Tubes, Catheters, Lines, and Other Devices

Unit 2 Part 4

Chapter 15 178-186

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RADIOLOGIC TECHNOLOGISTS ROLE

- Can play an important role in early detection of problems associated with malpositioned lines.
- Responsibility to alert authority if noticeably malpositioned
- Must also be aware and able to transfer patients and image patients with tubes and lines in place to ensure dislodgement does not occur
- Must have knowledge on preparation of the tube, assembly and able to assist if applicable

2

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

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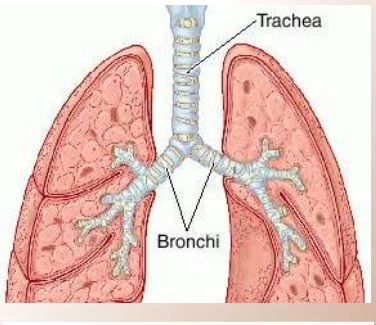
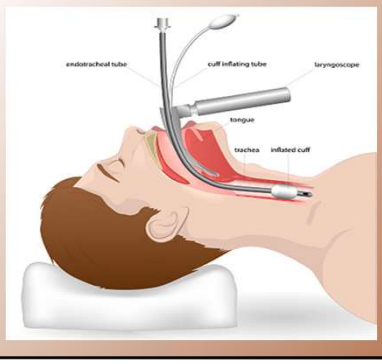
PLACEMENT

- 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 (3-5 cm) above the tracheal bifurcation (carina)
- Cuff inflated with air and placed at mid-trachea
- Pediatric tubes do not have cuff





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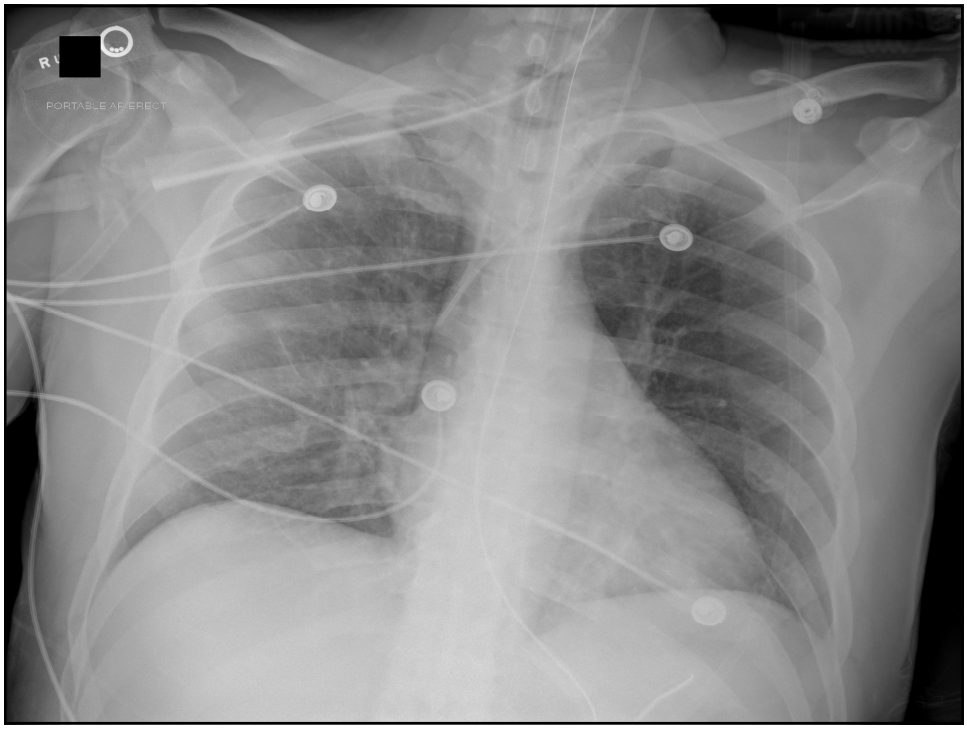

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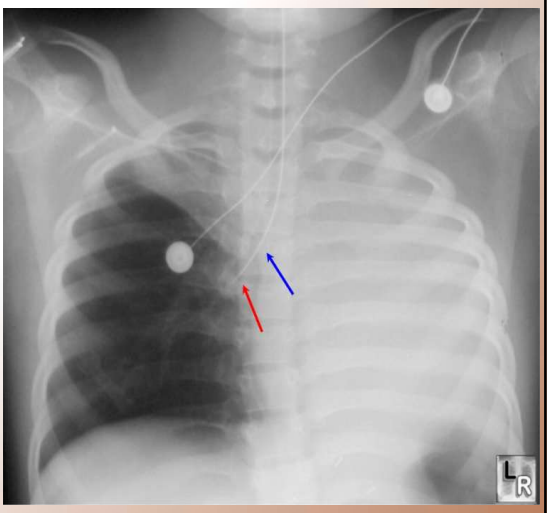
COMPLICATIONS

- 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



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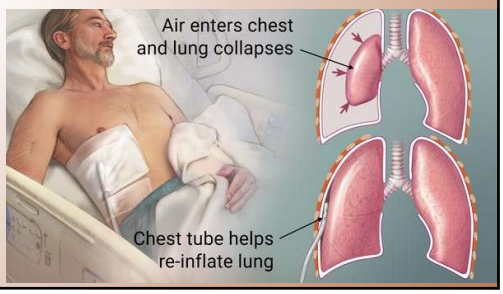
MORE COMPLICATIONS

- 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 (collapsed lung)



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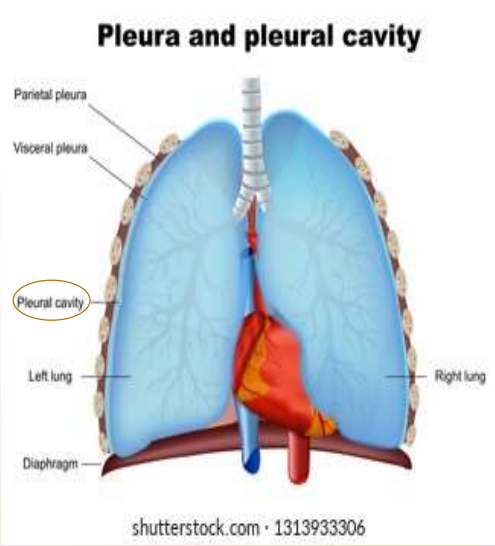
CHEST TUBES

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



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UNDERSTANDING HOW LUNGS WORKS

Negative pressure in pleural space allows lungs to expand

Fluid or air in pleural cavity can decrease negative pressure. When negative pressure is lowered (positive pressure), the lung fails to expand

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TREATMENT FOR..

- Pneumothorax
- Hemothorax
- Pleural effusion
- Empyema

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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

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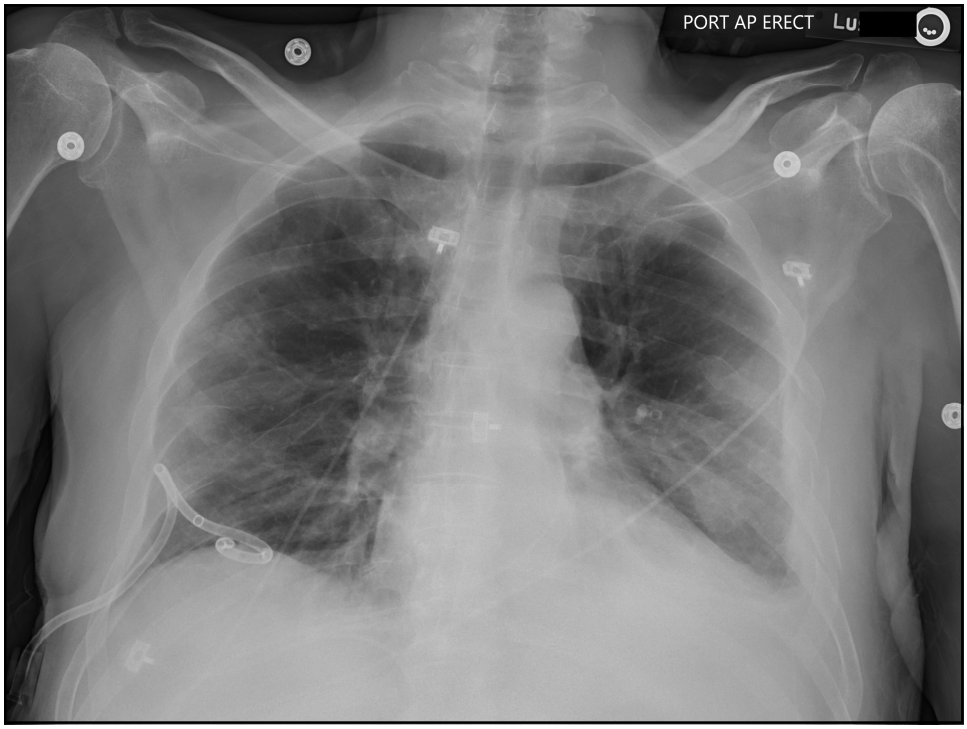

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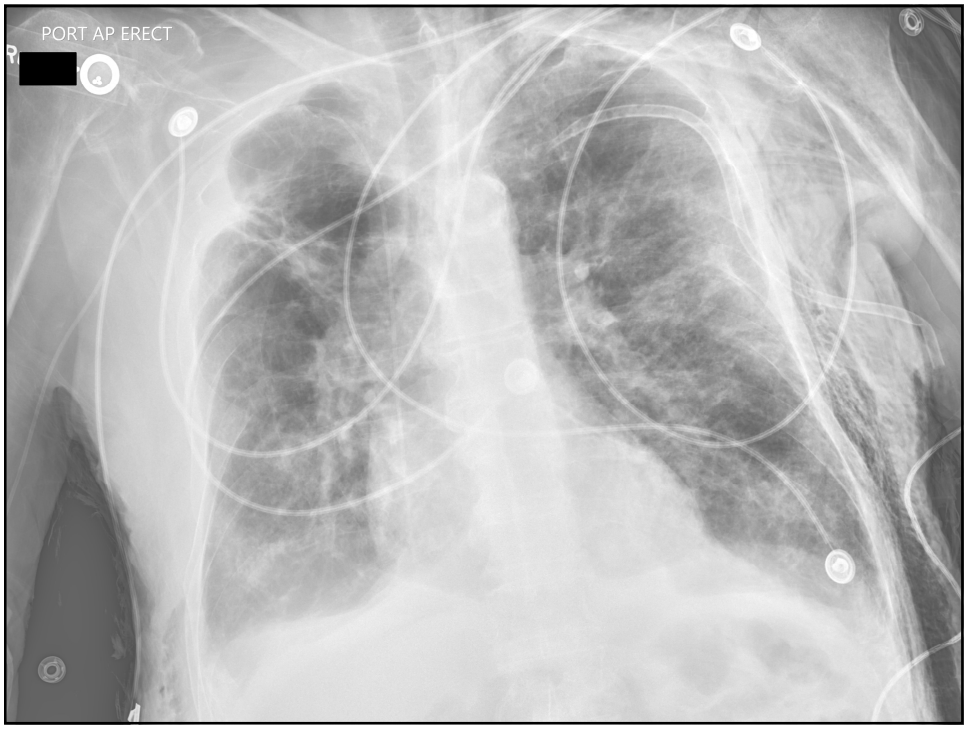

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CAUTIONS TO TAKE

- 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

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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.

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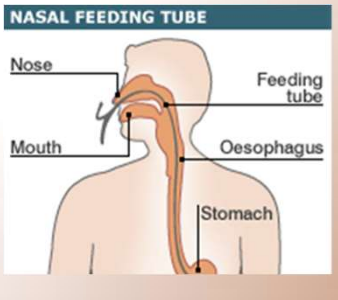
NASOGASTRIC/NASOINTESTINAL

- NG tube for therapeutic or diagnostic purposes
- Plastic or rubber tubes inserted through the nasopharynx into the stomach for air or secretions to be evacuated and/or medications, nourishment and contrasts may be injected
- Primary use:
  - administration of medications
  - gastric decompression
  - removal of flatus and fluids from the stomach after intestinal obstruction or major trauma



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Types:

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

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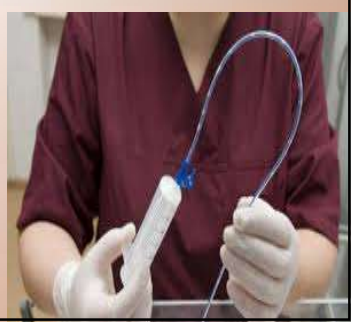
Take special care not to dislodge tubing during procedures

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

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



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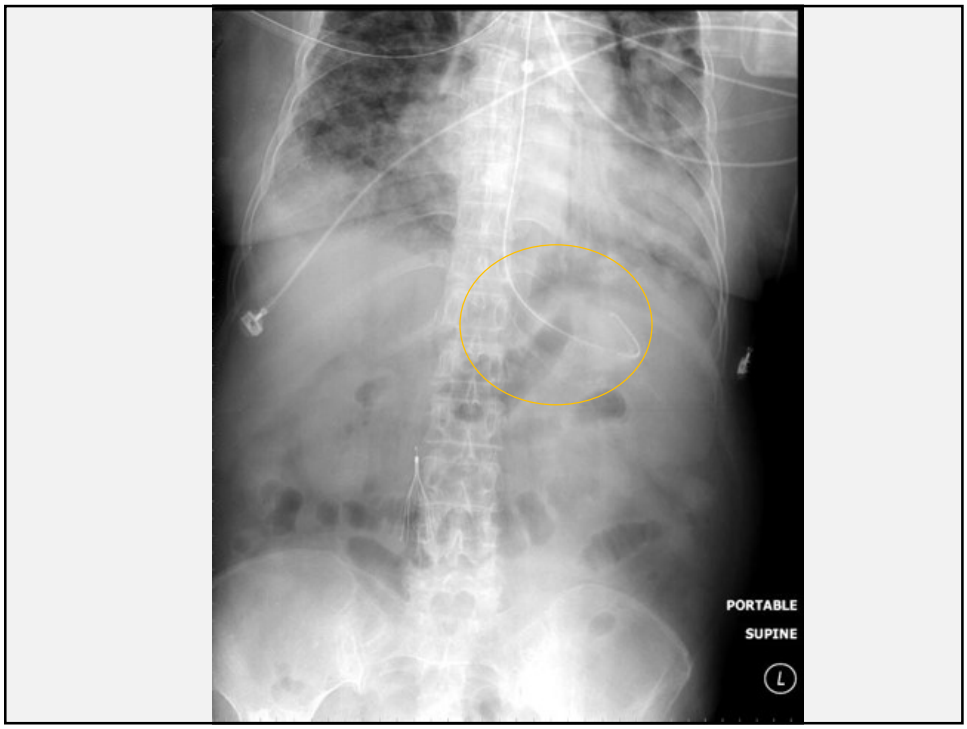

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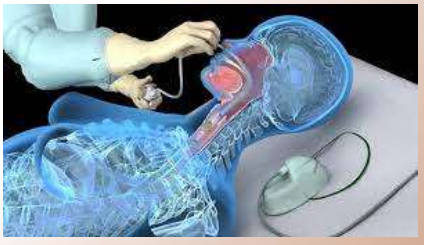
WHEN IS SUCTION NEEDED?

- Excessive vomiting who cannot change position on their own
- Audible rattling or gurgling sounds in their throat
- Signs of difficulty breathing and in distress
  - all of these may require mechanical suctioning to remove secretions to prevent aspiration or respiratory distress



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SUCTIONING

- May suction oropharynx, nasopharynx, or trachea (nasal or oral)
- Suctioning is a method of removing mucous, vomit or gastric secretions from the lungs, mouth or throat
- Creates negative pressure, acting as a vacuum to eliminate the secretions
- Can be an uncomfortable procedure for the patient
- Can be very painful and/or distressing experience

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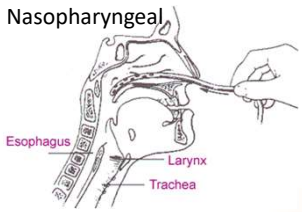
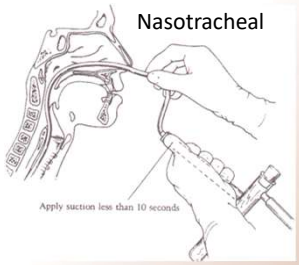
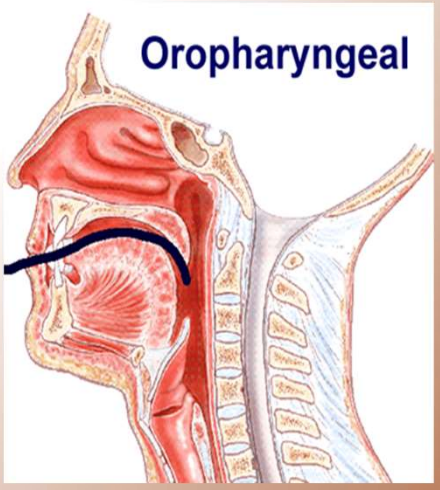
How to suction Page 231-232; refer to Edvance







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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

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YOU MUST ASSIST

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

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SUCTION- SPECIAL PRECAUTIONS

- If the 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 form passing into the esophagus
- For infants, use a 5 Fr to 6 Fr catheter
- For children, use a 6 Fr to 10 Fr catheter

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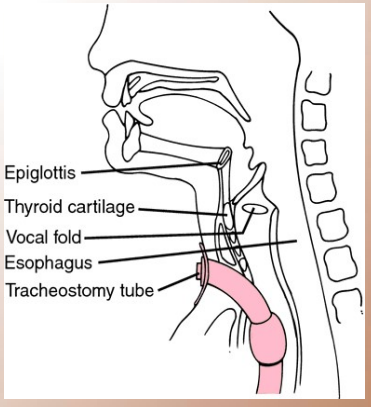
TRACHEOSTOMIES

- Opening in the airway providing an airway during upper-airway obstruction
- Communication is a concern:
  - Yes-or-no questions
  - Hand signals
  - Sign language



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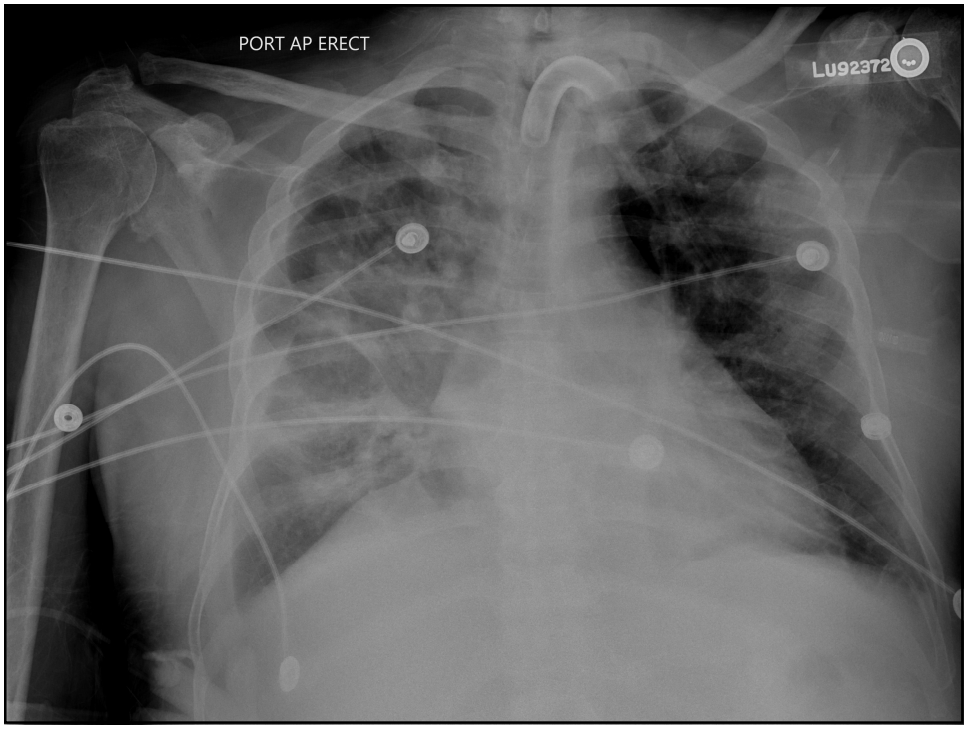

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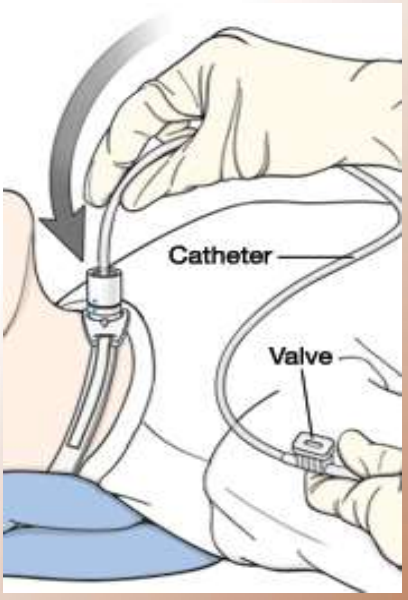
SUCTIONING OF TRACHEOSTOMIES

- To remove secretions
- Responsibility of a respiratory therapist or registered nurse
- Suctioning technique
  - Refer to Edvance Handout



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CPR WITH TRACHEOSTOMIES

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

onlineAHA.org

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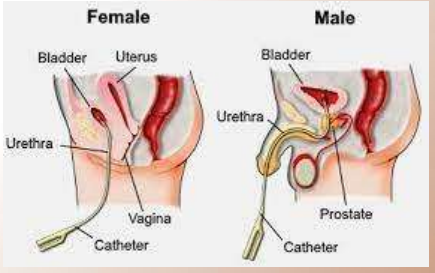
URINARY CATHETERS

- Insertion of a plastic, silicone or rubber tube (catheter) through the urethra into the bladder
- To keep bladder empty post surgery for tissues to heal, to drain, irrigate or instill medication, assist incontinence



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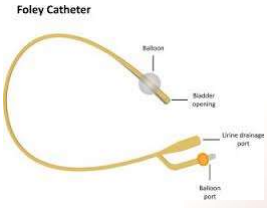
TYPES OF URINARY CATHETERS

- Foley (straight catheter) single lumen with a balloon

  - sterile technique for insertion; done by RN with physicians orders

- Condom Catheter – external on males who may be susceptible to UTI's, incontinent or comatose whose bladder empties unexpectedly



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CATHETER IN RADIOLOGY

- Careful when transferring patients
- Do not raise catheter bag above bladder, will cause reflux
- Catheters used in fluoroscopy during cystography or pyelography. Often times, the RA will insert the catheter, you will need to know where to find the supplies and which size French; specified by RA

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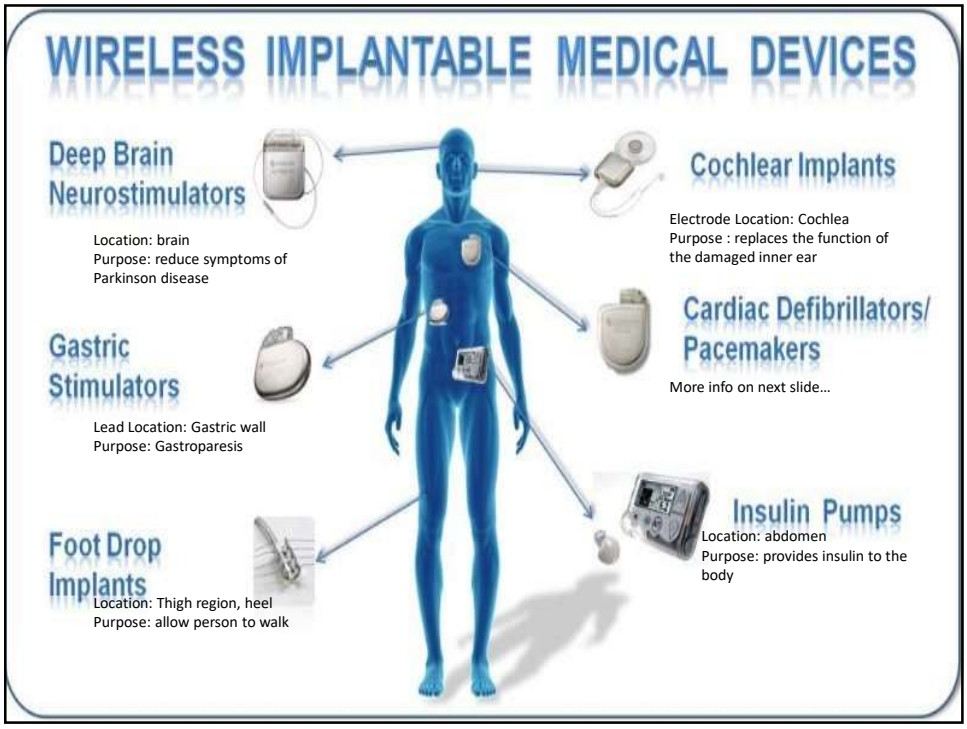

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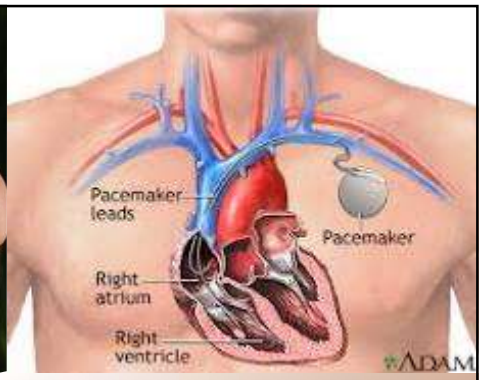

PACEMAKER (IMPLANTED DEVICE)

- Electromechanical device that regulates heart rate and heart function
- 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

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YOUR ROLE

- During insertion, 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

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GREENFIELD FILTER (IVC 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

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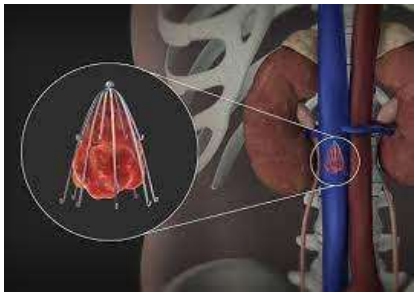

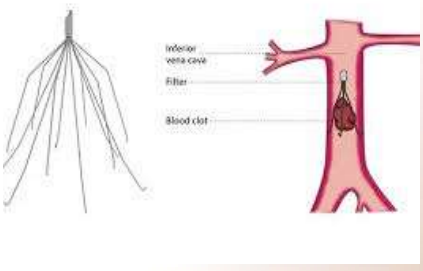

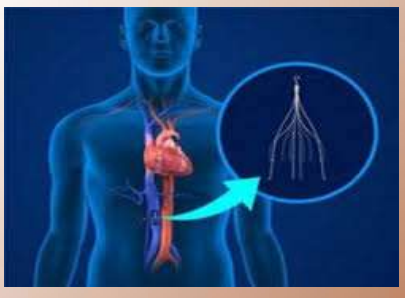

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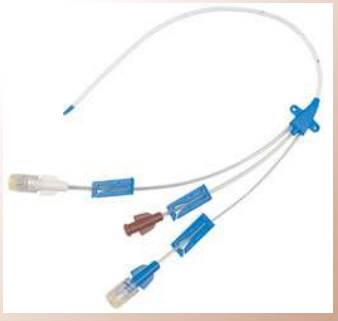
CENTRAL VENOUS LINES

- Catheters inserted into a large vein, usually in neck
- 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



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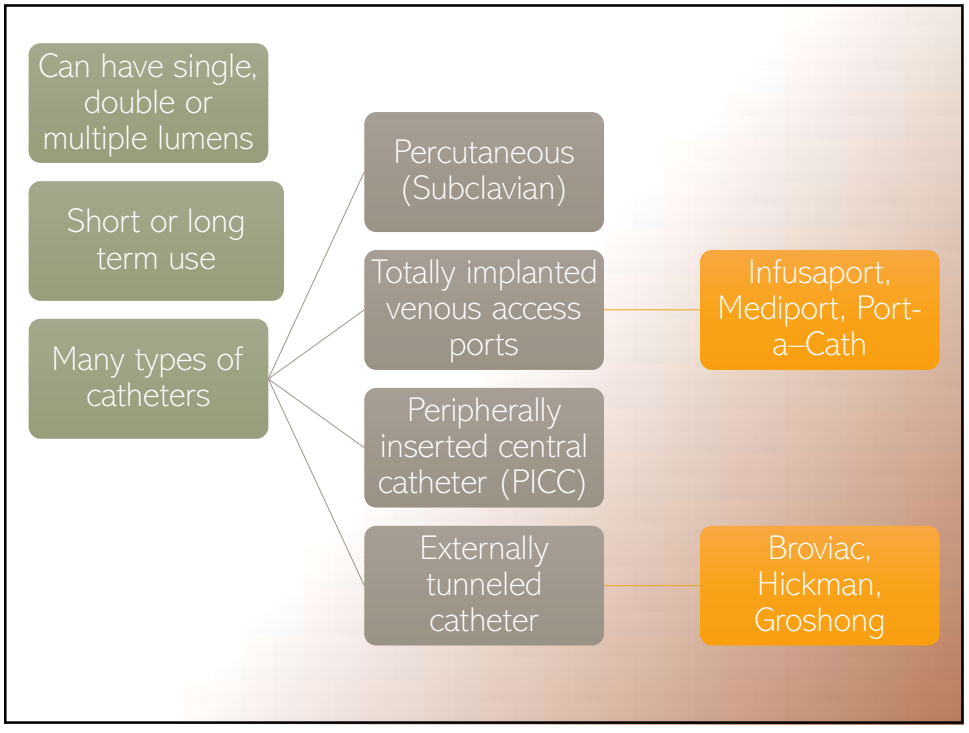

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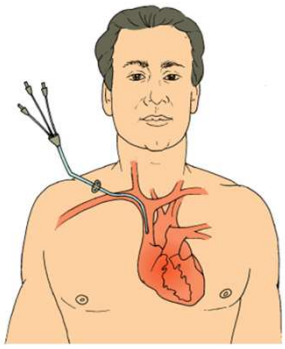

PLACEMENT

- 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

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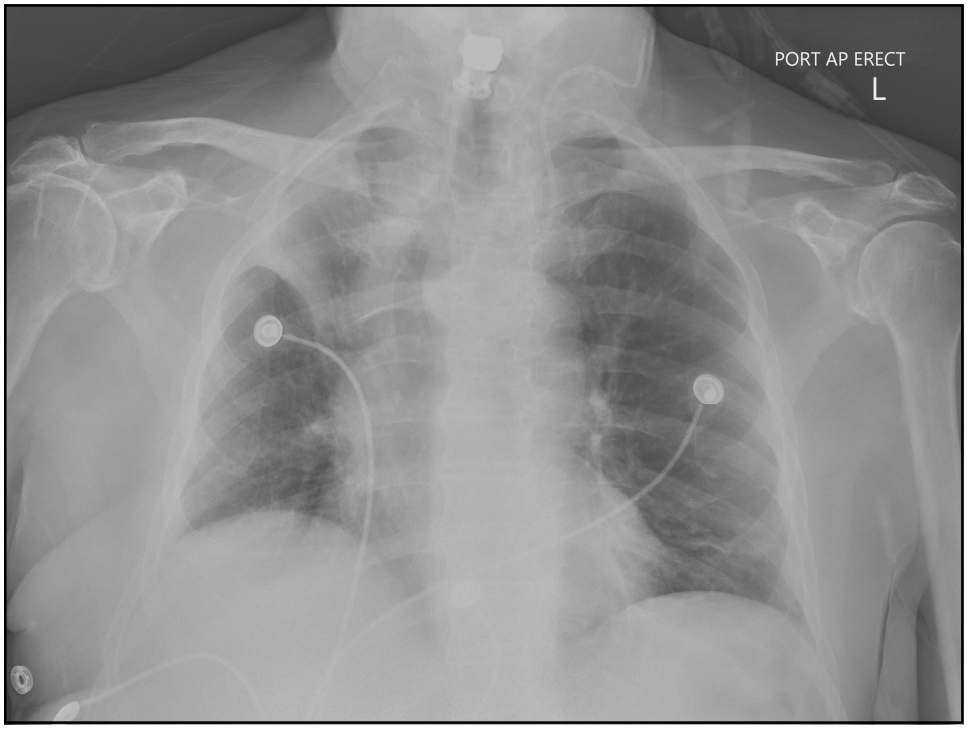

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COMPLICATIONS

- 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 – will use a longer line
- Distal tip should not go past the SVC

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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

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PLACEMENT

- Placed under sterile technique
- Can be done bedside by IV team or in IR under fluoro
- Inserted through the basilic, brachial, cephalic, or medial cubital vein of the arm
- The right basilic vein is preferred as it's a larger size and superficial location
- The distal tip of the catheter must terminate in the superior vena cava, the inferior vena cava, or the proximal right atrium – confirmed by imaging

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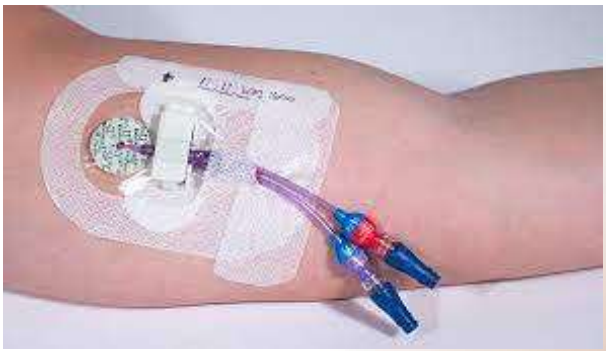

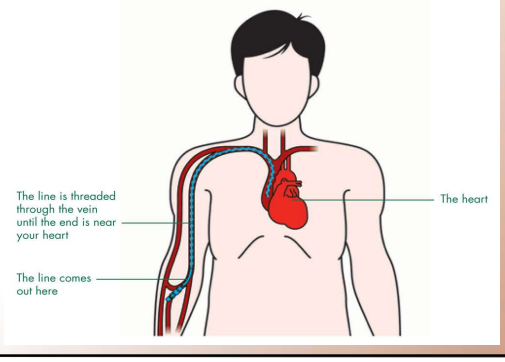

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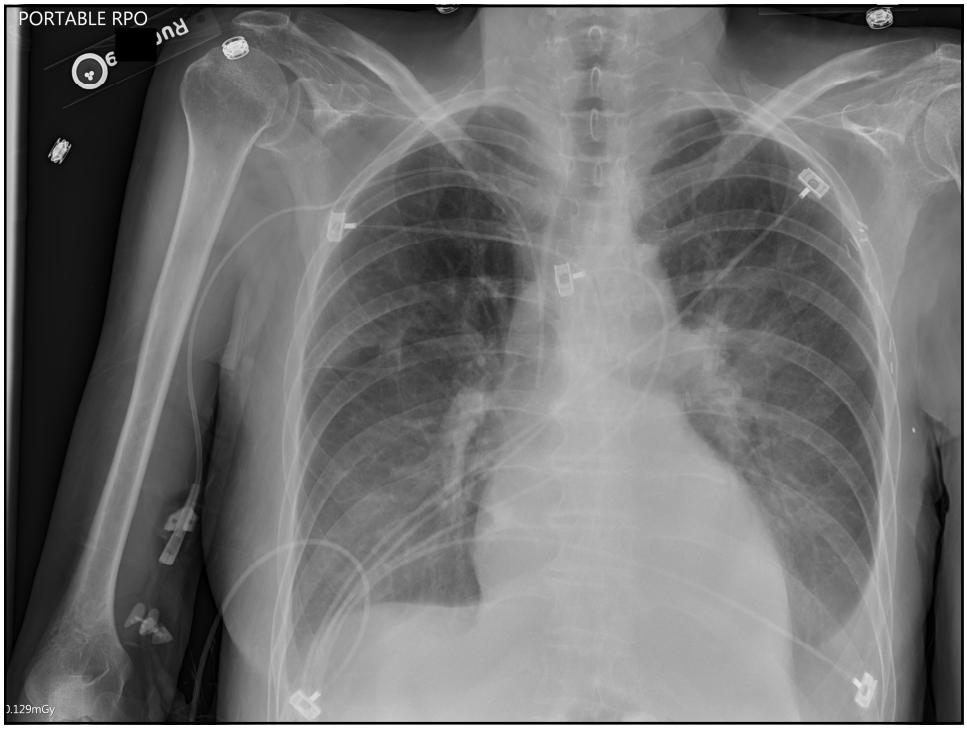

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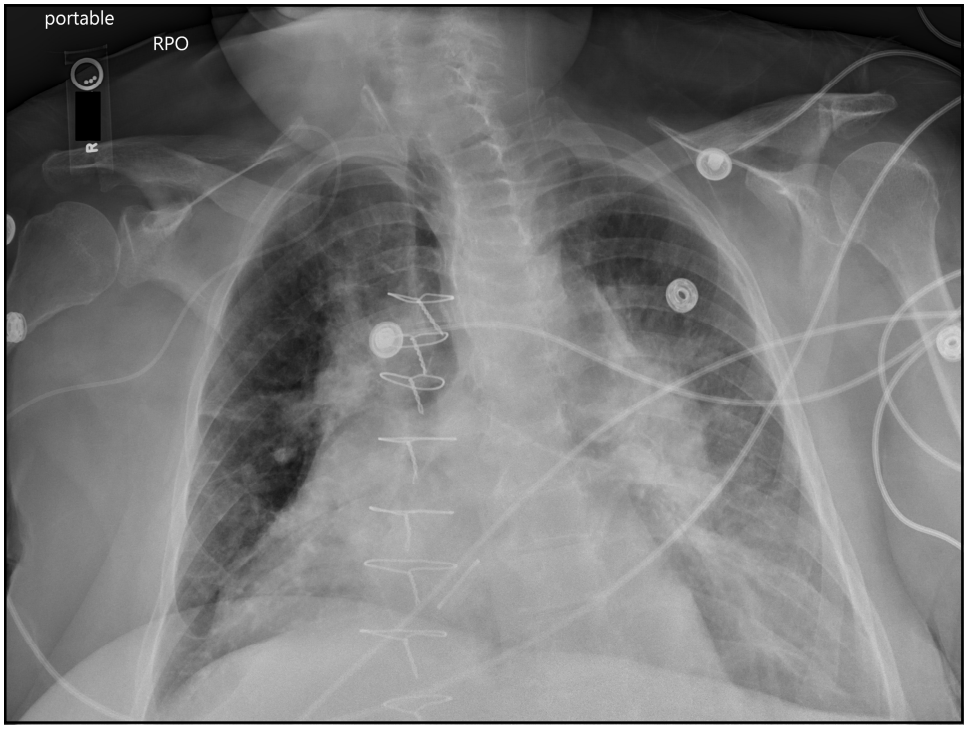

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CARE OF VENOUS CATHETERS

- Must wash hands prior to touching catheter
- Anything touching the end to introduce or withdraw from it must be sterile
- Trained personnel will flush lines with use or periodically if not used
- Use the best practices to prevent infections from occurring

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RT ROLE

- Confirm which side the PICC is inserted
- Chest x-ray when applicable, usually portable
- Check for malpositioning and inform those necessary
- If noticeable bleeding at site of insertion, communicate with RN

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ACCESS TO CATHETERS

Alcohol hub

Flush catheter

Inject contrast or medication

Flush catheter

Recap hub if facilities provide them

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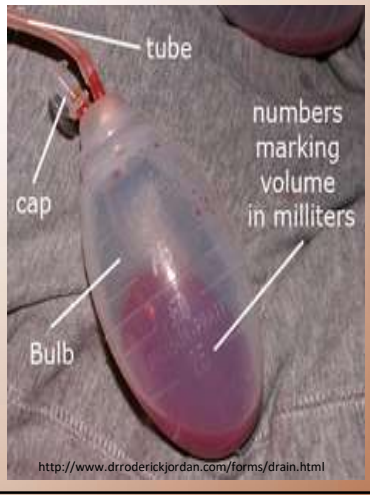
TISSUE DRAINS

- Placed at wound sites or surgical sites when excess drainage is expected
- To let blood, pus, or other fluids escape from a wound while it heals, without letting bacteria get in – post op
- Areas with increased blood supply (breast, neck, kidney or abdomen)
- 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**



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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.

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Ostomies

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

http://www.ostomy.org/ostomy_info/whatis.shtml

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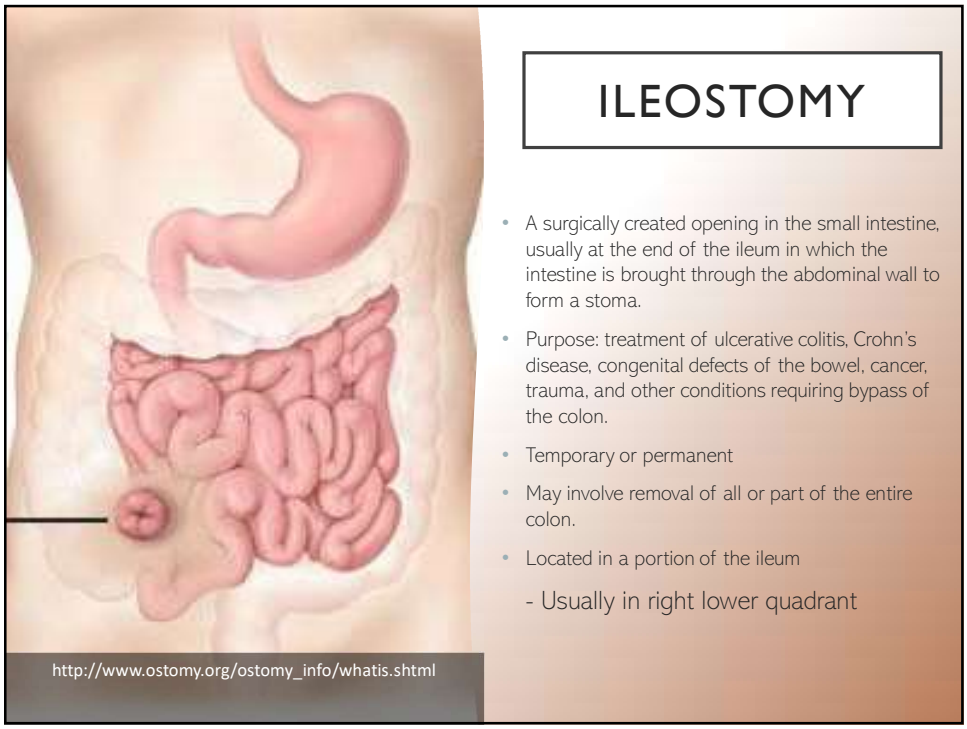
ILEOSTOMY
A surgically created opening in the small intestine, usually at the end of the ileum in which the intestine is brought through the abdominal wall to form a stoma.
Purpose: treatment of ulcerative colitis, Crohn's disease, congenital defects of the bowel, cancer, trauma, and other conditions 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
http://www.ostomy.org/ostomy_info/whatis.shtml

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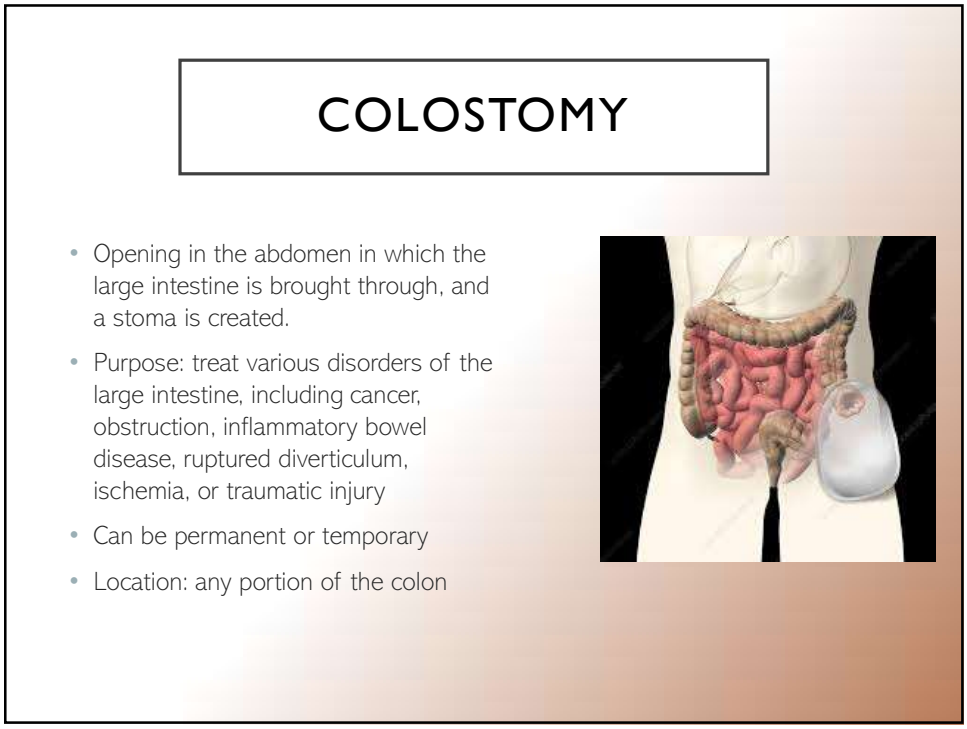
COLOSTOMY
Opening in the abdomen in which the large intestine is brought through, and a stoma is created.
Purpose: treat various disorders of the large intestine, including cancer, obstruction, inflammatory bowel disease, ruptured diverticulum, ischemia, or traumatic injury
Can be permanent or temporary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

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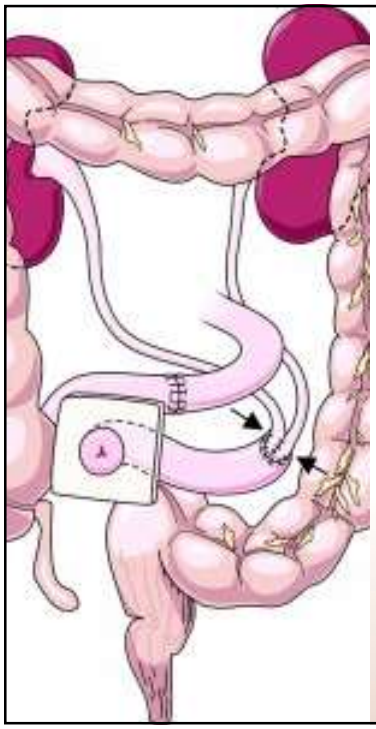

Ureteroileostomy

- 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

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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 revulsion or hesitancy
- May have different prep than other patients
- Should be instructed to bring in an extra pouch if

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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

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