

Tubes, Catheters, Lines, and Other Devices

Unit 2 Part 4

RT Role

Early detection of problems associated with malposition lines.



Must notify proper authority

- Expectation is not for you to diagnose

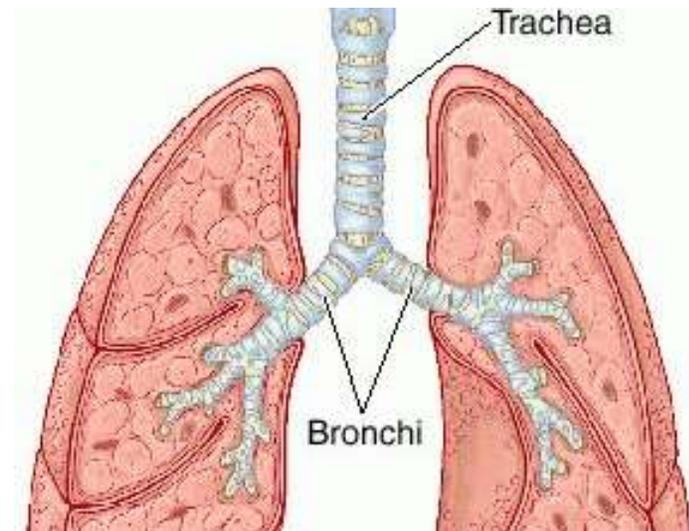
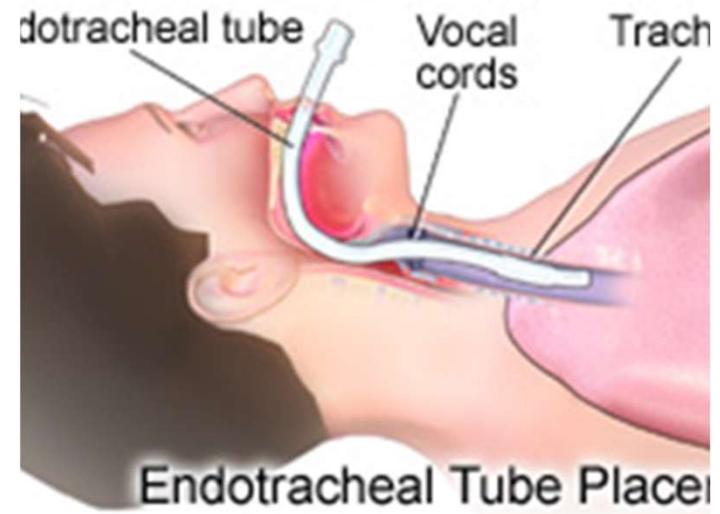
Endotracheal Tubes

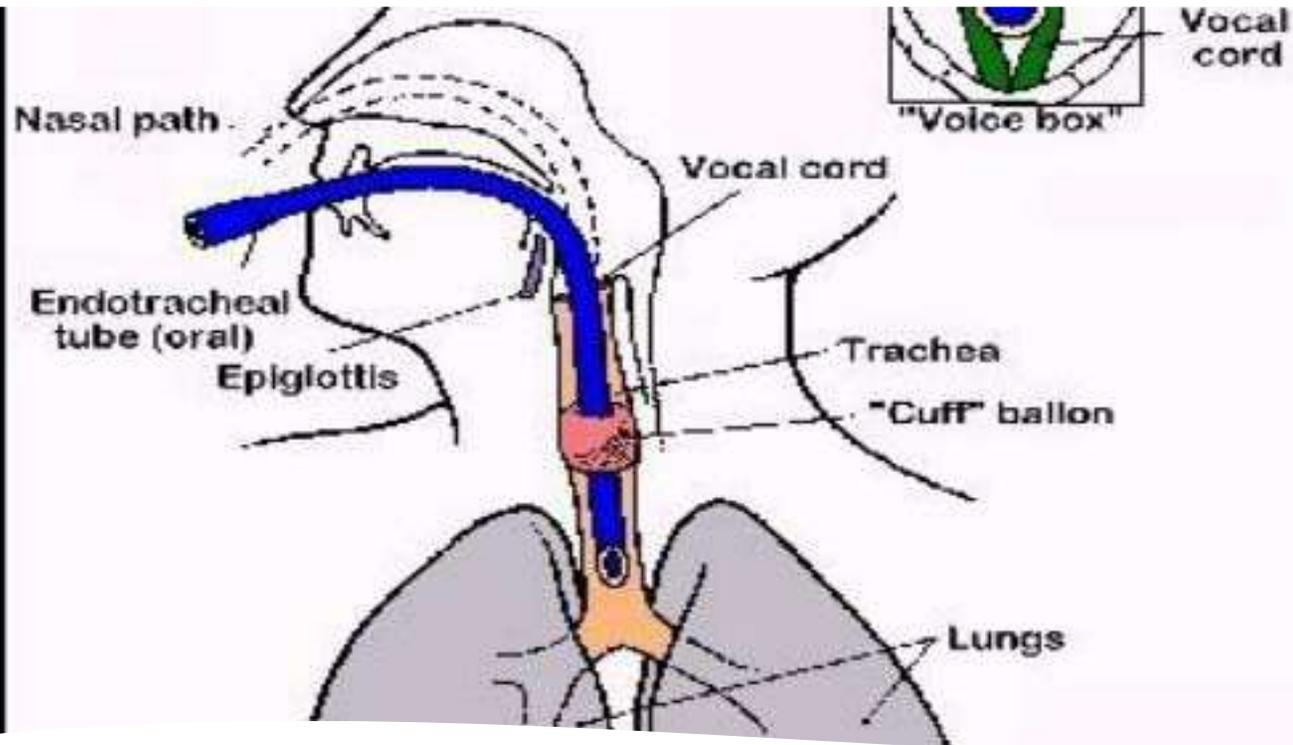


- Used for:
 - Need for mechanical ventilation or O₂ delivery because of:
 - Inadequate breathing
 - Inadequate arterial oxygenation
 - Severe airway obstruction
 - Shock
 - Parenchymal diseases that impair gas exchange
 - Upper-airway obstruction
 - Impending gastric acid reflux or aspiration
 - Provisions for tracheobronchial lavage

Placement

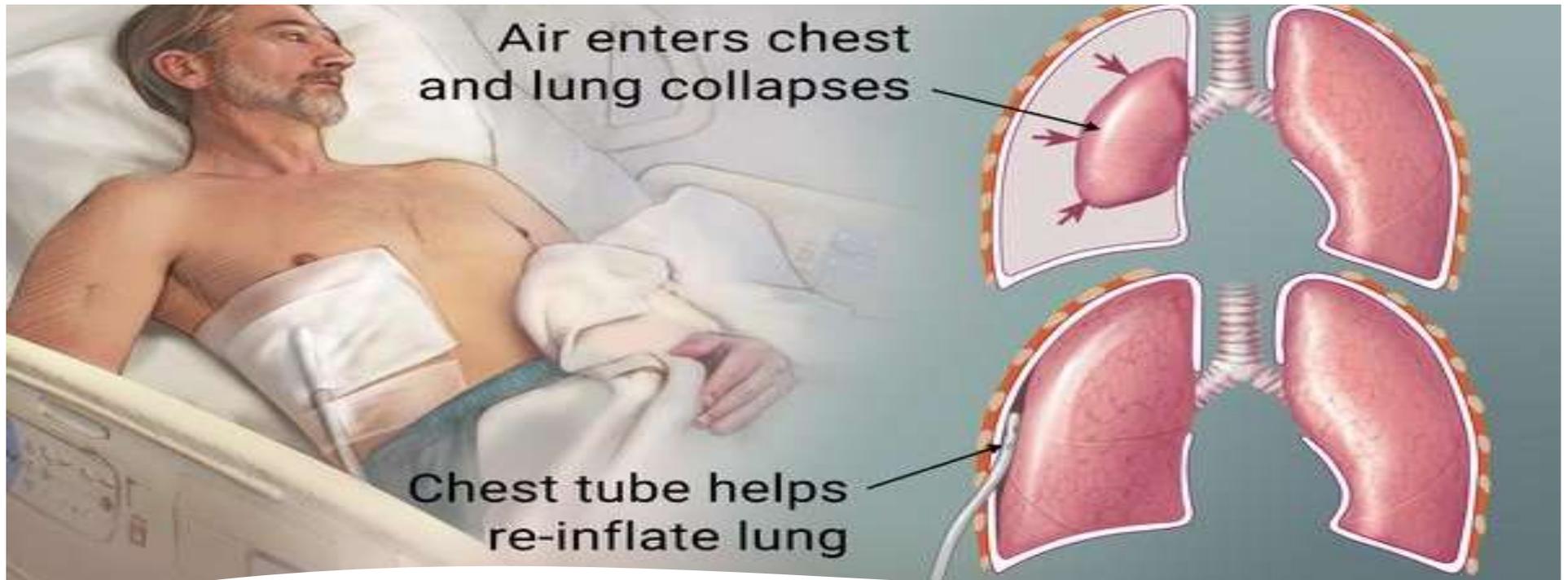
- Usually done through mouth or nose
- Placement of the tube confirmed with chest x-ray
- Distal tip of tube should be 1 to 2 inches above the tracheal bifurcation (carina)
- Cuff inflated with air and placed at mid-trachea
- Pediatric tubes do not have cuff





Complications

- Most common misplacement is intubation of right main bronchus
 - Wider than left main bronchus
 - Straighter than left main bronchus
- ET tube shaft may occlude the left main bronchus causing atelectasis of left lung



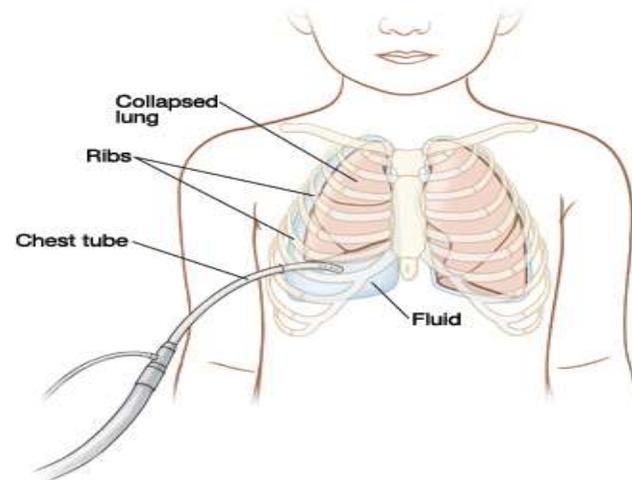
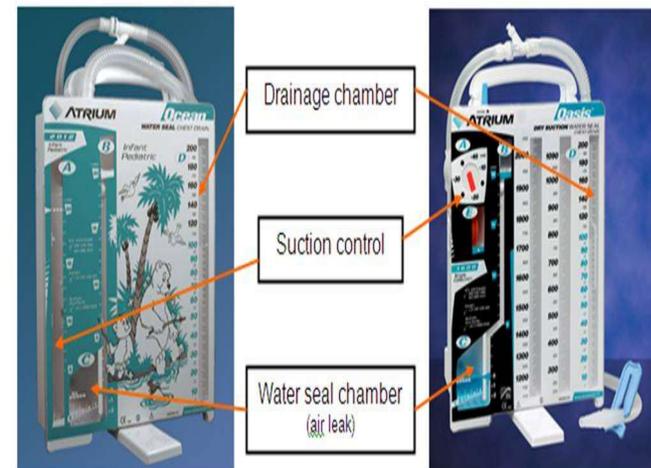
More complications

- Tube not placed far enough
 - Cuff inflation damages vocal cords
 - Inadequate ventilation provided
- Erosion of tracheal mucosa due to cuff trauma
 - Causes subcutaneous or mediastinal emphysema
- Pneumothorax

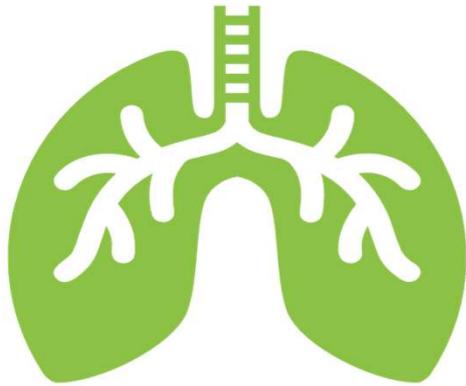
Chest tubes

- Thoracostomy (intrapleural) tubes
- Used to drain the intrapleural space and the mediastinum
 - Air
 - Fluid
- Pleural cavity- Space between parietal and visceral pleura

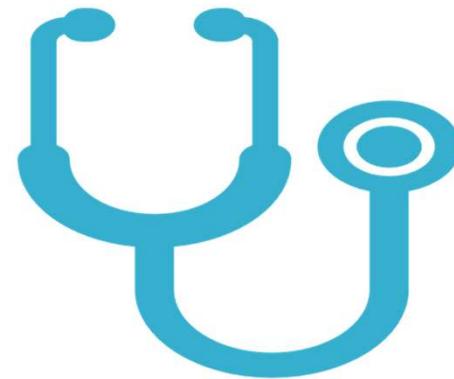
Chest drain system



Understanding how Body works



Negative pressure in pleural space allows lungs to expand



Fluid or air in pleural cavity can decrease negative pressure

Positive pressure causes lung collapse

Treatment for....

- Tubes can treat variety of problems
 - Pneumothorax
 - Hemothorax
 - Pleural effusion
 - Empyema



Placement

Tube insertion site is dependent on substance being removed

Hemothorax and pleural effusion

- Fifth to sixth intercostal spaces, laterally at midaxillary line
- May go through 4th or 8th spaces if needed

Pneumothoraces

- Second to third intercostal space at the midclavicular line is preferred

Cautions to take

- Chest drainage systems must be kept below the level of the chest
- Never knock a chest drainage system over
 - Pressure changes will cause tube to not work properly
- Patients can move with caution



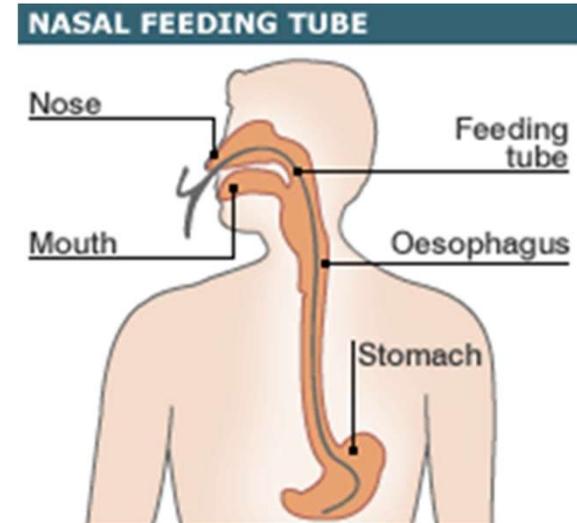
Unplanned Removal Of Chest Tube

In an unplanned chest-tube removal, stay calm. With a gloved hand, immediately cover the open insertion site and call for help while staying with the patient.

If you're walking with your patient and the chest tube becomes dislodged where it connects to the drainage tubing, immediately close off the tubing to air with your gloved hand by crimping it or using a clamp, if readily available. Call for help while staying with the patient.

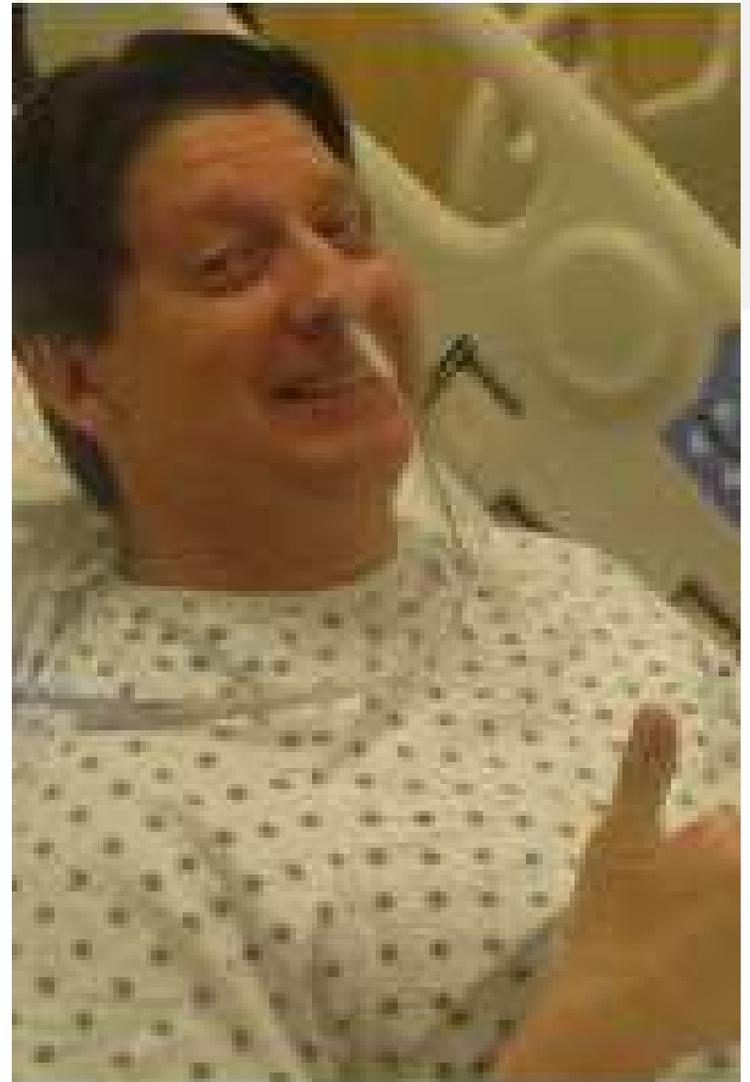
Nasogastric/Nasointestinal

- NG tube
- Plastic or rubber tubes inserted through the nasopharynx into the stomach
- Primary use:
 - administration of medications
 - gastric decompression
 - removal of flatus and fluids from the stomach after intestinal obstruction or major trauma



Types:

- Levin
 - Most common
 - Single-lumen with several holes near its tip
- Cantor
- Keofeed
- Miller-Abbott
- Sengstaken-Blakemore



1

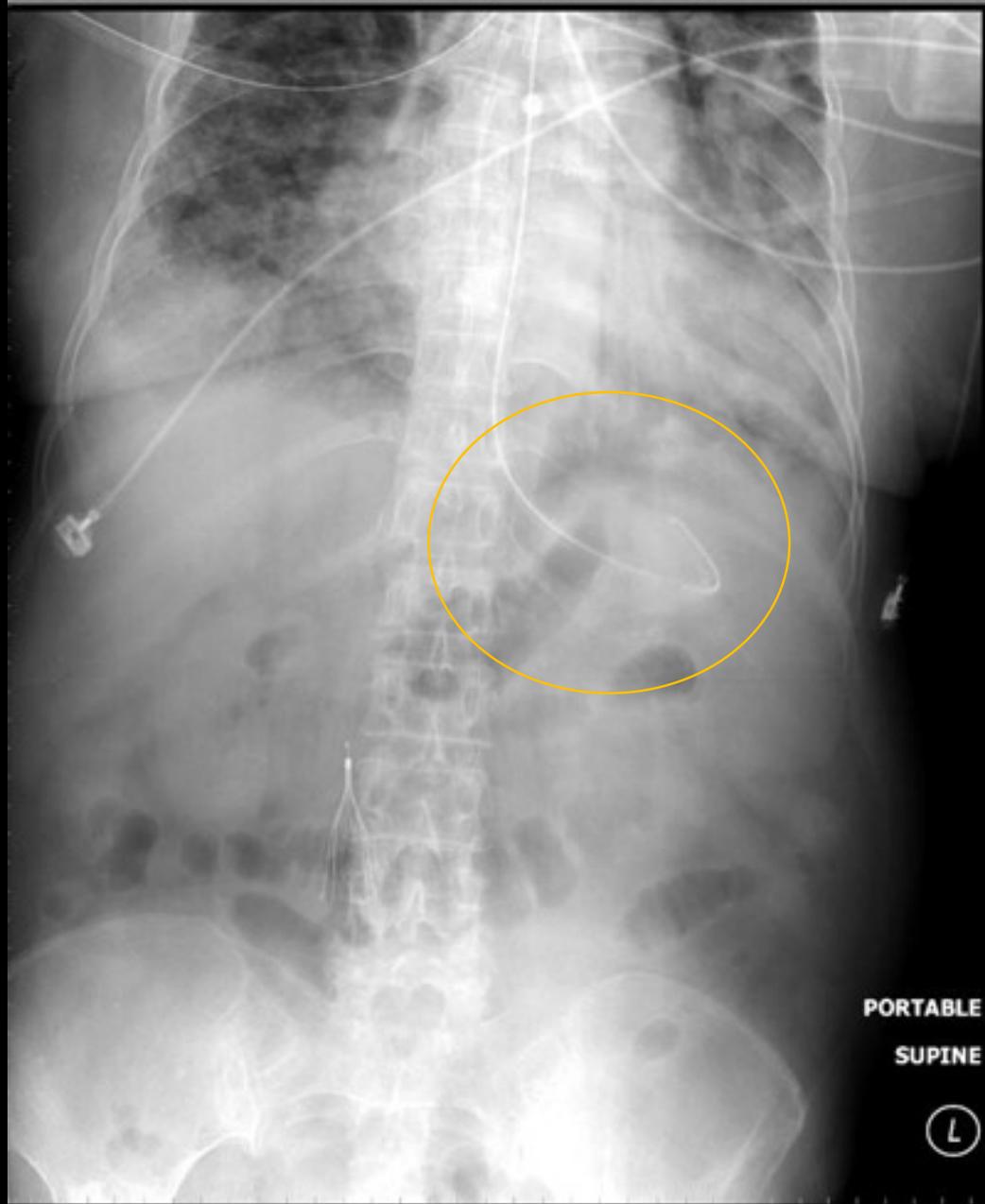
Take special care not to dislodge tubing during procedures

2

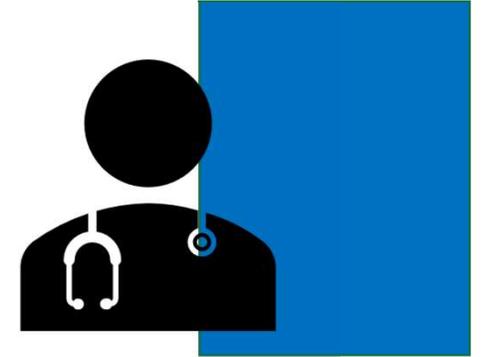
Sometimes contrast placed in NG tube as x-ray is taken to confirm placement when there is concern of dislodgement

3

Barium can be introduced through the NG tube to evaluate the Small Bowel



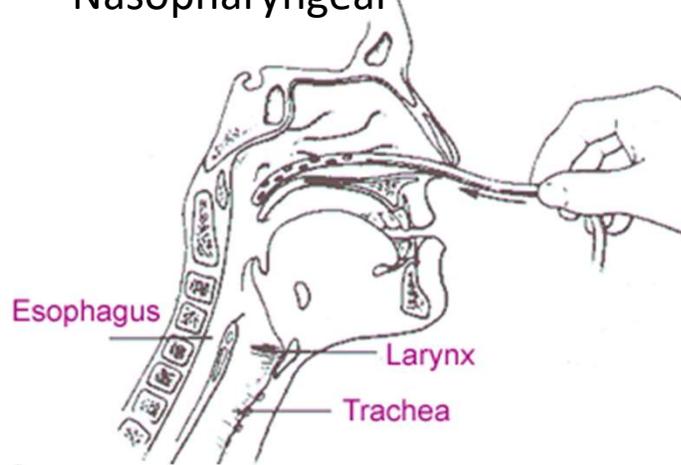
Suctioning



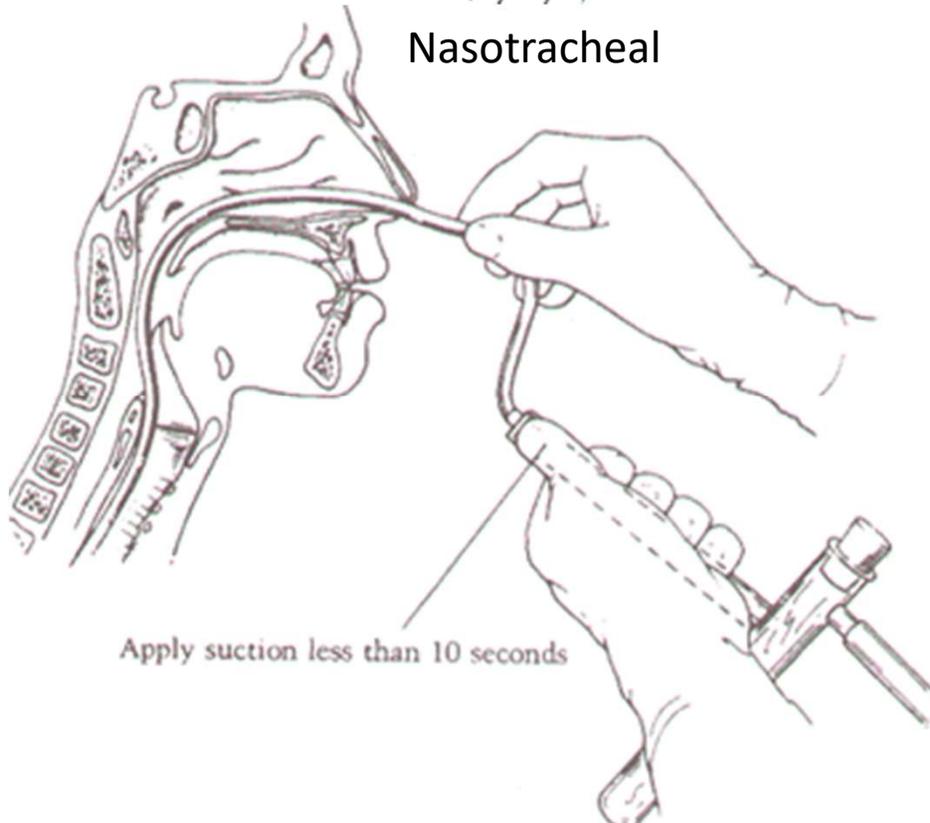
- Patient is unable to remove secretions with coughing
- May suction oropharynx, nasopharynx, or trachea
- Done often to keep ventilation effective and as effortless as possible
- Irritates mucosa and removes O₂ from the respiratory tract possibly causing hypoxemia
 - Important to pre-oxygenate prior to suctioning
 - Deep breaths before inserting the catheter
- Uncomfortable procedures
- Can be very painful and/or distressing experience

How to suction
Page 231-232;
refer to Edvance

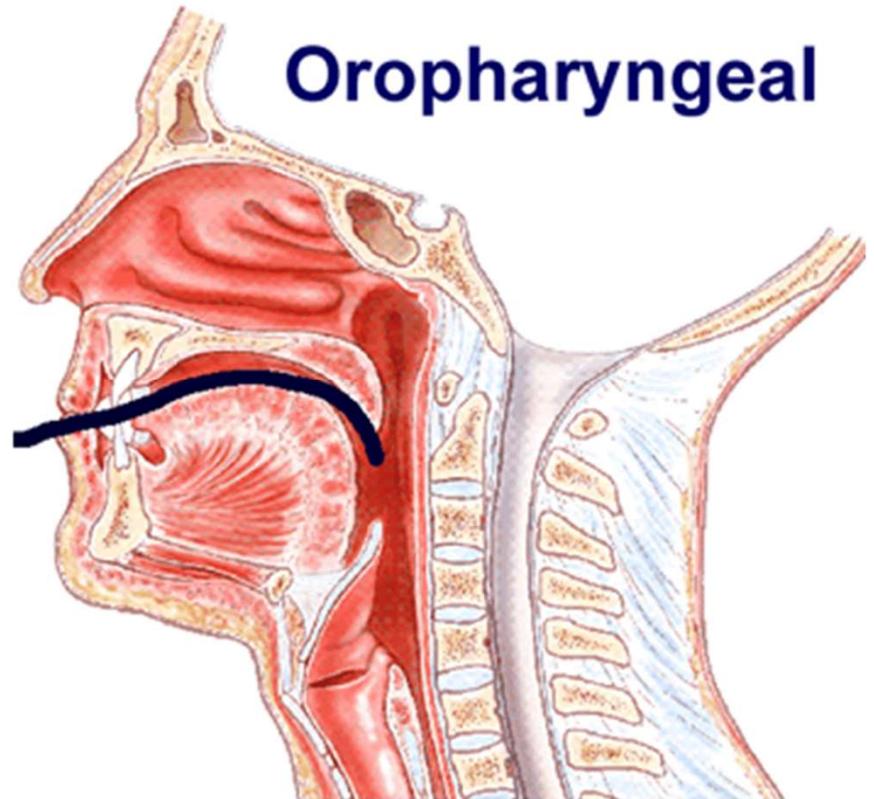
Nasopharyngeal



Nasotracheal



Oropharyngeal



Suction- Special Precautions

- Catheter or sterile glove touches an unsterile surface
 - Stop procedure, replace with sterile piece and start procedure over
- Patient vomits during suctioning
 - If gags or is nauseated – remove catheter (entered esophagus)
 - If needs to be suctioned again, change catheters and turn patient on side and turn head to prevent aspiration
- Secretions appear to be stomach contents
 - Ask patient to extend neck slightly. Helps prevent tube from passing into the esophagus
- For infants, use a 5 Fr to 6 Fr catheter
- For children, use a 6 Fr to 10 Fr catheter

SUCTIONING IS AN EMERGENCY PROCEDURE!!!

- It is NOT within the scope of your practice to perform suctioning because there are contraindications:
 - Head and facial bleeding
 - Esophageal varices
 - Nasal deformities
 - Trauma
 - Cerebral Aneurysms
 - Tight wheezing
 - Bronchospasm
 - Croup



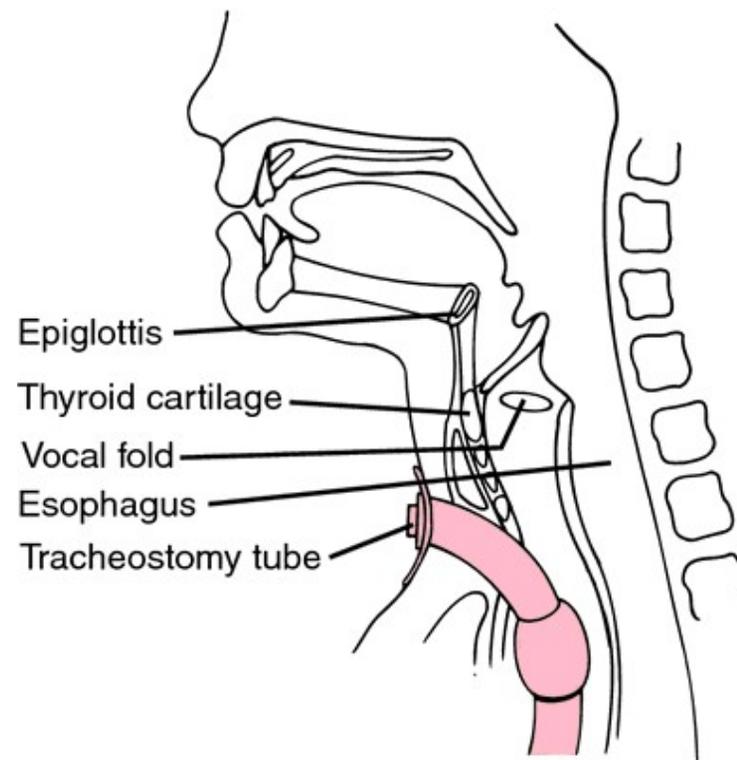
YOU MUST ASSIST!!!!

- RT is responsible for checking emergency suction equipment every day and making sure that its in good working order and all necessary items are available...

<https://www.youtube.com/watch?v=bHasd-Uj4Mo>

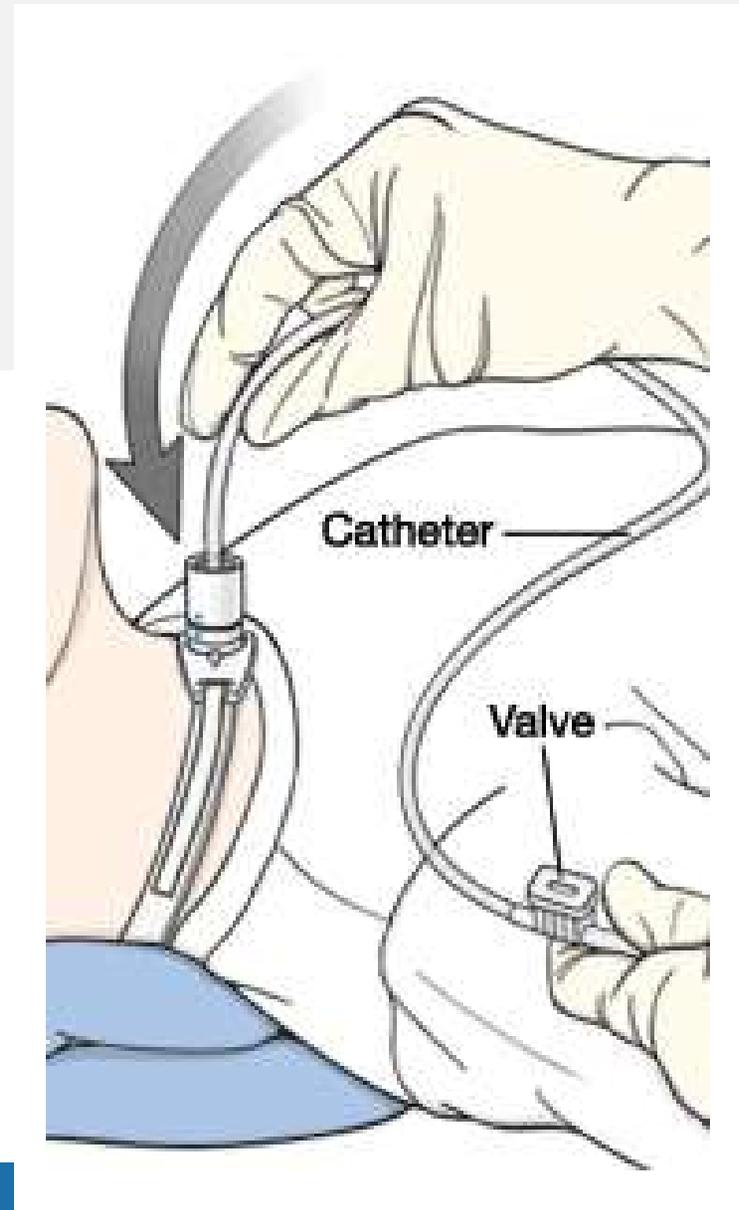
Tracheostomies

- Provides an airway during upper-airway obstruction
- Communication is a concern:
 - Yes-or-no questions
 - Hand signals
 - Sign language



Suctioning of Tracheostomies

- To remove secretions
- Usually responsibility of respiratory therapist or nurse
- Suctioning technique
 - Refer to Edvance Handout



CPR with Tracheostomies

- Use of ambu bag
- Compression rate of 100/min without pausing with breaths
- 1 breath every 6-8 seconds
 - onlineAHA.org



WIRELESS IMPLANTABLE MEDICAL DEVICES

Deep Brain Neurostimulators

Location: brain
Purpose: reduce symptoms of Parkinson disease



Cochlear Implants

Electrode Location: Cochlea
Purpose : replaces the function of the damaged inner ear



Gastric Stimulators

Lead Location: Gastric wall
Purpose: Gastroparesis



Cardiac Defibrillators/ Pacemakers

More info on next slide...



Foot Drop Implants

Location: Thigh region, heel
Purpose: allow person to walk



Insulin Pumps

Location: abdomen
Purpose: provides insulin to the body





Pacemaker (implanted Device)

- Electromechanical device that regulates heart rate
- Provides low levels of electrical stimulation to heart muscle
- Treats conduction defects of the heart
- Located in left pectoral fascia (pulse generator) and electrode in contact with apex of the right ventricle

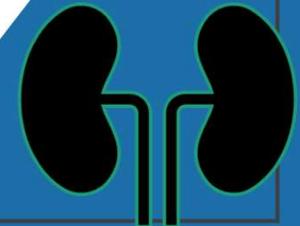
Your role

- The role of the radiographer is to operate the fluoroscopy unit, which will allow the physician to place the guidewire and pacemaker assembly correctly.
- AT RH, when patient arrives for chest x-ray within 6 weeks of pacemaker placement, patients may not raise their left arm above heart level
 - Extend in front of patient or rest on sponge



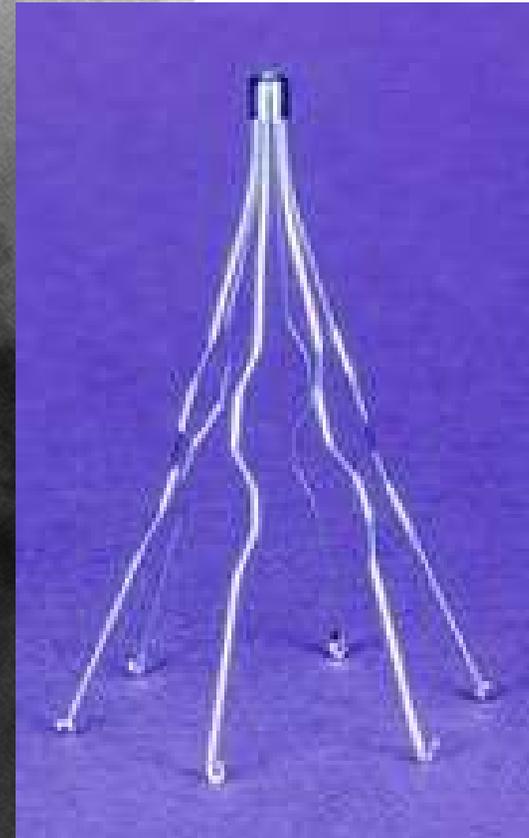
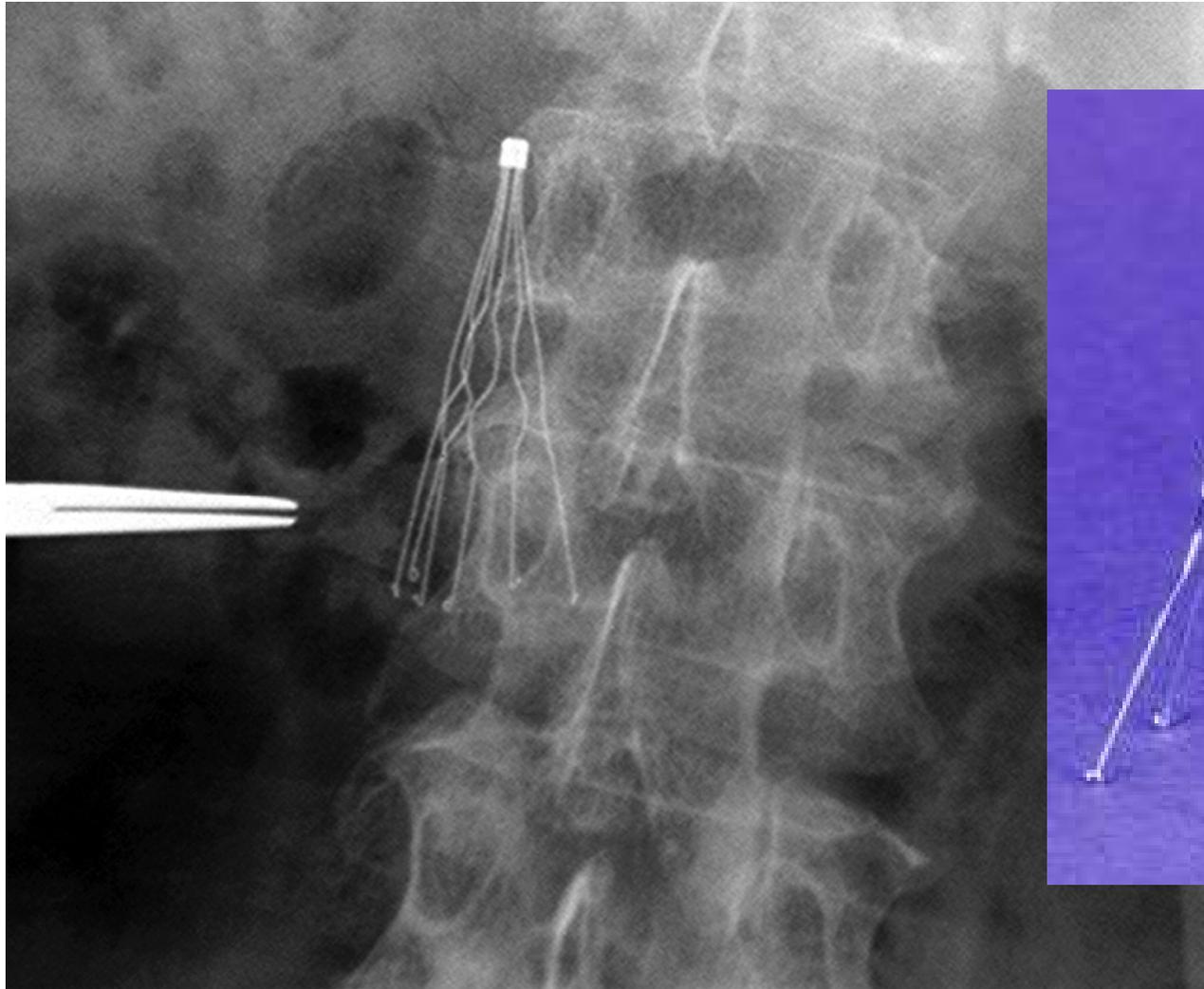
Greenfield Filter (IVL filter)

- Traps large clot fragments and prevents them from traveling through the vena cava vein to the heart and lungs, where they could cause severe complications or even death.
- Patients who may receive them:
 - diagnosed with deep vein thrombosis (DVT).
 - with pulmonary embolus.
 - who are trauma victims.
 - who are immobile.
 - who have recently had surgery or delivered a baby
- Placed through vein in groin or neck into the inferior vena cava
- Proper position infrarenal inferior vena cava with the apex of the filter just below the level of the lowest renal vein



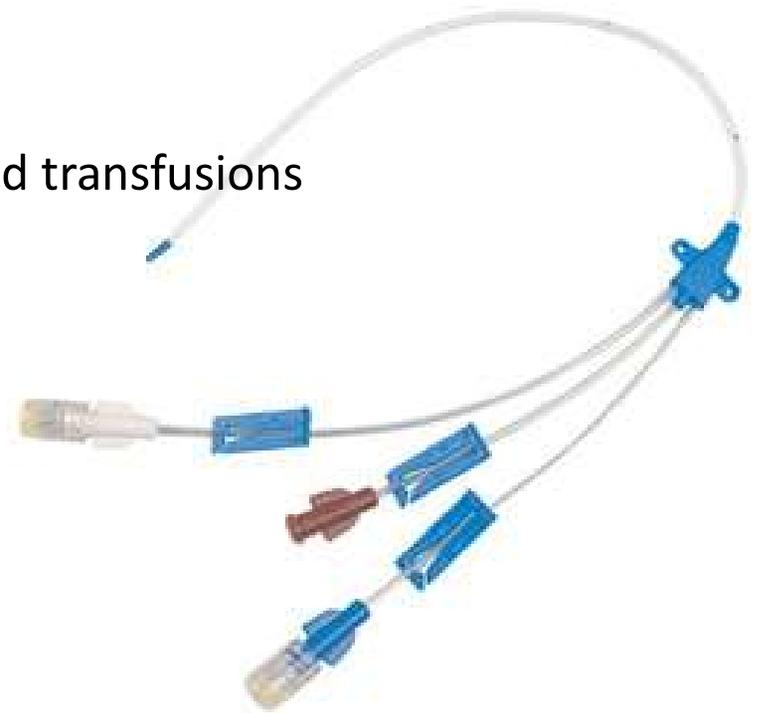
<http://www.radiologyinfo.org/en/info.cfm?pg=venacavafilter>

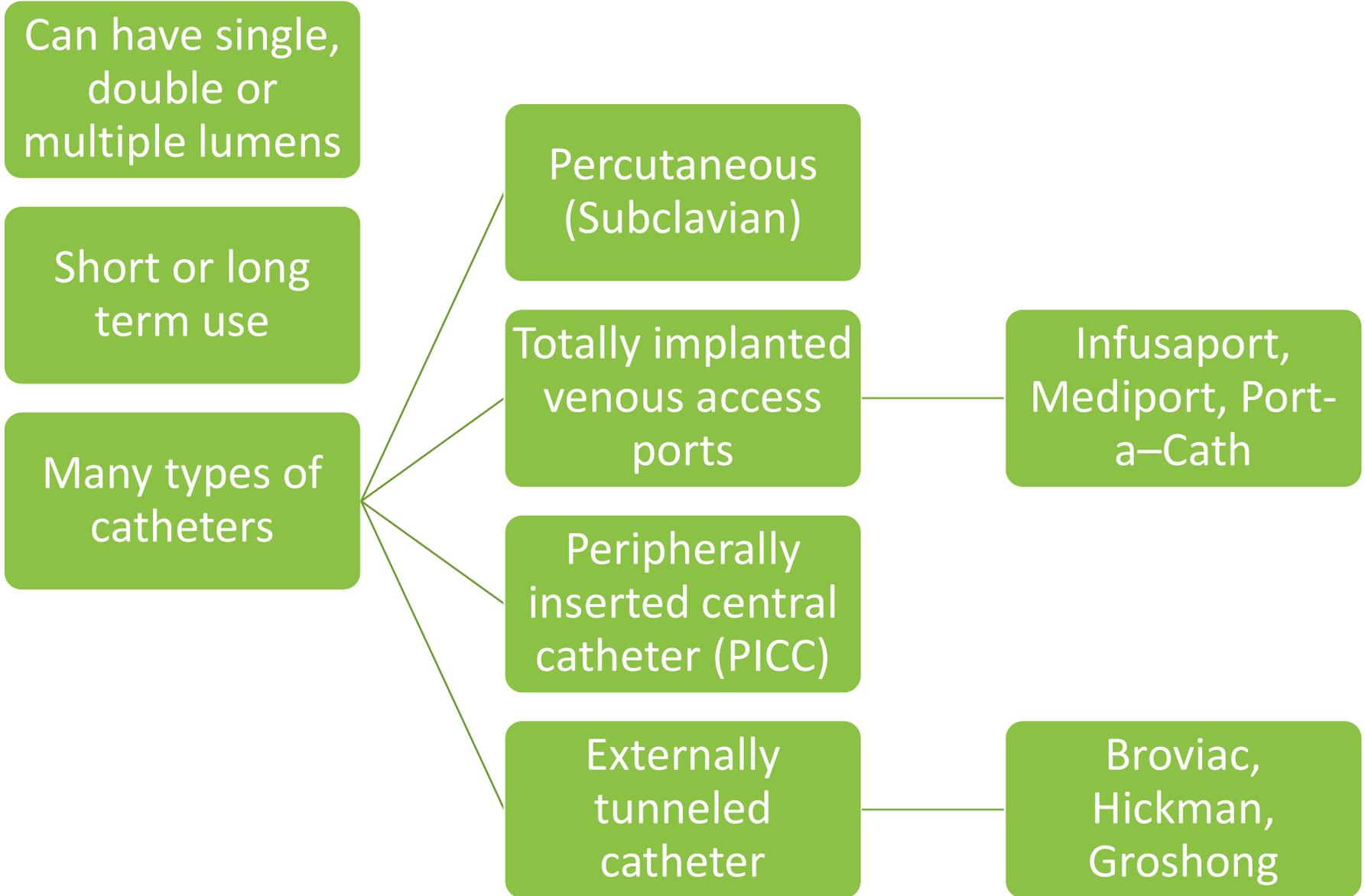
<http://www.ajronline.org/doi/full/10.2214/ajr.179.3.1790597>



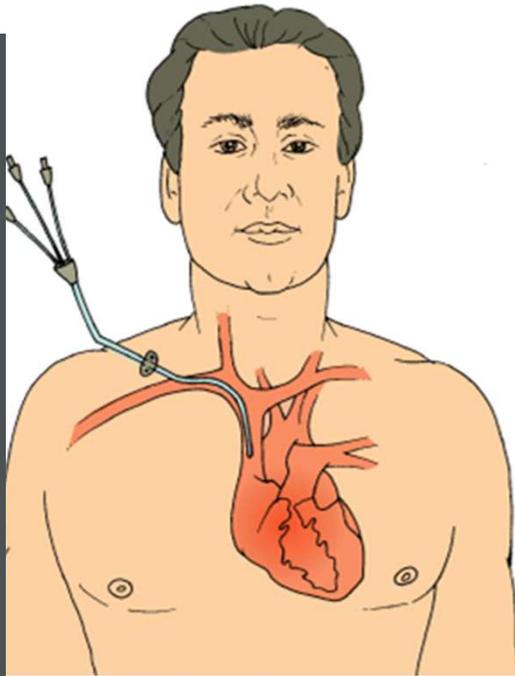
Central Venous Lines

- Catheters inserted into a large vein
- Used for:
 - Administer a variety of drugs
 - Manage fluid volume
 - Serve as a conduit for blood analysis and transfusions
 - Monitor cardiac pressures
- Other Names:
 - Central venous catheters
 - Venous access devices
 - Named after their developers
 - Hickman
 - Groshong





Placement

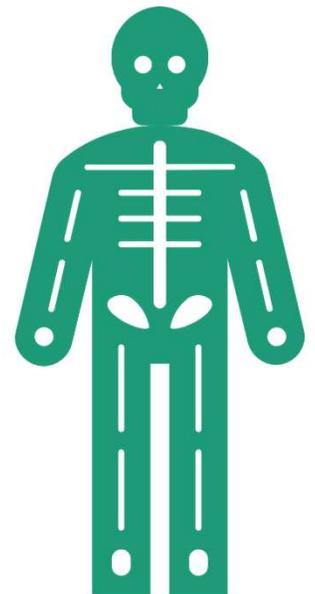


- All CVC's need to have the catheter tip placed in a central vein
 - Superior vena cava (SVC) is preferred location
 - 2-3 cm above the right atrial junction
 - SVC is very large and can withstand larger infusions of IV fluids better than smaller veins
 - Subclavian vein most common insertion site



Complications

- One third of CVC lines placed incorrectly
 - Placement always needs to be verified with x-ray or fluoroscopy
- Central line inserted on the right side should never cross the midline (knowledge of CV structure and branches)
- Central lines inserted on the left will need to cross midline
- Distal tip should not go past the SVC

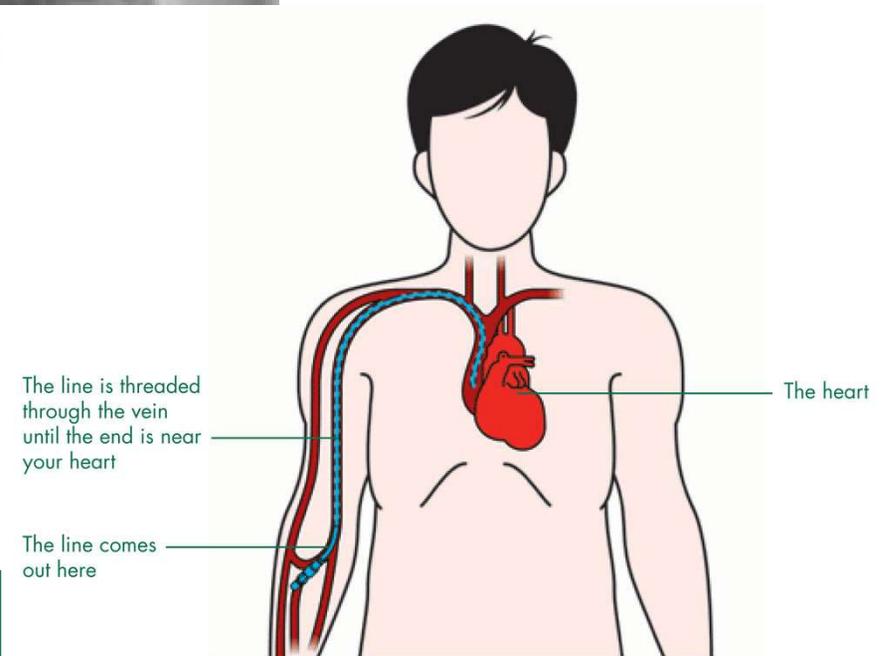


Peripheral venous line PICC Line



- A catheter inserted into a peripheral vein and guided to a central vein
- Used for:
 - Prolonged IV antibiotic treatment
 - TPN Nutrition
 - Chemotherapy
 - Home or sub-acute discharge for extended treatment
- Location:
 - cephalic vein, basilic vein, or brachial vein and then advanced through increasingly larger veins, toward the heart until the tip rests in the distal superior vena cava

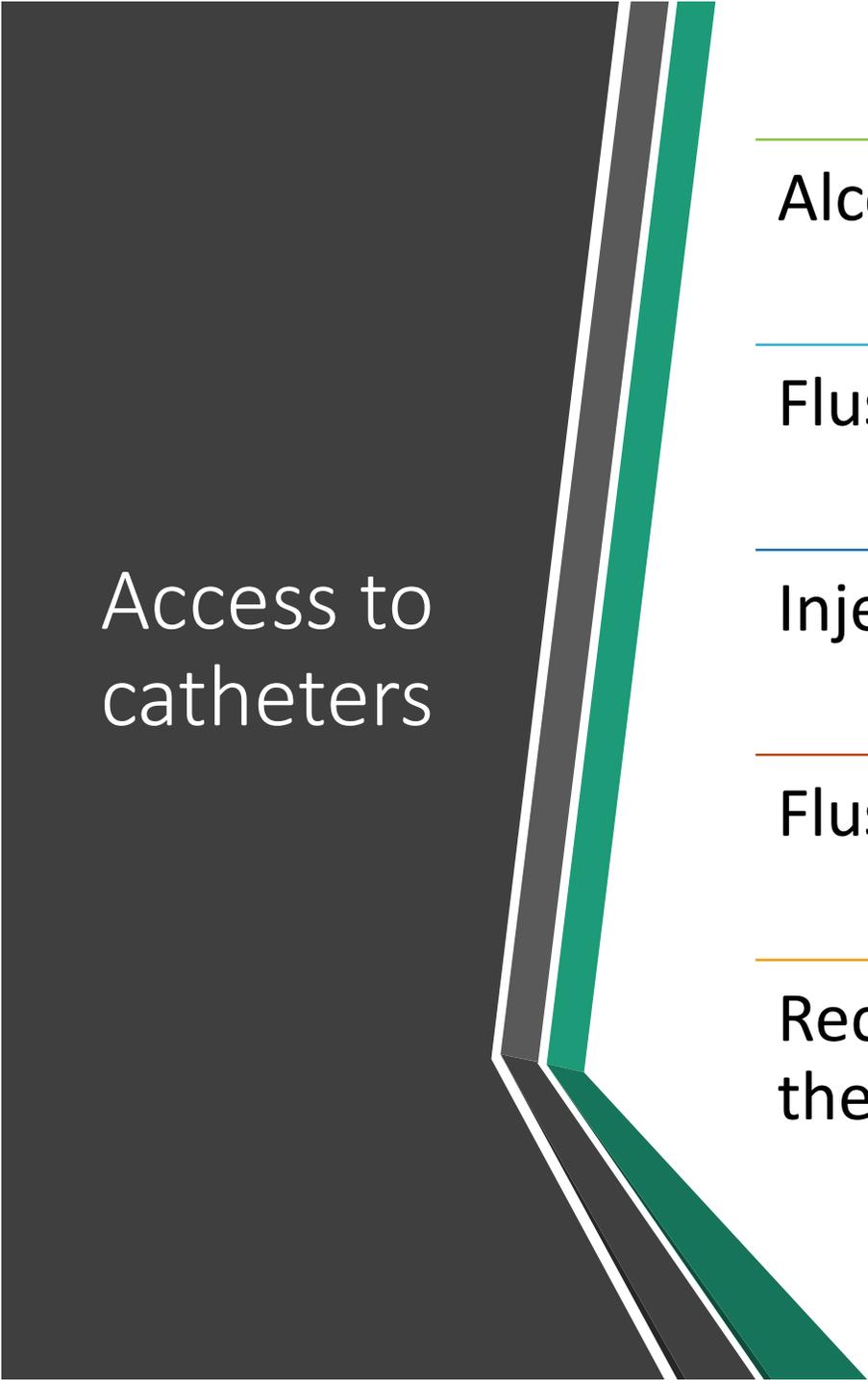
<http://www.mayoclinic.com/health/picc-line-placement/MM00781>





Care of venous Catheters

- Must wash hands prior to touching catheter
- Anything touching the end to introduce or withdraw from it must be sterile
- Keep it clamped when not in use
- Trained personnel will flush lines with use or periodically if not used
- Use of antibacterial locks and impregnated antibacterial catheters can eliminate infection
- Use the best practices to prevent infections from occurring



Access to
catheters

The diagram shows a dark grey rectangular area on the left representing a patient's back. A white line indicates the spine. To the right of the spine, there are two vertical lines representing catheters: a grey one on the left and a green one on the right. Five horizontal lines extend from the catheters to the right, each pointing to a specific procedure. The lines are colored green, blue, blue, orange, and orange from top to bottom.

Alcohol hub

Flush catheter

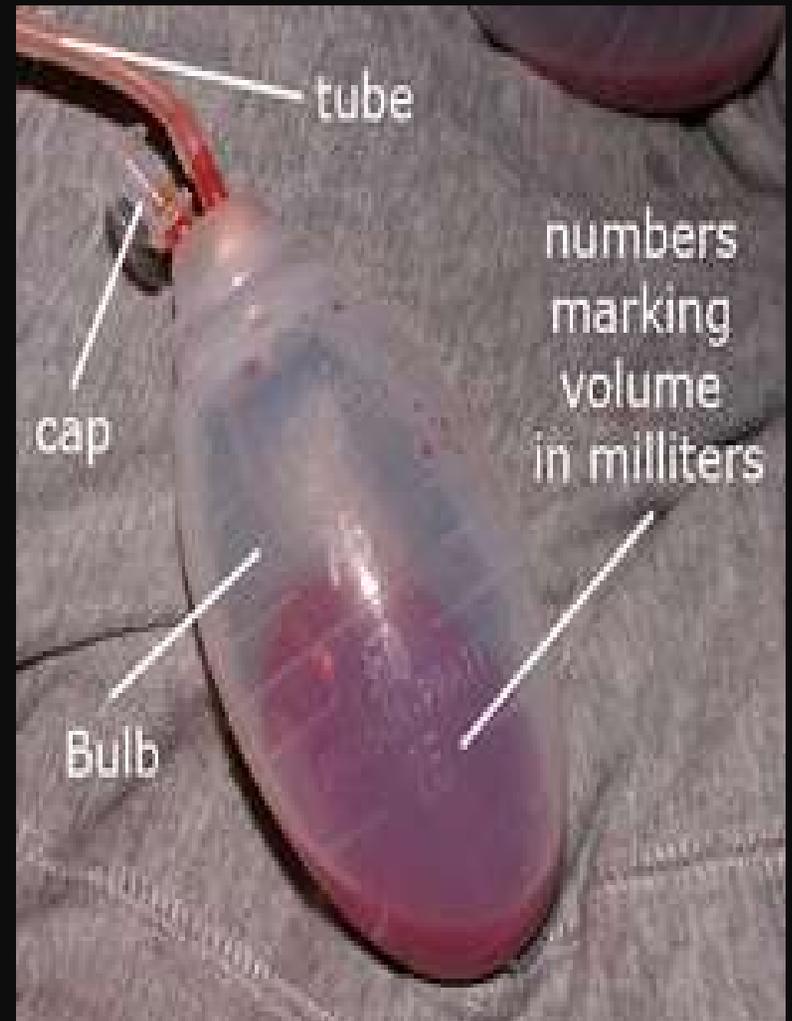
Inject contrast or medication

Flush catheter

Recap hub if facilities provide
them

Tissue Drains

- To let blood, pus, or other fluids escape from a wound while it heals, without letting bacteria get in.
 - A drain is removed when the surgeon feels that the amount fluid collected over 24 hours is low enough to remove the device
 - Components: the **drain**, the **drain tube**, and the **drain bulb**
-



1. Wash your hands with soap and water.
2. Hold the drain bulb upright and remove the stopper from the stem. The bulb will expand to an egg shape. (see Figure 1)
3. Hold the bulb over the measuring cup provided to you. Turn the bulb over with the stem over the cup. Gently squeeze the bulb to empty the drain fluid into the cup. (see Figure 2)
4. After emptying the drain, squeeze all of the air out of the bulb by grasping the bulb between your thumb and fingers. (see Figure 3)
5. Continue to squeeze the bulb. With the bulb completely empty of air, replace the stopper into the drain stem (Figure 4). When you release your grip on the bulb, it will stay collapsed.
6. Secure the drain bulb back to your clothing.
7. Look at the amount of fluid that was emptied into the cup and write down that amount on the record sheet provided. Be sure to also write down the date and time that the drain was emptied.
8. Pour the fluid from the cup into the toilet or sink and flush the toilet or rinse the sink.
9. Repeat steps 2 to 8 for each drain if you have more than one drain.
10. Rinse out your cup(s) and wash your hands.



Ostomies

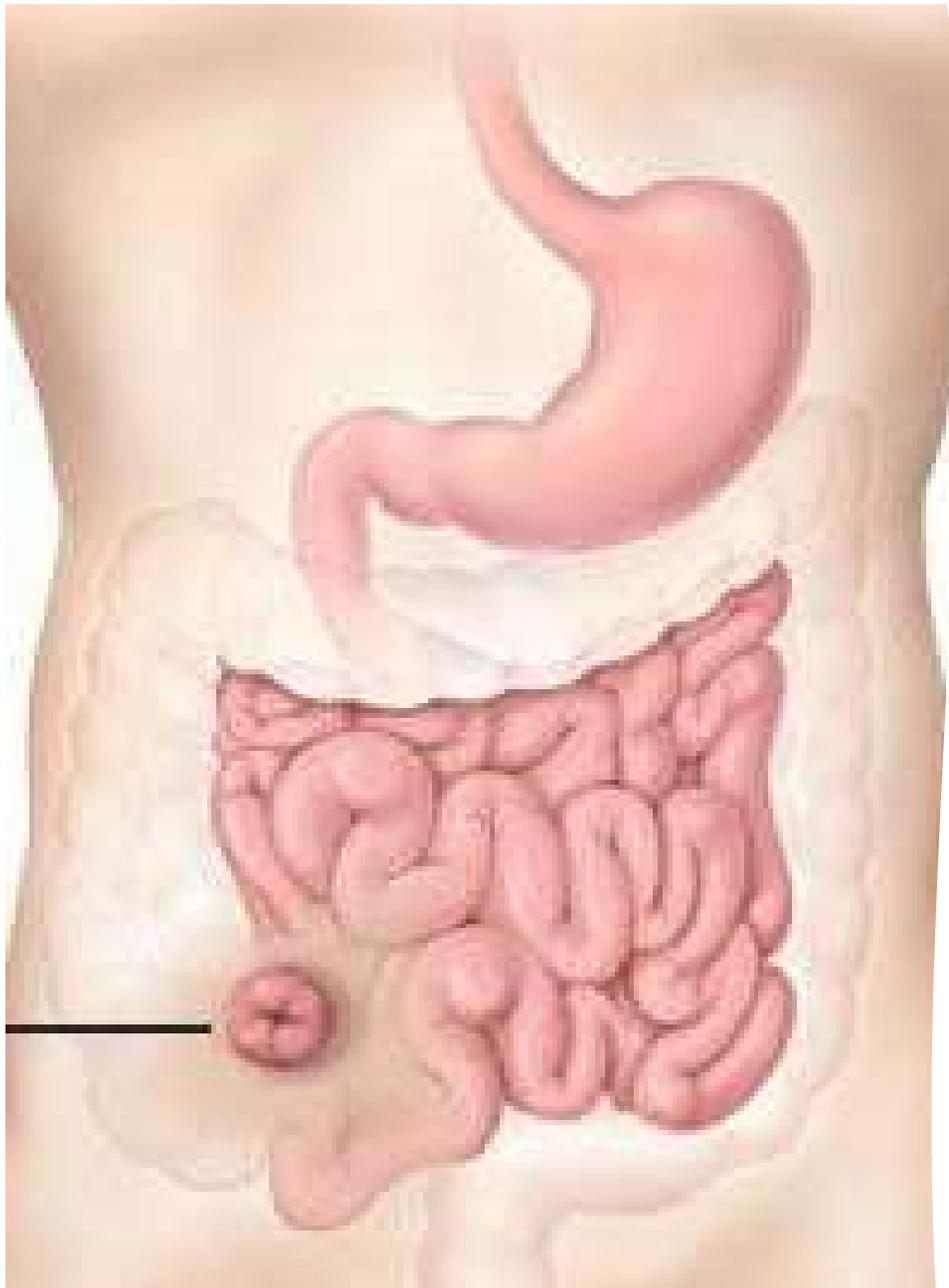
surgically
created
opening in
the body
for the
discharge
of body
wastes

Consists of:

- Stoma- end of the ureter or small or large bowel that can be seen protruding through the abdominal wall
- Pouch

Types of Ostomies

- Ileostomy
- Colostomy
- Ureteroileostomy

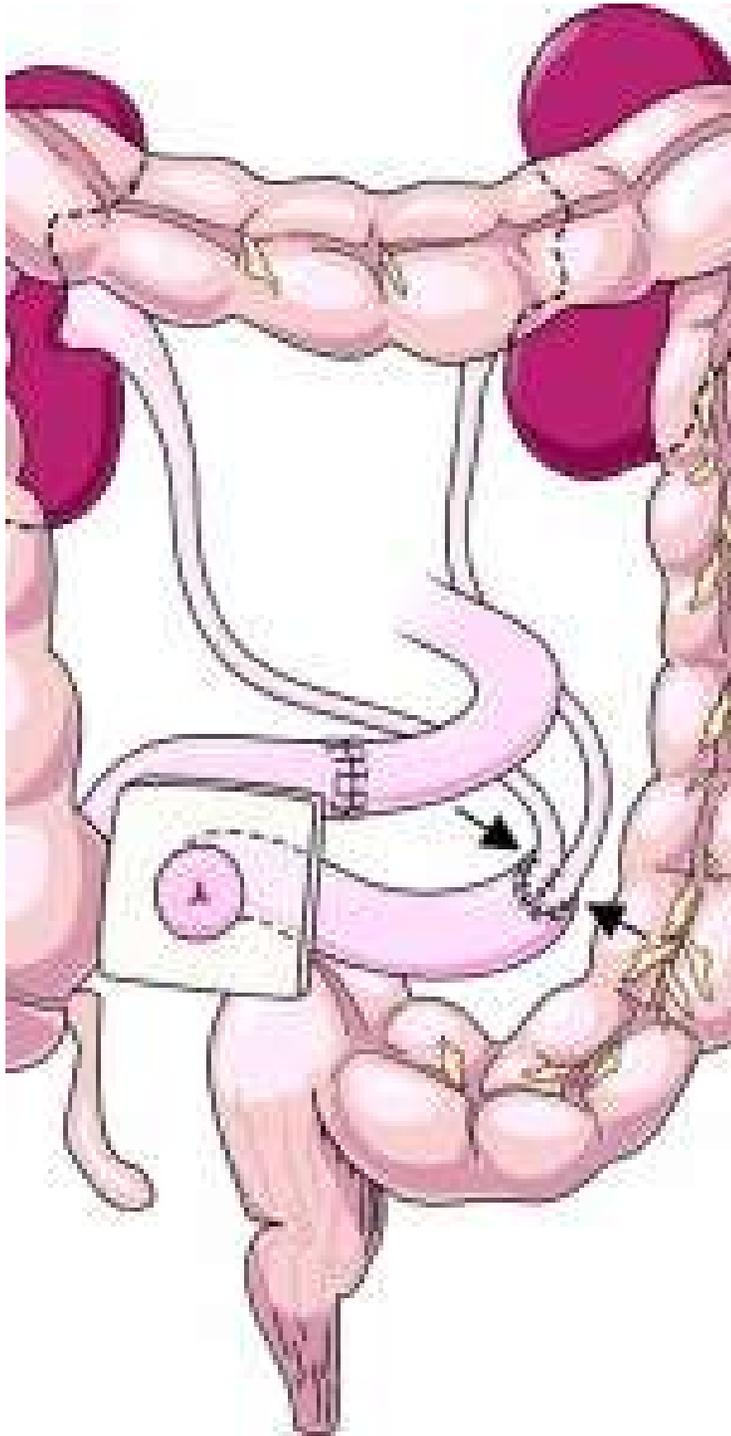


Ileostomy

- A surgically created opening in the small intestine, usually at the end of the ileum in which the intestine is brought through the abdominal wall to form a stoma.
- Purpose: treatment of ulcerative colitis, crohn's disease, congenital defects of the bowel, cancer, trauma, and other conditions requiring bypass of the colon.
- Temporary or permanent
- May involve removal of all or part of the entire colon.
- Located in a portion of the ileum
 - Usually in right lower quadrant

Colostomy

- Opening in the abdomen in which the large intestine is brought through and a stoma is created.
- Purpose: treat various disorders of the large intestine, including cancer, obstruction, inflammatory bowel disease, ruptured diverticulum, ischemia, or traumatic injury
- Can be permanent or temporary
- Location: any portion of the colon



Ureteroileostomy

- A section at the end of the small bowel (ileum) is surgically removed and relocated as a passageway (conduit) for urine to pass from the kidneys to the outside of the body through a stoma
- Purpose: diverts urine away from a diseased or defective bladder
- It may include removal of the diseased bladder
- Permanent or temporary
- Located in area of the ileum

Things to be aware of with ostomies

- Produces a major change in a patient's body image
- Many patients go through a grieving process
- Do not express *ANY* type of hint of revulsion or hesitancy
- May have different prep than other patients
- Should be instructed to bring in an extra pouch if





Care and Access



Wear the right size pouch



Change the pouching system regularly



Clean the skin and stoma



Watch for sensitivities and allergies



Empty bag when 1/3 way full



Access:

Catheters or other medical devices can be introduced through the stoma

- Irrigation of ostomy or fluoroscopic procedures