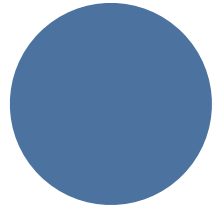
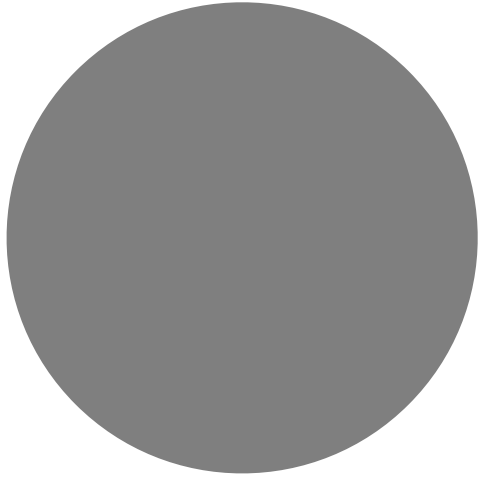


Diagnostic Testing, Urinary & Fecal Elimination

Angela Mueller, MSN, RN



Diagnostic Testing

Important Considerations Before Diagnostic Testing

1. What type of sample will be needed and how will it be collected?
 1. Many ways to obtain sample and PCP will instruct what type to get and check that it's specific.
 2. Always when in doubt, ask the doctor again for clarification.
2. Does the client need to stop oral intake for a certain number of hours before procedure? (NPO)
3. Does the test include administration of contrast dye and if so is it oral or IV?
 1. Oral liquid will need to be swallowed and typically used for swallow study.
 2. IV dye need to prepare it before sending the client to any other department.
4. Are medications given or withheld?
 1. Depending on the patient's condition, we need to consider if the medication is crucial.
5. How long is the test?
6. Is a consent form required?
 1. Simple x-ray don't need consent.
 2. If the procedure is consider invasive, then yes we need to obtain consent first.

Blood Work

- **CBC:**
 - Hgb (M: 14-18. F: 12-16)
 - Hct (M: 42-52%. F: 37-47%)
 - Erythrocytes
 - RBC (M: 4.7-6.1. F: 4.2-5.4)
 - Leukocyte count
 - Differential white cell count (M&F: 5-10mm³)
- **BMP/Chem 7:**
 - BUN (M&F: 10-20 mg/dL)
 - Creatinine (M: 0.6-1.2. F: 0.5-1.1)
 - Potassium (M&F: 3.5-5)
 - Sodium (M&F: 135-145)
 - Calcium (M&F: 9.0-10.5)
 - Chloride (M&F: 98-106)
 - Glucose (M&F: 70-110)
- **CMP/Chem 12:**
 - Includes everything from the BMP/Chem 7
 - + Liver enzymes, Protein/Albumin, Bilirubin



Capillary Blood Specimen

- **Most commonly performed for blood glucose levels (Accucheck)**
- Make sure finger is **warm** (hot=vasodilation)
- Hold in dependent position (gravity is down)
- Many facilities are still using alcohol swabs to clean the site, however **best practice is to wash with soap and water** because alcohol can obscure the readings.
- If using alcohol, must wipe away first drop
- **Infants:** outer aspect of the heels most common site
- **Adults & Children >2 yo:** side of a fingertip
 - Less painful and less nerve ending.



Stool Specimens

- Reasons for testing feces:
 - Occult blood (hidden blood in feces)
 - Analyze dietary products and digestive secretions
 - Detect presence of ova and parasites
 - Detect presence of bacteria or viruses
- Instructions for collection:
 - Defecate in a clean bedpan or bedside commode
 - **Do not contaminate specimen with urine.** Void before specimen collection
 - Do not place toilet tissue in the bedpan b//c contents can affect lab analysis
 - Trash can only!
 - Notify nurse as soon as possible so lab specimen can be sent immediately (“fresh”)
 - Need to call ASAP
 - **15 minute rule! Prevent skin breakdown**



Stool Specimen Principles

- **Presence of blood could indicate ulcers, inflammation, or tumors (AKA guaiac smear)**
- **Steatorrhea:** fat in the stool which usually indicates a small intestine issue.
- When testing dietary proteins/digestive secretions, you must send the full sample, not just a small piece of it
 - Need a lot for accurate and complete reading.
- If testing for ova and parasites, bring sample to lab immediately, while it is still warm
- If testing for bacteria, send immediately to lab and make sure you inform lab if patient is taking any antibiotics

Urine Specimen

- **Clean-Voided**
 - Best if using first morning void
- **Clean-Catch (mid-stream)**
 - Must clean well with antiseptic on the urethra.
 - Start urine stream and then place container under. Why?
 - The first volume of urine is considered contaminated.
- **Straight Cath (sterile)**
- **Indwelling catheter (sterile)**
- **Timed urine specimen (24hr urine collection)**
 - At the start, discard first urine and then save all produced urine during the specified timeframe
 - Get rid of old urine.
 - **Put urine on ice or in refrigerator**
 - **If a client accidentally forgets a void, you must start the collection over again from beginning**



Urine Specimen-cont'd

- Reasons for testing urine:
 - **Specific gravity** (# of solutes present in urine)
 - Indicator of fluid status
 - High=fluid volume deficit/dehydration (more solutes=less H₂O)
 - Low=fluid volume overload/over hydration (less solutes=more H₂O)
 - **pH** (normal pH of 6)
 - **Glucose** (screening for diabetes)
 - 70-110 the ideal range of BGLs.
 - **Ketones** (found in poorly controlled diabetes)
 - Low glucose in the body system.
 - **Protein** (could indicate kidney issue such as glomerulonephritis)
 - Check the filtration in urination process.
 - **Occult Blood** (indicative of kidney or urinary tract damage)
 - **Osmolality** (more exact measure of solute concentration than specific gravity)
 - Also a huge indicator of fluid status

GI Diagnostics & Procedures

- **Anoscopy:** visualizing the anus
- **Proctoscopy:** viewing the rectum
- **Proctosigmoidoscopy:** viewing the rectum and sigmoid colon
- **Colonoscopy:** viewing the large intestine
- Barium is a radiopaque substance that helps with the visualization of the tract.
 - **Upper GI=barium swallow**
 - **Lower GI=barium enema**

Urinary Diagnostics & Procedures

- **KUB:** visualizes the kidneys, ureters, and bladder.
 - X-ray on the abdominal area
- **IV pyelography:** contrast medium injected via IV to visualize urinary/kidney structures.
- **Retrograde pyelography:** contrast medium is instilled directly into the kidney via the urethra, bladder, & ureters to visualize urinary/kidney structures.
- **Ultrasonography:** noninvasive test that uses reflected sound waves to visualize the kidneys.
- **Cystoscopy:** lighted instrument (cystoscope) inserted into the urethra to visualize the bladder, ureteral orifices, and urethra.
 - Require consent form.
 - Complications: burning sensation during void and pink urine.

Imaging

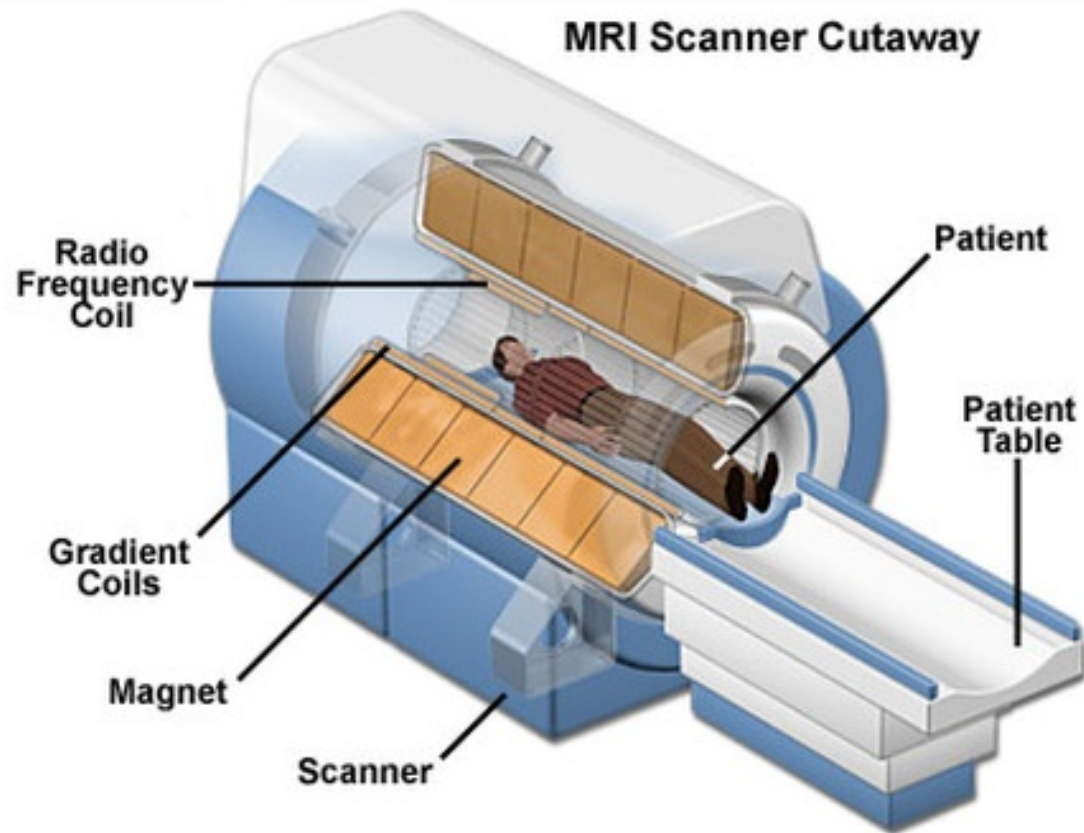
- **Xray** (bone)
- **CT** (soft-tissue)
 - Provides a 3 dimensional image, making it more sensitive than the x-ray machine
- **MRI** (soft tissue)
 - Non-invasive technique where client is placed in a magnetic field
 - Provides better contrast between normal and abnormal tissue than the CT scan
 - Have to remove all metal objects
 - Clients with metal implants cannot undergo an MRI
 - Body tattoos can become very warm during the procedure (especially red colors)
- **Nuclear Imaging**
 - Ex: PET scan
 - Involves radioactive isotopes
 - Distribution of isotope is different in normal tissue than diseased tissue
 - Commonly used for patients with history of cancer
 - Very expensive imaging

CT SCAN



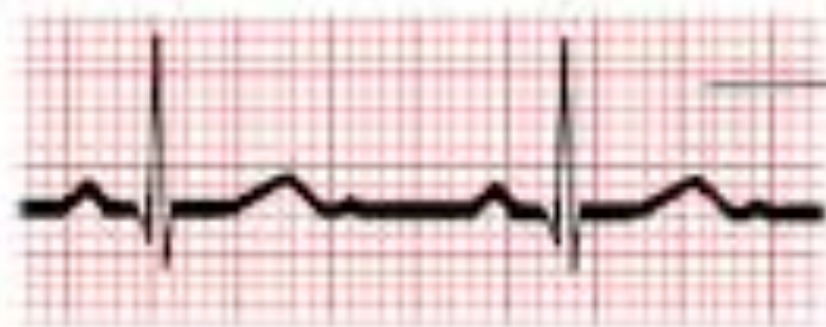
What is MRI machine? How Does It Work?

MRI Scanner Cutaway



Cardiac Diagnostics & Procedures

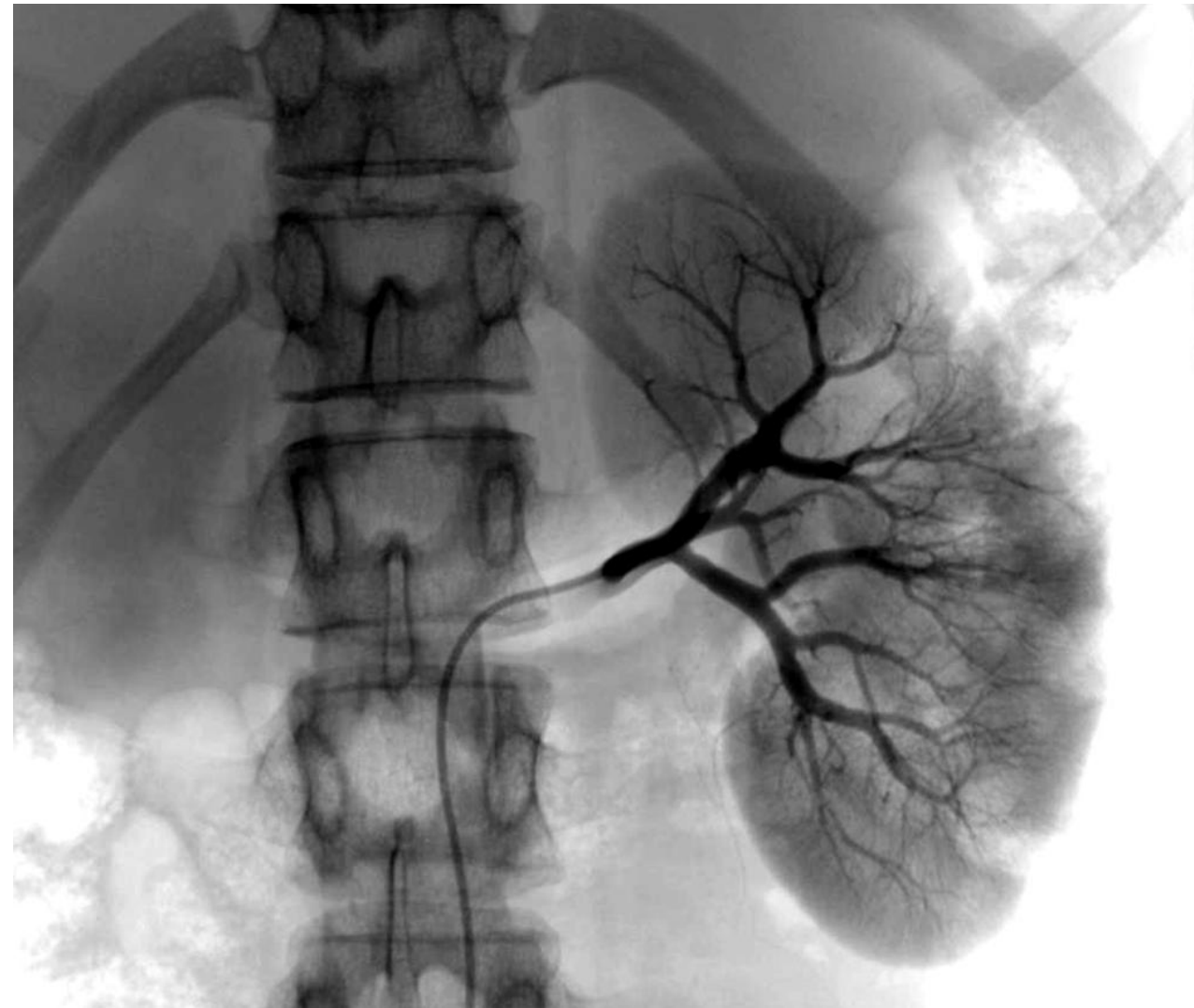
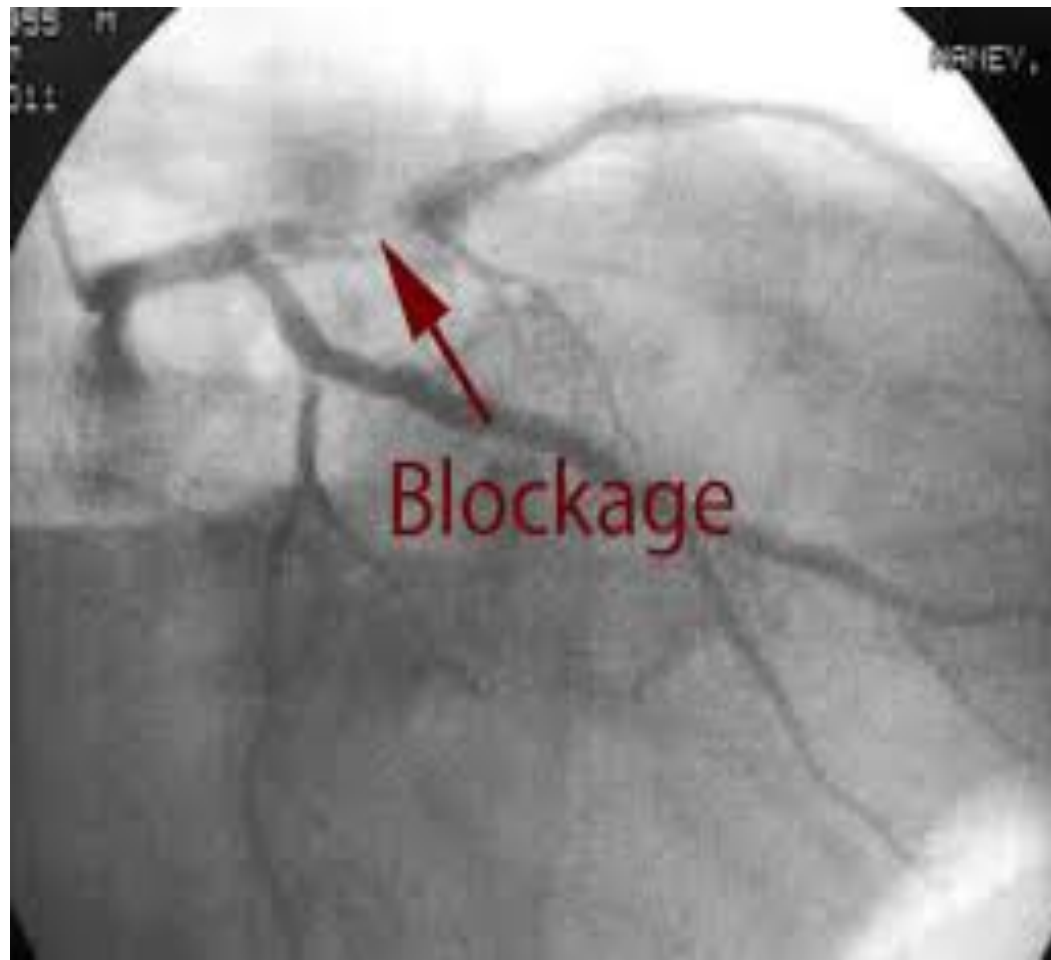
- **Electrocardiography (EKG/ECG):** provides graphic recording of the heart's electrical activity.
- **Angiography:** invasive procedure requiring informed consent. Radiopaque dye injected into vessels needing examination. Using fluoroscopy and x-rays we can see blood flow through the vessels and areas of narrowing or blockage.
 - Invasive procedure=need consent form
- **Echocardiogram:** noninvasive test that uses ultrasound to visualize structures of the heart and evaluate left ventricular function.



ECG tracing

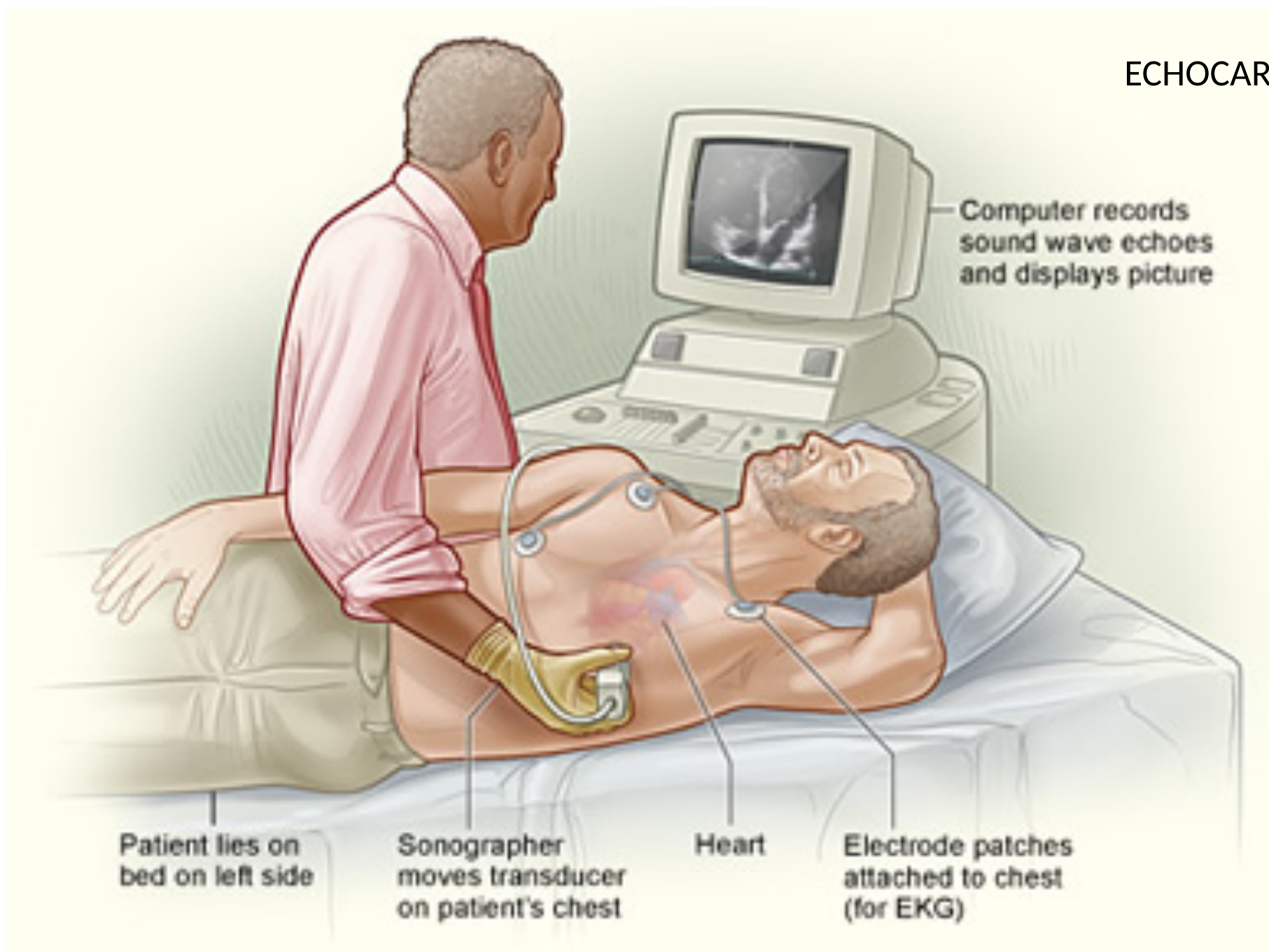


ADAM



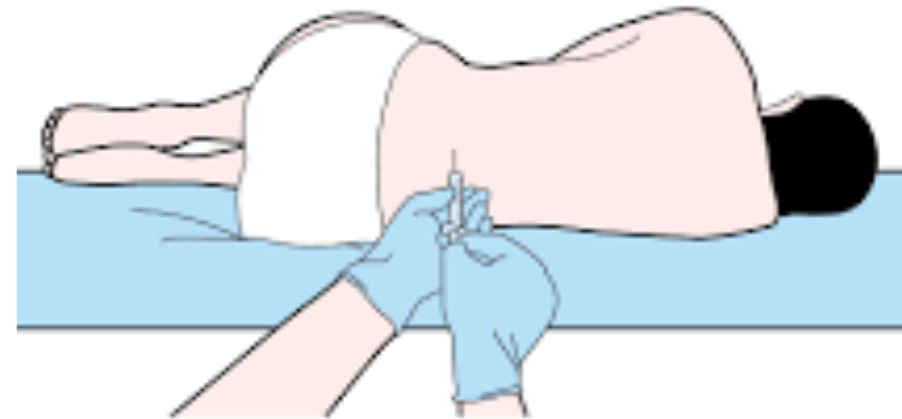
ANGIOGRAPHY

ECHOCARDIOGRAM



Lumbar Puncture

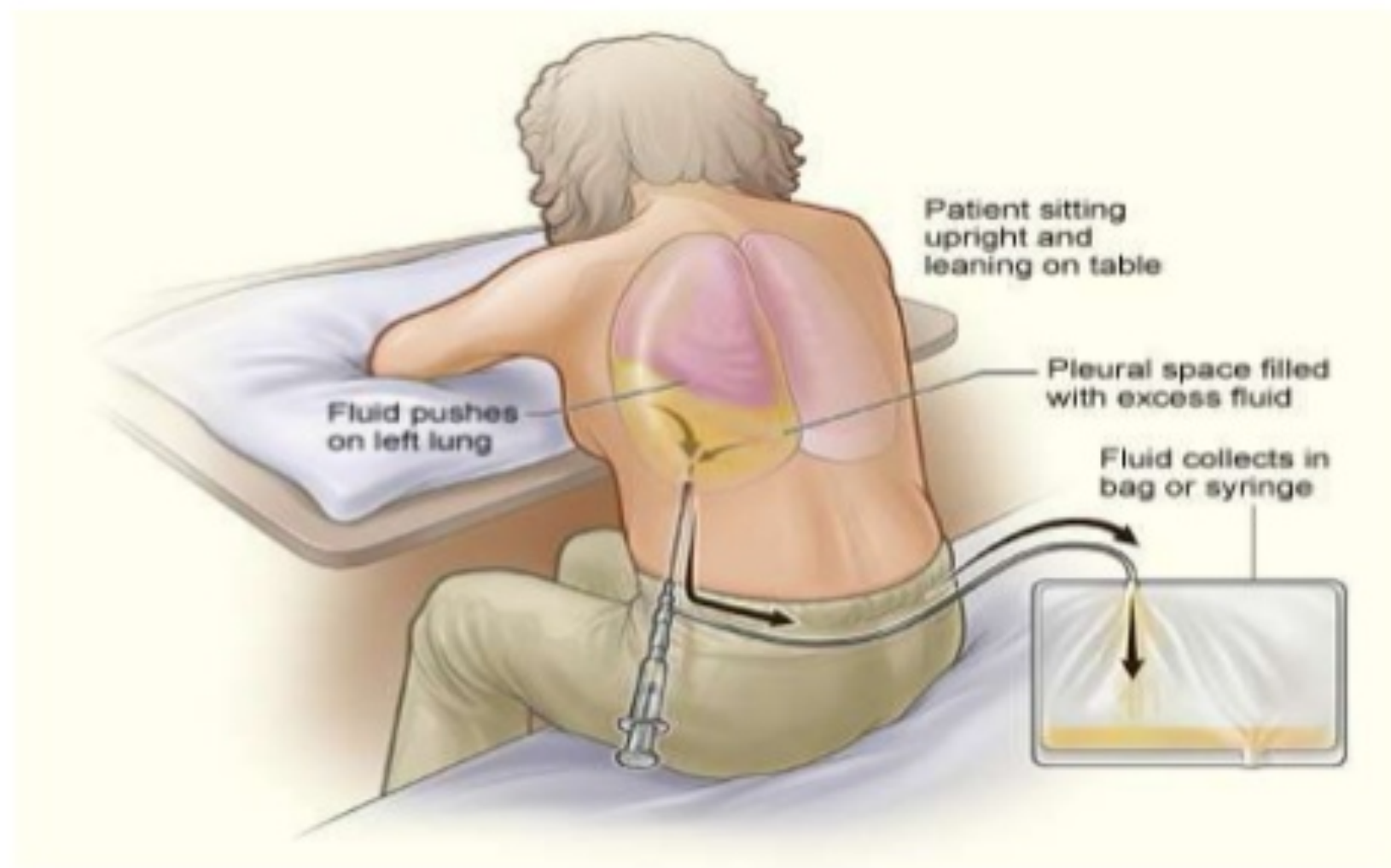
- Needle is inserted into the subarachnoid space of spinal canal between 3rd & 4th or 4th & 5th vertebrae
- Client positioned laterally with head bent towards chest and knees drawn into the abdomen.
- **Tell client to lay flat after procedure for risk of “spinal headache”**
- **Sterile procedure**
- Risk for meningitis and subsequent sepsis if breach in sterile procedure



Paracentesis/Thoracentesis

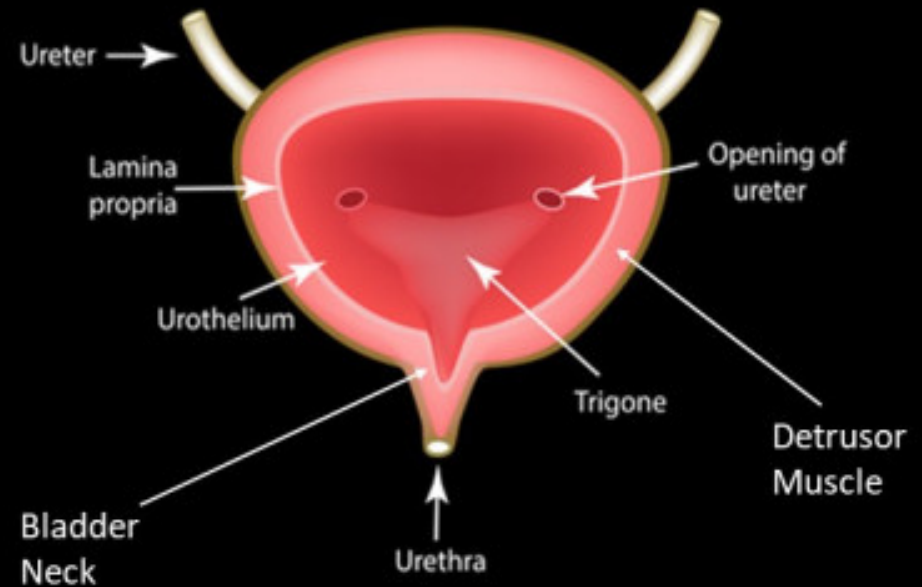
- Needle inserted into abdominal cavity (**paracentesis**) or pleural space to drain off fluid (**thoracentesis**)
- **Strict Sterile Technique**
- Have to be careful not to drain too much for paracentesis or we can throw the patient into hypovolemic shock
- Usually position patient over a bedside table for thoracentesis for optimal positioning
- Risk for puncturing organs

A person having thoracentesis



Urinary Elimination

URINARY BLADDER



Note: the Bladder Parametrium is not identified in this image.

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Factors Affecting Urination

- Psychosocial
- Fluid and Food Intake (**1500ml./day is recommended**)
- Medications
- Muscle Tone
- Pathologic Conditions
- Surgical and Diagnostic Procedures

Altered Urine Production

- **Polyuria:** production of abnormally large amounts of urine
- **Oliguria:** decreased urinary output
- **Anuria:** lack of urine production
- **Frequency:** voiding at frequent intervals (> 4-6x per day)
- **Nocturia:** voiding two or more times at night
- **Urgency:** sudden strong desire to void
- **Dysuria:** painful or difficult to void
- **Enuresis:** involuntary urination in children beyond the age when normal bladder control is established (4-5yrs)
- **Incontinence:** involuntary leakage of urine or loss of bladder control
 - Stress incontinence: muscle reflex causing leakage of urine.

Incontinence

- Types
 - ***Stress***: laughing, coughing, etc
 - ***Urge***: urgent need to void and inability to stop (overactive bladder)
 - ***Mixes***: both stress and urge are present
 - ***Overflow***: continuous bladder leakage (enlarged prostate, MS, Parkinson's, etc.)
- Patient Teaching
 - Pelvic Floor exercises (**Kegel's**) with help strengthen the muscles and sphincters.

Diagnostic Testing

- BUN
 - Amount of nitrogen in your blood that comes from the waste product urea. **Urea** is made when protein is broken down in your body.
 - Both Sexes: 10-20 mg/dL
- Creatinine
 - Used for assessing kidney function
 - Male: 0.6-1.2 mg/dL
 - Female: 0.5-1.1 mg/dL
- Urinalysis (UA)
- Urine Culture (UC)
 - Used for trying to identify microorganisms in urine.
 - E. Coli is commonly found in urine.



UTI Prevention

- Drink at least 8 eight-ounce glasses of water to flush bacteria out **(2,000-3,000ml)**
- Practice frequent voiding **(every 2-4hrs)** to flush out bacteria
- Always void after intercourse
- Avoid use of harsh soaps, bubble baths, powder or sprays.
- Avoid tight-fitting pants or other garments
- Wear cotton underpants because they allow for ventilation
- **Always wipe front to back (least contaminated to most contaminated)**
- Take showers as opposed to baths

Bladder Retraining

- Establish a regular voiding schedule and stick to it (**q2-4hrs**)
- Slowly lengthen intervals between voids
- **Avoid significant fluid intake during evening hours (none after 1800)**
- Avoid consumption of citrus juices, carbonated beverages, alcohol, and caffeine because these are all bladder irritants
- **If on diuretics, give in the morning (never at night)**
- Adequate fluid intake
- Protector pads
- Pelvic floor exercises (**Kegels**)
- Positive reinforcement

Bladder Catheterization

- Most frequent healthcare associated infection is UTI, and indwelling catheters cause 80% of these.
- **CAUTI**- UTI while catheter is in placed or within 48hrs of its removal
- Hospitals will not be reimbursed for CAUTI's by Medicare or Medicaid
- **Latex Considerations**
- Size Considerations (14, 16, 18 for adults)
- Balloon Size (5-10ml most common, 20ml after prostate surgery)
- **Sterile technique!**
- Advance catheter about 5cm (2in) further then when you get urine return
- **Bag needs to stay below the level of the bladder**
- No dependent loops
- Closed system, never disconnect tubing
- **Attach to stationary part of bed frame**, never side rails or moveable sections
- **Catheter maintenance**



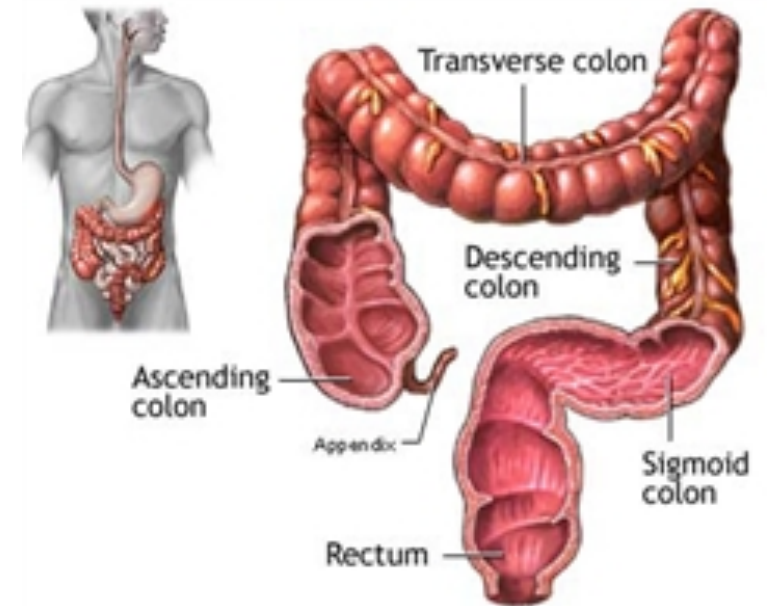
3 Check catheter and tube placement

Fecal Elimination



Factors Affecting Defecation

- Development
 - Kids are likely to have fecal accidents
 - Elderly adults have flexed colon can also contribute for accidents.
- Diet (fiber)
- Fluid intake and output
 - Increase fluids=increase better output.
- Activity: more exercise will help increase bowel movement.
- Psychological Factors: social anxiety
- Defecation habits: no regular routine will cause feces elimination irregularly.
- Medications
 - Example: antibiotics and narcotics will decrease ACh, which will cause less bowel movement.
- Diagnostic Procedures
- Anesthesia and surgery
- Pathologic conditions
- Pain
 - Hemorrhoids and recent labor mothers both don't like to defecate due to the unpleasant pain.



Fecal Elimination Problems

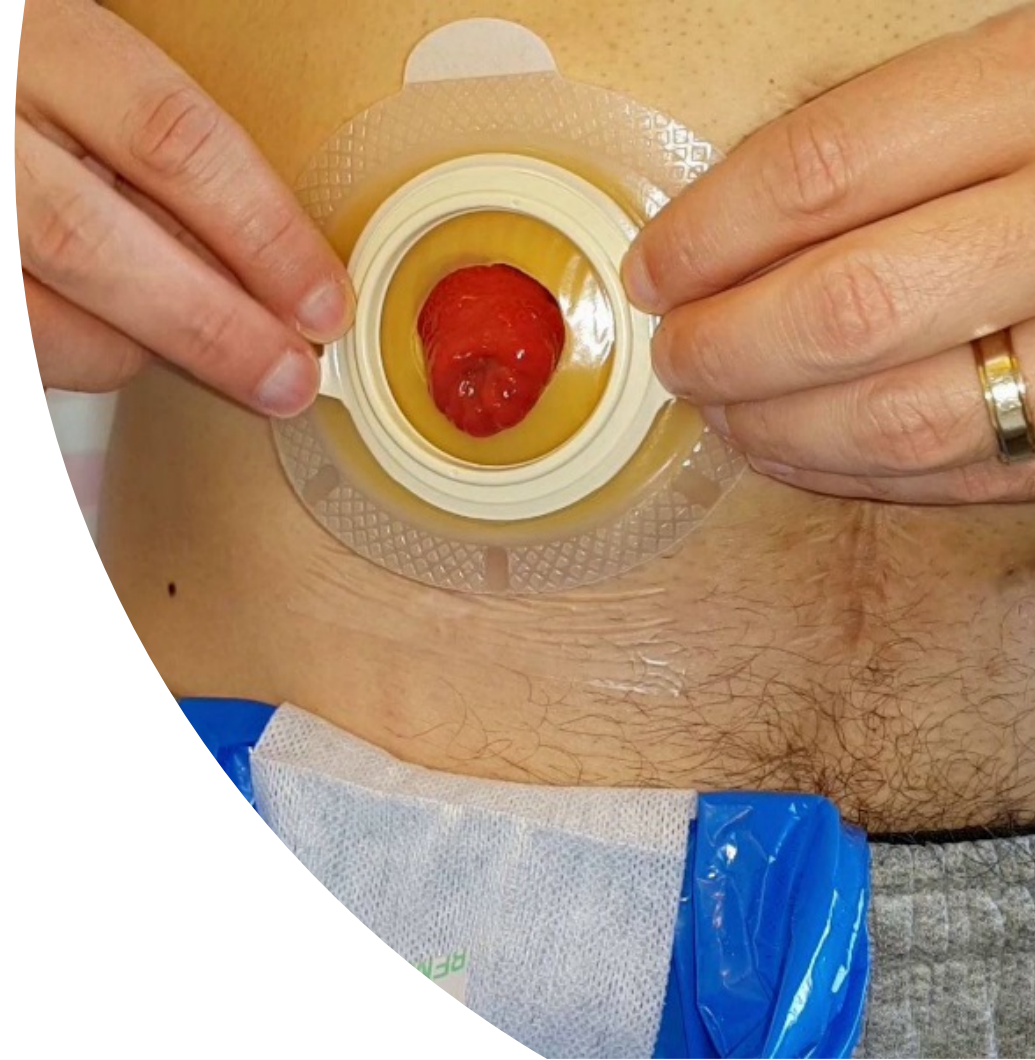
- **Constipation:** fewer than 3 BM's per week
 - *Complication: Fecal Impaction:* stool is too big and hard, impossible to defecate.
 - *Patient Teaching:* Establish exercise regimen, include high-fiber foods such as vegetables, fruits, & whole grains, maintain fluid intake of 2,000-3,000ml/day, do not ignore urge to defecate, allow more time to defecate, avoid OTC medications that impair motility
 - *Tx:* Stool softeners (prophylactic purposes), Laxatives, & Enemas
- **Diarrhea:** passage of liquid feces and increased frequency of defecation
 - *Complication:* fluid and electrolyte imbalance, skin breakdown
 - **C-Diff:** hand hygiene, contact precautions (+), bleach cleaning
 - *Patient Teaching:* eat foods with NA & K, increase soluble fiber such as rice, oatmeal, and skinless fruits and potatoes, avoid alcohol and caffeine, limit insoluble fiber such as whole wheat and whole grain, limit fatty foods, thoroughly clean and dry peri area, creams as needed, eat fermented dairy products such as yogurt, seek medical treatment for diarrhea lasting more than 48hrs or signs of electrolyte imbalances
 - *Tx:* Antidiarrheal medications (**Imodium**) & fluids, plus supportive care.
- **Bowel Incontinence:** involuntary passage of feces
 - Emotionally distressing
 - Spinal cord/Neurological issues (elderly adults common age group)
 - Incidence increases with age

Flatulence “Gas”

- Causes:
 1. Action of bacteria on the chyme in the large intestine
 2. Swallowed air
 3. Gas that diffuses between the bloodstream and intestine
- Patient Education:
 - Limit carbonated beverages
 - Limit straws and chewing gum (increase ingestion of air)
 - **Limit gas-forming foods such as cabbage, beans, onions, and cauliflower**

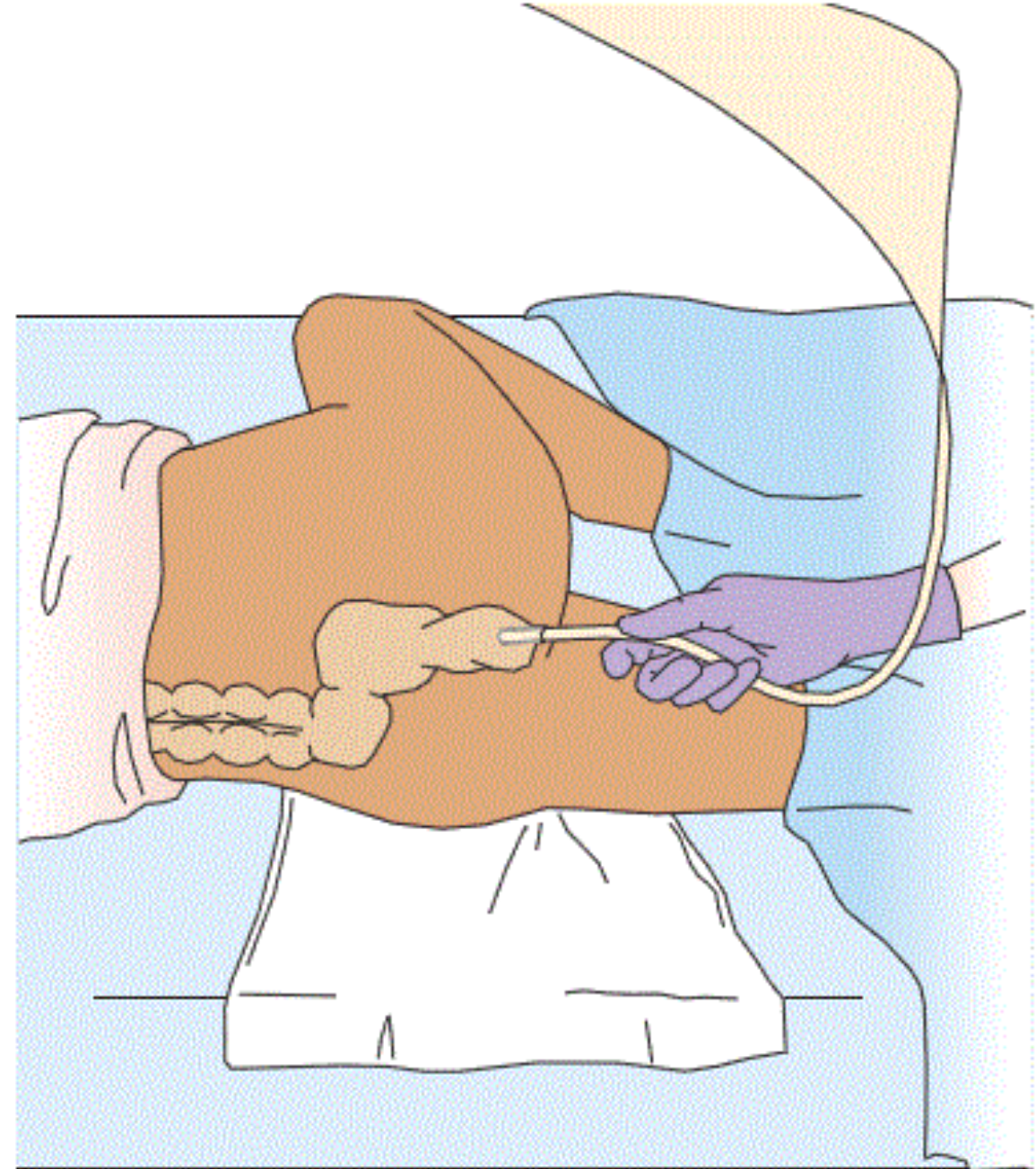
Ostomies

- Termed according to location (gastrostomy, jejunostomy, ileostomy, colostomy).
- **Stoma:** Piece of bowel is pulled through the abdominal wall.
 - Should be pink and moist
 - **Purple, black, dry, or swollen is a bad sign**
 - No oxygenated blood=irregular circulation.
- Can be permanent or temporary
- Person cannot feel ostomy because there are no nerve endings in the stoma
- **The further down the ostomy site, the more solid the fecal matter draining from it**
 - Ex: ileostomies drain liquid, colostomies drain more solid material
- 1/8 inches should be cut further for a perfect fit.



Administering an Enema

- Position in **left lateral position with right leg flexed**
- Insert tube 7-10cm (3-4in)
- If you meet resistance, have the client take a deep breath before trying to advance
- The higher the bag is held, the faster the solution infuses. **Start at 12in above the rectum.**
 - Large volume enema need to be raised.
- If the patient complains of discomfort, lower the bag or clamp off for 30sec and then resume at a slower rate.
- Encourage the client to retain the enema for at least 5-10min for best results



Bowel Retraining Programs

- **Fluid intake of 2500-3000ml/day**
- **Increase fiber in the diet**
- Intake hot drinks before usual defecation time
 - Speed up the defecation time.
- **Increase exercise**
- Administer suppositories (**Dulcolax**) 30min before defecation time
- **Provide for privacy**
- Lean forward at the hips to apply pressure on the abdomen and bear down. Increased pressure in the colon.
- Avoid straining because this causes hemorrhoids
- Provide positive feedback