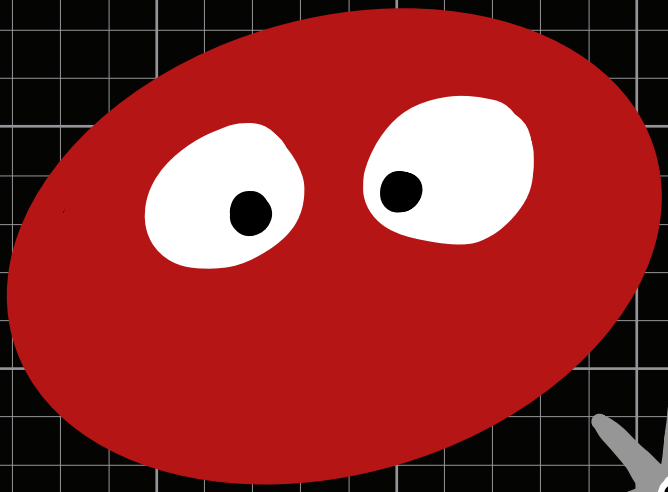
LOWER RESPIRATORY TRACT



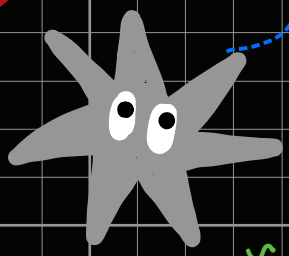


* w/ asthma or COPD, expiration is a labored process

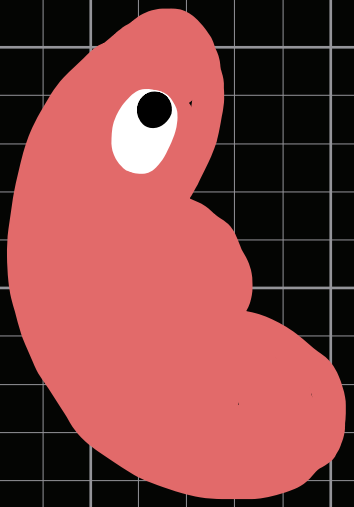
RED BLOOD CELL



- one cell contains about 270 million molecules of HgB
- **IRON** is the building block of hemoglobin



- **IRON** is carried through the CV system to hematopoietic tissue in bone marrow
- RBC's are made in hematopoietic tissue

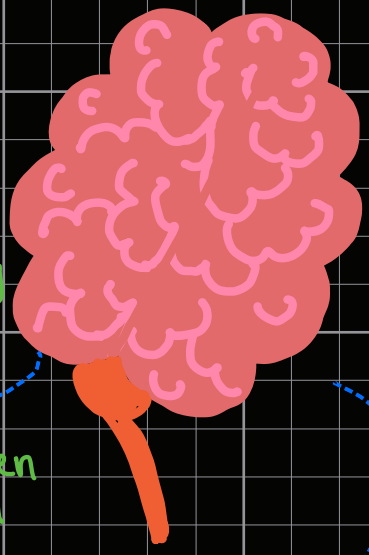


KIDNEY

regulates the amount of red blood cells produced through release of **ERYTHROPOIETIN**

- 2.5 million RBC's per second

BRAIN



- **BRAINSTEM** initiates breathing, sending signal to diaphragm, contracting & increasing intrathoracic space

ALVEOLI

in the lungs create surface area for oxygen to diffuse through their membrane from capillaries

- O_2 pumped throughout CV system ; ♥ & vessels