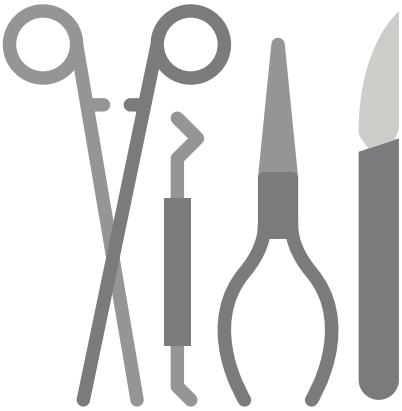

A COMPLETE GUIDE FOR
NURSING MEDSURG CLASS

MEDICAL SURGICAL NURSING BUNDLE

NURSINGSTORERN

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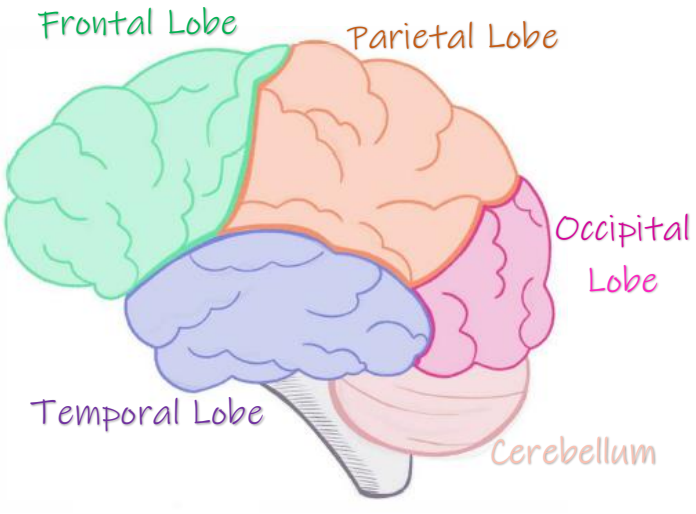
NEURO



Injured Brain Area	Nursing Intervention
Frontal Lobe	Give simple instructions, re-orientate as needed
Temporal Lobe	Speak clearly due to impaired hearing
Occipital Lobe	Assist with ADL due to visual disturbances.
Cerebellum	Assist with walking
Brain Stem	Monitor Vital Signs
Parietal Lobe	Provide simple, one-step instructions

BRAIN ANATOMY

- Cerebrum

Consists in the Right and Left hemisphere. Each one receives sensory info from the opposite side of the body.

- Cerebral Cortex

Outer grey matter

Frontal Lobe: Contains the motor cortex and Broca's area (speech function)

Parietal Lobe: Contains the sensory cortex.

Occipital Lobe: Contains the visual cortex.

Temporal Lobe: Contains the auditory cortex and Wernicke's area (comprehension of verbal/written language).

- Basal Ganglia

Cell bodies in white matter that help cerebral cortex produce voluntary movements.

- Diencephalon

Thalamus: relays sensory impulses to the cortex. Provide a Pain gate. Part of Reticular activating system.

Hypothalamus: Regulates responses of Sympathetic/Parasympathetic Nervous System. Regulates Stress response, sleep, appetite, body temperature, fluid balance, and emotions. Responsible for production of Hormones secreted by the Pituitary Gland and hypothalamus.

- Brainstem

Midbrain: Motor coordination. Visual reflex and auditory relay centers.

Pons: Respiratory center and regulates breathing.

Medulla Oblongata: Contains Afferent and efferent tracts, and cardiac, respiratory, vomiting, and vasomotor center. Controls Heart Rate, respiration, blood vessel diameter, sneezing, swallowing, vomiting and coughing.

- Cerebellum

Coordinates muscle movement, posture, equilibrium, and muscle tone.

AUTONOMIC NERVOUS SYSTEM

- Sympathetic (Adrenergic)

Fight or Flight. Originates at T1-L2 in the spinal cord.
Effects: Increase cardiac output, vasoconstriction (Increase BP), bronchodilation, pupil dilation, Decrease secretions and peristalsis. Increase perspiration.

- Parasympathetic (Cholinergic)

Rest and Digest. Originates at S2-S4 in the spinal cord.
Effects: Decrease cardiac output, Vasodilation (Decrease BP), Bronchoconstriction, pupil constriction, Increases Secretions and Peristalsis. Increase salivation, bladder contraction.

DIAGNOSTIC TESTS

Computed Tomography (CT)

A brain scan that may or may not require injection of dye. Used to detect intracranial bleed, cerebral edema, infarctions, hydrocephalus, cerebral atrophy, shifts of brain structures.
Pre-procedure: Assess for allergies to Iodine, contrast dyes, shellfish if using dye. Withhold metformin if iodinated contrast dye used, risk of metformin-induced lactic acidosis.
Post-procedure: Fluids replacement, monitor for allergies to dye. Assess injection site for bleeding.

Magnetic Resonance Imaging (MRI)

Noninvasive procedure that identifies tissues, tumors, and vascular abnormalities. Provides more detailed pictures than a CT.

Pre-procedure: Remove all metal objects from the client. Make sure patient doesn't have metal implants, pace-maker, implanted defibrillator, hip prosthesis, vascular clip. Also contraindicated in pregnant women (Increases temperature of Amniotic fluid). Assess for claustrophobia.
Post-procedure: Patient resumes normal activities.

Cerebral Angiography

Injection of contrast usually through the femoral artery into the carotid artery to visualize cerebral arteries, and assess for lesions.
Pre-procedure: Assess for allergies to Iodine and shellfish. Assess Renal Function. Withhold anticoagulation meds. NPO 4-6 hours before procedure. Assess and mark distal pulses (to easily recheck them post-op).
Post-procedure: Monitor for swelling of the neck and difficulty swallowing. Bed rest for 12hrs. Check insertion site for bleeding. Keep extremity straight and check for blood flow distal to the puncture site (pulses, capillary refill, temp, color). Increase fluid intake.

Electroencephalography (EEG)

Used to identify seizures, sleep disorders, and other conditions. Electrodes place on scalp to record electrical activity in the brain.
Pre-procedure: Wash the patient's hair. Withhold coffee, tea, caffeine beverages, antidepressants, tranquilizers, and seizure meds 24-48hrs before test. No NPO needed, can have breakfast.
During-procedure: Hyperventilation or strobe lights may be used to increase seizure activity.
Post-procedure: Wash patient's hair. Safety precautions if patient was sedated.

DIAGNOSTIC TESTS =CONT=

Lumbar Puncture

Sample of Cerebral Spinal Fluid (CSF) obtained from insertion of spinal needle (L3-L4). Used to diagnosed meningitis, subarachnoid hemorrhage, neurological disorders.

Contraindicated in patients with Increased Intracranial Pressure (ICP).

Pre-procedure: Have the patient empty bladder. Position patient on their side in fetal position, lateral recumbent position, or stretched over a table while sitting (so the back is arched).

Post-procedure: Lay flat for several hours. Increase fluids. Monitor for CSF leak, which can cause headaches (epidural blood patch may be necessary).

NEURO ASSESSMENT

Respirations

Cheyne-Stokes: Rhythmic, with periods of apnea. Can indicate metabolic disfunction or dysfunction in the cerebral hemisphere or basal ganglia.

Neurogenic Hyperventilation: Regular rapid and deep sustained respirations. Indicates a dysfunction in the low midbrain and middle pons.

Apneustic: Irregular, with pauses at the end of inspiration and expiration. Indicates a dysfunction in the middle or caudal pons.

Ataxic: Totally Irregular. Indicates a dysfunction in the medulla.

Cluster: Cluster of breaths with irregular spaced pauses. Disfunction of Medulla and Pons.

Posture

Decerebrate **(Extensor): brainstem** lesion.

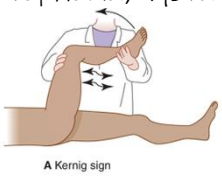
Decorticate **(flexor): cortex** problem. Cerebral dysfunction.

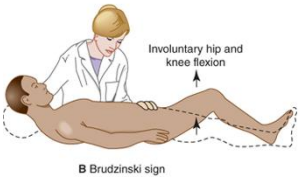
Flaccid: No motor response in any extremity.

Meningeal Irritation

Irritability, nuchal rigidity, severe headaches, tachycardia, nausea and vomit, photophobia, nystagmus, abnormal pupil reaction and eye movement.

- **Kernig's Sign:** Loss of the ability of a supine patient to straighten the leg completely when it is fully flexed at the knee and hip.
- **Brudzinski's Sign:** Involuntary flexion of the hip and knee when the neck is flexed.


A Kernig sign



B Brudzinski sign

Motor Response: Hemiparesis, hemiplegia, and decreased muscle tone.

Memory Changes: Short attention span, personality and behavior changes.

Reflexes

Deep Tendon Reflexes (DTRs): Biceps, triceps, brachioradial, quadriceps

Superficial Reflex: Plantar, abdominal, Babinski

Reflex Activity:

Absent, no response = 0

Weaker than normal = 1+

Normal = 2+

Stronger/more brisk = 3+

Hyperactive = 4+

GLASGOW COMA SCALE

EYE	Spontaneous	4
	To Voice	3
	To Pain	2
	NONE	1
VERBAL	Oriented	5
	Confused	4
	Inappropiate Words	3
	Incomprehensible sounds	2
	NONE	1
MOTOR	Obey command	6
	Localized Pain	5
	Withdraws	4
	Flexion	3
	Extension	2
	NONE	1

Deep Coma: 3
Comatose: ≤8
Normal: 15

INCREASED INTRACRANIAL PRESSURE =ICP=

A rise in pressure within the skull that can result from a brain injury or cause it.

Factors:

- Head injury with subdural or epidural hematoma.
- Cerebrovascular accident or cerebral edema.
- Brain tumor, Hydrocephalus, Meningitis, encephalitis
- Ruptured aneurysm and subarachnoid hemorrhage

Normal ICP = 10-15 mmHg
Elevated ICP: >20 mmHg, sustained

Manifestation

- Early Sing: Changes in LOC (Irritability, restlessness, confusion, drowsiness, lethargic). Headache, pupil abnormalities, Nausea and Vomit (projectile) abnormal breathing (Cheyne-Stokes, Biot's), abnormal posturing (decorticate or decerebrate).
- Cushing's Triad

Cushing's Triad
↑ Systolic B/p
↓ Pulse
↓ Respirations

Nursing Interventions

Monitor VS and neurologic function. Keep head elevated 30-45 degree. Keep head in neutral position to enhance drainage. Avoid Trendelenburg's position. Avoid coughing, sneezing, straining, and suctioning. Maintain maximum respiratory exchange (Hypercapnia causes vasodilation, thus increasing ICP). Administer oxygen. Monitor I&O, may restrict fluid. Use hypothermia do decrease ICP. Intensive care is required when monitoring ICP (ventriculostomy).

ICP Monitoring: Device inserted into the cranial cavity in the OR to measure pressure. Huge risk of infection. Indications: Patient in coma (Glasgow Coma Scale <8).

Medications:

- Osmotic Diuretics (MANNITOL (Osmitrol)) and steroids (Dexamethasone).
- Avoid opiates and sedatives unless ventilated (will restrict neurologic assessment).
- Acetaminophen for fever.
- Barbiturates to place patient into therapeutic coma with ventilator and cardiac monitoring.

MIGRAINE HEADACHE

Neurovascular disorder causing unilateral throbbing head pain that persists for 4-72 hours.
P: Poorly understood. Possibly caused by activation of CN V and cerebral arterial vasodilation.
RF: Women, family history
Triggers: Bright/flashing lights, stress, anxiety, menstrual cycles, sleep deprivation, foods (MSG, tyramine, nitrites).
S/S: Unilateral throbbing pain, N&V, photophobia, phonophobia, aura.
Tx: NSAIDs (mild migraine), antiemetics, caffeine, sumatriptan or ergotamine (severe migraine). Prophylactic med (antihypertensives, anticonvulsants)
Nurse: Promote Dark/quiet environment.

CLUSTER HEADACHE

Severe, sudden head pain that last 30min-2hrs. Happens daily at the same time for months.
S/S: Severe unilateral, non-throbbing headache (around orbital region), facial sweating, nasal congestion droopy eyelid, excess tearing, agitation and pacing.
Tx: O2 Therapy, sumatriptan, ergotamine, verapamil, corticosteroids.

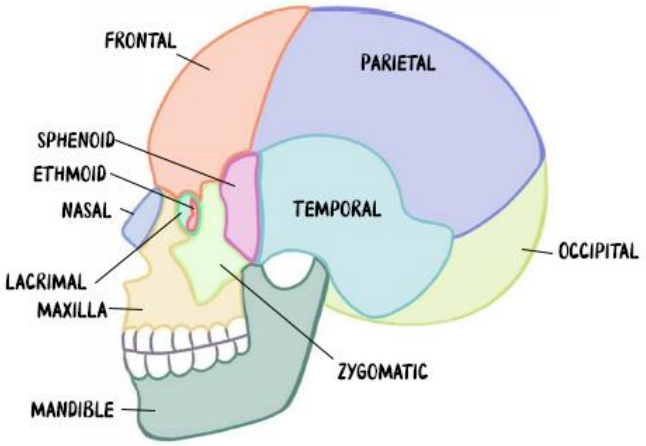
TYPES OF HEAD INJURY

Open:
- Scalp lacerations
- Fractures in the skull
- Interruption of the dura mater

Closed:
- Concussions
- Contusions
- Fractures

SKULL FRACTURE

Causes of Skull Fractures:
- Motor Vehicle Collision
- Falls
- Fire arms related injuries
- Assaults
- Sport related Injuries
- Recreational Accidents
- War related injuries

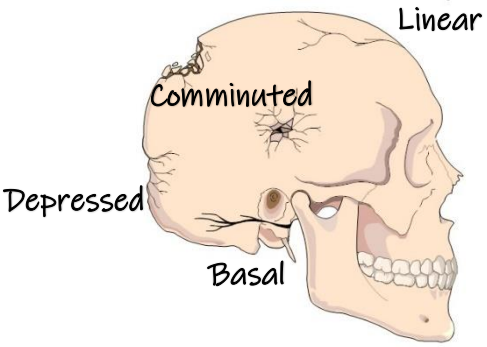


Death Can Occur at 3 points in time after injury:
1- Immediately After
2- Within 2 hours after
3- Three Weeks after injury

Scalp Lacerations: Highly Vascular/High Risk of Blood Loss

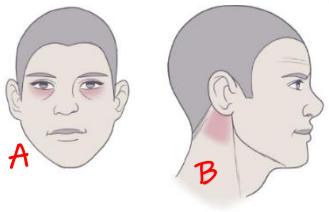
Types of Skull Fractures

Simple (linear) fracture: is a break in the continuity of the bone.
Comminuted skull fracture: a splintered or multiple fracture line.
Depressed skull fractures: occur when the bones of the skull are forcefully displaced downward.



Basal skull fracture: A fracture of the base of the skull.
It allows CSF to leak from the nose and ears.

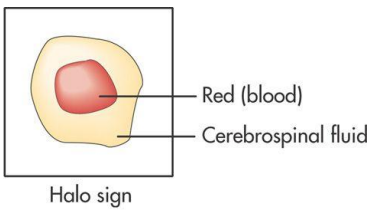
Signs of Basilar Skull:
A) Raccoon Eyes: Periorbital edema and ecchymosis.
B) Battle's Sign: Postauricular ecchymosis noted on mastoid bone.



Testing for CSF (Cerebrospinal Fluid)

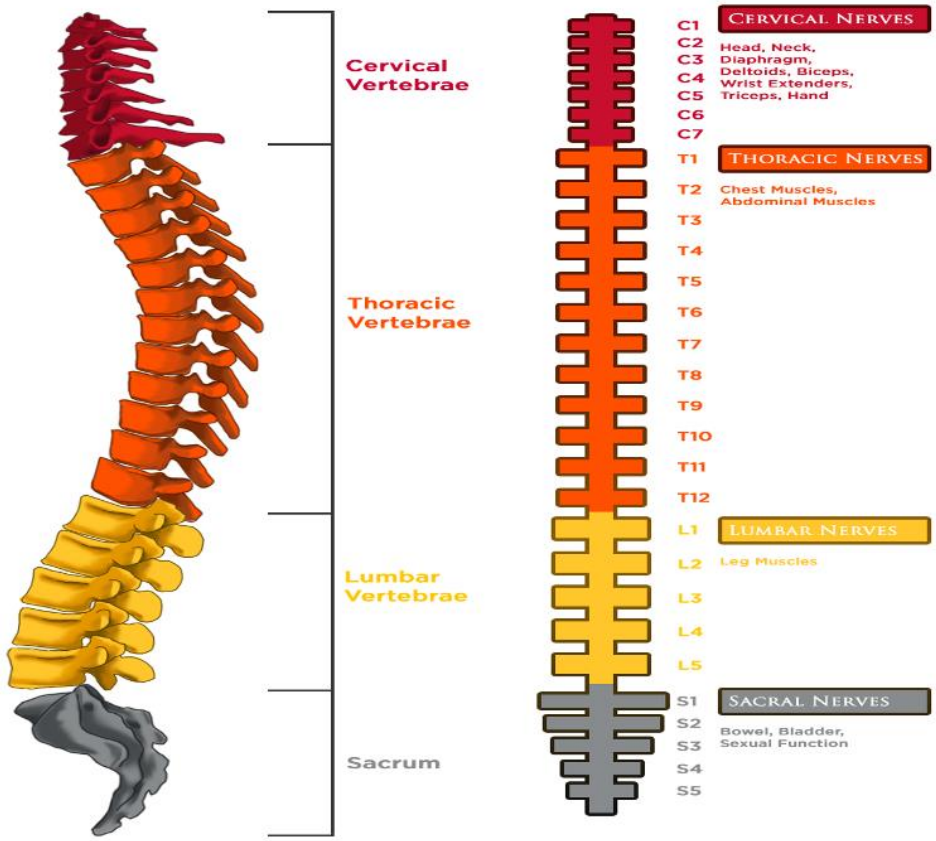
Dextrostix or Test-Tape Strips
Used to detect glucose found in CSF, however it is inaccurate if blood is in the sample as there is glucose in the blood

Halo's Sign
Allow drainage to leak onto a white gauze pad. Within a few minutes, blood should gather in the center and CSF will create a yellow ring around the blood



SPINAL CORD INJURY

Partial or Complete disruption of nerve tracts and neurons, resulting in paralysis, sensory loss, altered activity, and autonomic nervous system dysfunction.



Manifestations by the Level of Injury

Cervical: Partial or Complete quadriplegia/tetraplegia

- Respiratory dysfunction (patient may be ventilator dependent) **C4↑ Loss of system function.**
- Partial or complete paralysis of all four extremities.
- Loss of bladder and bowel control, alteration in sexual dysfunction.

Thoracic Injury: Partial or Complete Paraplegia

- Loss of bladder and bowel control, alteration in sexual function.
- Partial or Complete paralysis of lower extremities and major control of body trunk
- Potential complication of autonomic dysreflexia – Injury above T6
- Respiratory Complications.

Lumbar

- Partial or Complete paralysis of lower extremities
- Loss of bladder and bowel control, alterations in sexual function.

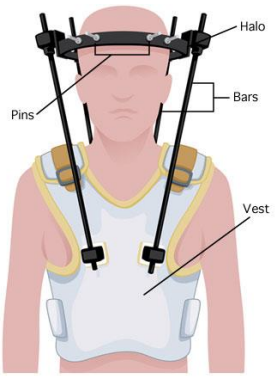
SPINAL CORD INJURY

Paraplegia (Injury below T1): Paralysis or paresis (weakness) of lower extremities.
Quadriplegia (Injuries in the cervical region): Paralysis or paresis of all 4 extremities
Hypertonia (Injury to upper motor neurons, above L1/L2): Spastic muscle tone, spastic neurologic bladder.
Hypotonia (Injury to lower motor neurons, below L1/L2): Flaccid muscle tone, flaccid neurogenic bladder.

Interventions:
- Stabilize spine, maintain patent airways, monitor VS, prevent pressure injuries.
- Monitor for spinal shock (loss of sensation, flaccid paralysis, and reflexes below the level of injury).
- Monitor for neurogenic shock (Decreased BP, HR, and cardiac output)
- Monitor for **Autonomic Dysreflexia** (life-threatening syndrome with sudden, **severe hypertension** triggered by noxious stimuli below cord damage. **Caused by impaction, bladder distention, pressure points or ulcers, or pain.**

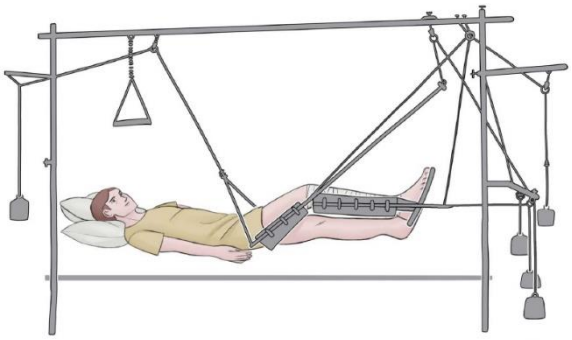
Autonomic Dysreflexia: Severe Hypertension with bradycardia. Headache, flushing. Piloerection (goose bumps), sweating. Nasal Congestion.
Nurse: High-Fowler's position to help decrease BP, loosen constrictive clothing. Determine causative stimuli. Teach patient bowel and bladder management. Administer meds. Therapeutic Measures (Surgical management). Referral (Occupational and physical therapy).

Immobilization
- Spinal Board
- Halo Traction
- Gardner-Wells traction or Crutchfield tongs
- Cervical Collar



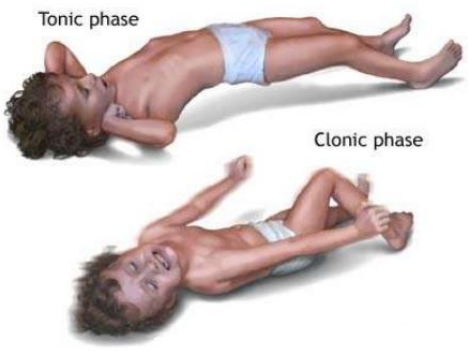
Halo Traction: Move patient as a unit, do not apply pressure to rods. **Mare sure wrench/screwdriver are attached to the vest to release patient from device in the event of an emergency.**

Skeletal Traction: Used to realign or reduce injury when skin traction is not possible Ropes pulls and weights are used. Traction needs to be maintained at all times. **Weights must hang freely** and the knots in the rope are tied securely.



SEIZURE

Generalized Seizures



- Tonic-Clonic [Grand Mal]

Tonic-Clonic seizures may begin with an aura. The **tonic phase** involves the stiffening or rigidity of the muscles of the arms and legs and usually lasts 10 to 20 seconds, followed by loss of consciousness. The **Clonic phase** consists of jerking of the extremities and hyperventilation, and usually lasts about 30 sec. Full recovery from the seizure may take several hours.

- Absence [Petit Mal]

A brief seizure that lasts seconds, and the individual mayor may not lose consciousness. No loss or change in muscle tone occurs. Seizures may occur several times during a day. The victim appears to be daydreaming. This type of seizure is more common in children. Resembles "day dream".

- Myoclonic

Myoclonic seizures present as a brief generalized jerking or stiffening of extremities. The victim may fall from the seizure.

- Atonic or Akinetic [Drop Attacks]

An atonic seizure is a sudden momentary loss of muscle tone. **The patient may fall.**

Partial Seizures

- Simple Partial (Usually without alteration of consciousness)

The simple partial seizure produces sensory symptoms accompanied by motor symptoms that are localized or confined to a specific area. The client remains conscious and may report an aura.

- Complex Partial (Usually with impairment of consciousness)

The complex partial seizure is a psychomotor seizure. The area of the brain most usually involved is the temporal lobe. The seizure is characterized by periods of altered behavior of which the client is not aware. The client loses consciousness for a few seconds.

Phases of Seizure

- **Prodromal**: Symptoms preceding seizure: nervousness, lightheaded...
- **Aural**: Sensory Warning
- **Ictal**: Actual seizure
- **Postictal**: Altered state of consciousness - Can last 5-30 min after seizure.

Nurse: Maintain patent airways (**position Side-Lying**). Don't put anything in patient's mouth. Don't restrain. Note onset/duration.

Medication: Phenytoin, Carbamazepine, Valproic Acid, Phenobarbital, Levetiracetam, Topiramate.

Status Epilepticus: Life-threatening condition where there is a prolonged seizure (>5min) or fails to regain consciousness in between seizures.

RF: CNS Infection, head trauma, drug withdrawal/toxicity.

Tx: Lorazepam (medication of choice), Diazepam, Fosphenytoin.

Phenytoin (IV slowly, no more than 50mg/min). Don't mix with glucose. Administer in Normal Saline (0.9%). Monitor for bradycardia and heart block.

STROKE – Brain Attack

TRANSIENT ISCHEMIC ATTACK (TIA)

Sudden temporary episode of neurological dysfunction lasting usually < 1hr secondary to decreased blood flow to the brain. Warning Sign of a Stroke.
RF: Advanced age, male, genetics. Hypertension, Hyperlipidemia, Diabetes Mellitus, Smoking, Atrial Fibrillation.
S/S: Sudden change in visual function. Sudden loss of sensory or motor functions.
Dx: Carotid Ultrasound, CT scan and/or MRI, Arteriography, 12-lead ECG.
Tx: Angioplasty. Carotid endarterectomy (removal of plaque from one or both carotid arteries).
Meds: Antiplatelet (Clopidogrel, Dipyridamole + Aspirin, Ticlopidine). Anticoagulants (Warfarin). Lipid-lowering agents.
Nurse: DASH diet (high fruits and vegetables, moderate in low-fat dairy products, low animal protein). Maintain body weight with regular exercise. Stop smoking.

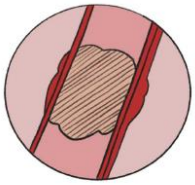
CEREBROVASCULAR ACCIDENT (CVA)

CVA = STROKE = Brain Attack.
Sudden loss of brain function resulting from a disruption of blood supply to the brain.

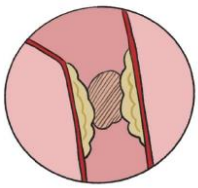
Brain uses 20% of body's total oxygen, it has no oxygen reserve.
Anoxia: >2-4 min - Cell Damage / 10 mins – Irreversible Damage
Glucose is the main source of energy

Ischemic Strokes (80% of all Strokes)

Inadequate blood flow due to occlusion of an artery.

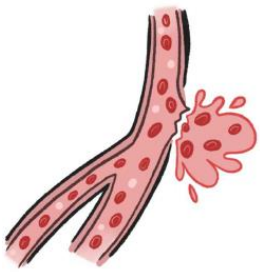


Embolic:
Clot can be made up of: Blood, fat, bacteria or air.
Caused when embolus lodges/occludes cerebral arteries. Sudden onset



Thrombotic:
Occurs in large arteries. Occurs from injury to a blood vessel wall, formation of a blood clot. Gradual Onset. Typically occurs at night. Commonly precedes by TIA.

Hemorrhagic Strokes



Sudden onset of symptoms. Progression over minutes to hours because of ongoing bleeding
- Most commonly caused by **Hypertension**
- Typically occurs during activity

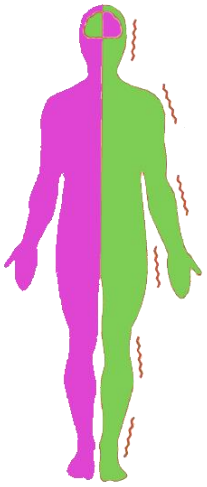
Symptoms: Severe, sudden headache. N/V, Nuchal rigidity, Rapid deterioration of function, HTN

STROKE – Brain Attack

CEREBROVASCULAR ACCIDENT ≥CVA≤

LEFT HEMISPHERE DAMAGE

Paralysis, weakness on RIGHT side
Right visual field deficit
Aphasia
- Expressive
- Receptive
- Global
Altered intellectual ability
Slow, cautious behavior
Increased level of frustration
Depression



RIGHT HEMISPHERE DAMAGE

Paralysis, weakness on LEFT side
Left visual field deficit
Spatial-Perceptual deficit
Increased Distractibility
Impulsive behavior/poor judgment
Lack of awareness of deficits
Abilities overestimated

Aphasia

- **Expressive:** Damage occurs in **Broca's area** of the frontal brain. Patient understands what is said but is unable to communicate verbally.
- **Receptive:** Injury involves **Wernicke's area** in the temporoparietal area. Patient is unable to understand the spoken and often the written word.
- **Global or mixed:** Language dysfunction occurs in expression and reception.

Diagnostic Test

NON-contrast CT/MRI – to determine Ischemic or Hemorrhagic.
Lumbar Puncture, Cerebral Angiography or Angioplasty, Digital Subtraction, Angiography, Transcranial Doppler Ultrasound.
PT/INR, PTT

Treatment

Ischemic

Thrombolytic Therapy
(Tissue Plasminogen Activator)
- MUST be given within 3.5 - 4 hrs of onset
- MUST rule out hemorrhage via CT
- Criteria:
  - BP<185/110
  - PT <15; INR < 1.7
  - Not on coumadin
  - >18 years old

Hemorrhagic

Management of HTN
Surgery (based on cause)
- Evaluate hematoma
- Clip aneurism
- Resection

Prevent ICP
Seizure prophylaxis if needed

Nurse:

- Assess swallowing and **gag reflex** before allowing patient to eat. **Thicken liquids**, teach patient to tuck chin to chest when swallowing.
- Teach patient to use **scanning technique** (turn head from direction of unaffected side to affected side) for homonymous hemianopsia.

MULTIPLE SCLEROSIS

Chronic Progressive Autoimmune disorder, causes **destruction of myelin, nerve fibers, and neurons** in the brain and spinal cord. Characterized by periods of relapsing and remitting.

RF: Women, 20-40yrs

S/S: Vision problems (diplopia/nystagmus), muscle spasticity and weakness, balance problems, bladder - bowel dysfunction, cognitive changes, fatigue, emotional changes, pain.

Labs: MRI, Lumbar puncture (Increased protein in CSF).

Tx: Immunosuppressants, anti-inflammatories, muscle relaxants.

Nurse: Avoid triggers (temp extremes, stress, fatigue, illness).

MYASTHENIA GRAVIS

Autoimmune disorder that causes severe **muscle weakness**. Characterized by periods of exacerbation and remission.

P: Antibodies block/destroy ACh receptors at the Neuromuscular Junction.

S/S: Muscle weakness (worse with activity, improves with rest), diplopia, dysphagia, SOB, thymus hyperplasia, drooping eyelids.

Dx:

1- Edrophonium (Tensilon) test: Immediate improvement of symptoms that last 5 min (Positive). Atropine (antidote) should be available in case of adverse effects (bradycardia, sweating, cramping).

2- Electromyography (EMG)

3- Repetitive Nerve stimulation

Tx:

- Medications: Anticholinesterase (Pyridostigmine) Antidote is Atropine.
  Immunosuppressants (Prednisone), Immunoglobulins.
- Procedures: Plasmapheresis, Thymectomy.

Nurse: Maintain patent airways. Assist with ambulation. Encourage periods of rest. Provide small, frequent, high caloric meals. Monitor for choking or aspiration. Administer eye drops, tape eyes shut at night (to prevent corneal drying/damage).

GUILLAIN-BARRE SYNDROME (GBS)

Acute Autoimmune attack affecting the peripheral nervous system that causes a sudden onset of **weakness and paralysis**.

P: GBS usually follows a respiratory or GI viral infection, leading to autoimmune destruction of the myelin sheath and axons in motor and sensory nerves.

S/S: Symmetric Weakness, hyporeflexia, paresthesia and pain. Recovery takes several months – 2 years Symptoms begin at lower extremities and ascend bilaterally.

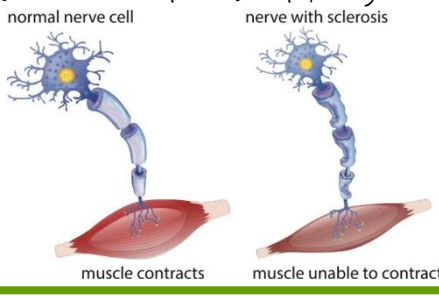
Labs/Dx: Lumbar Puncture (Increase protein in CSF). Abnormal nerve conduction velocity test.

Tx: IV Immunoglobulin (IVIG), Plasmapheresis. May need mechanical ventilation.

Nurse: Maintain patent airways. Monitor for aspiration pneumonia, respiratory failure

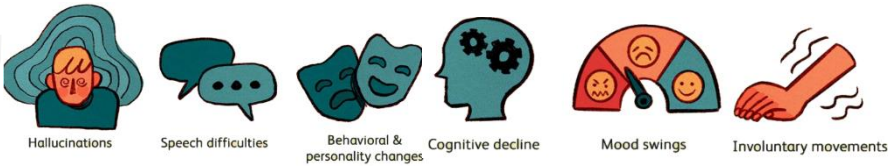
AMYOTROPHIC LATERAL SCLEROSIS (ALS)

Neurodegenerative disease that attacks nerve cells (neurons) that control voluntary muscles (Lou Gehrig's disease). Cognitive function is not impacted.
RF: white, >40 yo, family history.
S/S: Muscle weakness, cramping, fasciculations. Respiratory paralysis (within 3-5 years). dysphagia, dysarthria.
Dx: Clinical symptoms, rule out other neurologic diseases.
Tx: No cure. Riluzole slows deterioration of motor neurons. Baclofen/Dantrolene/Diazepam (to manage spasticity).
Nurse: Maintain patent airways. Monitor for pneumonia, respiratory failure. Coordinate with palliative team.



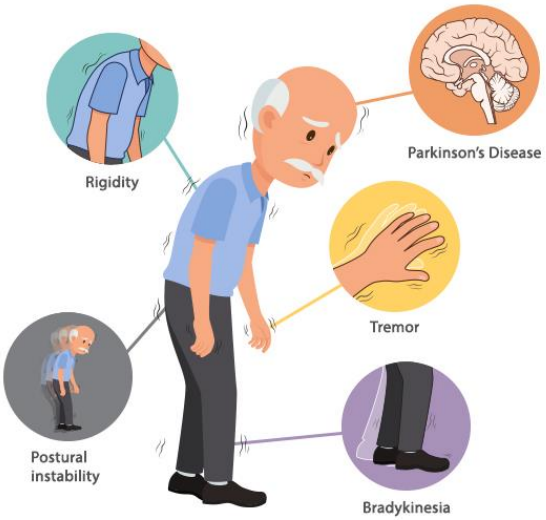
HUNTINGTON'S DISEASE

Progressive brain disorder that causes uncontrolled movements, emotional problems, and dementia.
P: Genetic (autosomal dominant) disorder that results in degeneration of GABA neurons (Inhibitory neurotransmitters) and Increase Dopamine in the cerebral cortex and basal ganglia.
S/S: Chorea (abnormal/excessive involuntary movements), bradykinesia, dysphagia, cognitive issues (dementia, memory loss, poor impulse control), psychiatric issues (depression, mania, personality changes).
Dx: Genetic testing, family Hx.
Tx: No Cure. Symptoms management psychotropic agents, tetrabenazine.



PARKINSON'S DISEASE

Progressive neurodegenerative disease causing muscle rigidity, akinesia, and involuntary tremor.
P: Caused by loss of pigmented cells of substantia nigra and depletion of dopamine.
S/S: Muscle rigidity, tremor, slow/shuffling gait, postural instability, akinesia/bradykinesia, mask-like expression, drooling, dysphagia.
Dx: Clinical Symptoms, rule out other neurologic diseases.
Tx:
Meds: Levodopa/Carbidopa, Benztropine.
Dopamine Agonist (Bromocriptine)
Procedures: Deep brain stimulation
Nurse: Monitor swallowing and food intake. Thicken food. Sit patient upright to eat. Have suction equipment available at the bedside. Encourage ROM and exercise. Asist with ADLs, falls precautions.



ALZHEIMER'S DISEASE

Gradual Irreversible dementia caused by nerve cell deterioration.
P: Beta-Amyloid deposits and **neurofibrillary tangles** develop in the brain. Neuron death leads to atrophy of the affected areas.
RF: Older age, family Hx, Cardiovascular disease.

Agnosia: Failure to recognize or identify familiar objects despite intact sensory function.
Amnesia: Loss of memory caused by brain degeneration.
Aphasia: Language disturbance in understanding and expressing spoken words.
Apraxia: Inability to perform motor activities, despite intact motor function.

Stage I (Mild): Memory lapses. Losing/Misplacing items, poor concentration, short-term memory loss.
Stage II (Moderate): Forgetting events of one's own history. Confusion, disorientation, agitation, assistance with ADLs, incontinence.
Stage III (Severe): Bedridden, verbal/motor skills lost, dysphagia.

Tx: No Cure. **Donepezil**, Galantamine, Anxiolytics, antidepressants, antipsychotics.
Nurse: Maintain structured environment. Provide short directions, repetition, frequent reorientation. Avoid overstimulation. Use a single-day calendar. Maintain routine toileting schedule.
Home Safety: **Remove scatter rugs**. Install door locks (out of sight and patient reach), good lighting (especially over stairs). Mark step edges with colored tape. Remove clutter.

MENINGITIS

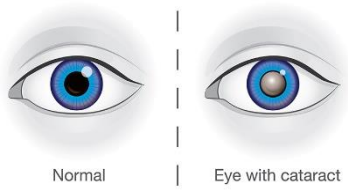
Inflammation of the meninges (membranes around the brain and spinal cord).
P: Infectious organism enter the CNS through the bloodstream or gain access directly (trauma). Viral meningitis typically resolves without treatment. Bacterial meningitis is contagious and potentially fatal.
RF: Crowded conditions, immunosuppression, travel exposure.
Prevention: Hib Vaccine (given to infants). **meningococcal vaccine (given to students living in dorms)**, pneumococcal vaccine.
S/S: **Nuchal rigidity**, Headaches, Fever, Photophobia, Tachycardia, Nystagmus, altered mental status, **Positive Brudzinski's & Kernig's Signs**, Seizures.
Labs/Dx: CSF analysis
-Bacterial: **CSF is Cloudy with Decreased glucose**, increased pressure, increased WBC, elevated protein.
-Viral: **CSF is Clear**, usually normal, Negative gram stain, slightly high protein and WBCs.
Tx: Antibiotics (Bacterial), anticonvulsants, analgesics
Precautions: **Droplet Precautions** for suspected/confirmed bacterial meningitis during the first 24 hrs of antibiotic therapy.
Nurse: Seizure precautions. Monitor neurologic status. Provide quite room, dim light. Minimize increased ICP (maintain HOB 30 degree, head midline, minimize suctioning).

MENIERE'S DISEASE

Inner ear disorder that affects balance and hearing.
P: Overproduction or decreased absorption of endolymphatic fluid leads to endolymph buildup in the inner ear, which distorts the entire inner-canal system.
S/S: Tinnitus, unilateral sensorineural hearing loss, vertigo, balance issues, vomiting.
Dx: Hearing Test, Electrocochleography, CT/MRI to rule out tumor.
Tx: No Cure.
Meds: Antihistamine (Meclizine), Diazepam (for acute vertigo), antiemetics, diuretics.
Procedures: Labyrinthectomy, endolymphatic decompression.
Nurse: Avoid caffeine and alcohol. Low-Sodium Diet. Avoid aspirin and Monosodium Glutamate.

CATARACT

Slow progressive clouding of the lens.
P: Proteins in the lens deteriorate and clump together, causing the lens to thicken/harden. This obstructs the passage of light through the lens to the retina.
RF: Aging, heredity, systemic disease (Diabetes), trauma
S/S: Gradual/painless loss of vision, blurred and double vision, white/grey pupil, absent Red Reflex.
Dx: Physical examination, Visual Acuity Test
Tx: Surgical removal of cataract.
Pre-Op: Dilate the eye. Administer Mydriatics, Antibiotics, Corticosteroids.
Post-Op: Keep the operative eye close. HOB 30-45°.
Patient Teaching: Importance of wearing sunglasses. Avoid Increase IOP (Don't bend at waist. Avoid sneezing, coughing, blowing nose, lifting >10lbs, tight collars, straining with bowel movements). Best vision occurs 4-6 weeks after surgery.



GLAUCOMA

Eye disorder that results in Increased IOP

Acute (Close-Angle) Ocular Emergency: Results in Sudden Increased of IOP from an obstruction to the outflow of aqueous humor, or overproduction.
S/S: Severe Pain, rapidly progressive visual impairment, blurred vision, N&V,

Open Angle (Most Common): Insidious onset with slowly decreasing visual acuity. Gradual Increase of IOP.
S/S: Usually bilateral, but one eye may be more affected. Halos around lights. Loss of peripheral Vision.

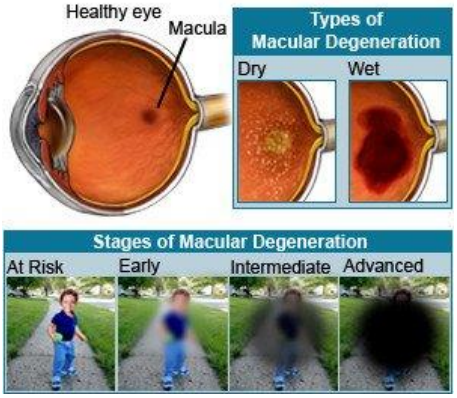
Dx: Tonometry to measure IOP (Normal Range: 10-20 mmHg)
Tx:
- Systemic: Mannitol (for close Angle).
- Local (eye drops): Timolol, Acetazolamide, Pilocarpine, Travoprost, Brimonidine.
- Surgery: Trabeculoplasty, Trabeculectomy.

MACULAR DEGENERATION

Deterioration of the macula, resulting in Central Loss of Vision.

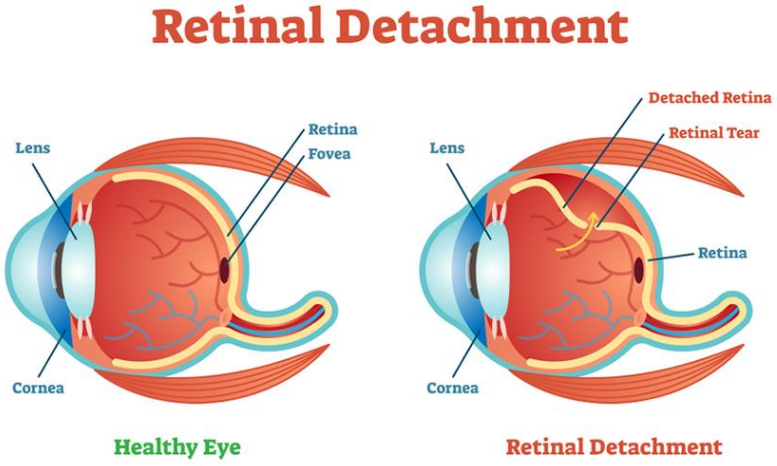
Dry: Macula gets thinner with age and tiny clumps of protein (drusen) grow. More Common, slower onset.
Wet: Abnormal blood vessels grow under the retina and leak blood/fluid, causing scarring of the macula. Less Common, faster onset.

S/S: Loss of Central Vision, blurred vision.
Dx: Ophthalmoscopic examination.
Tx: No Cure. Dietary supplements, photodynamic therapy.
Nurse: Teach quit smoking, wear sunglasses, follow up care, home modifications to ensure safety.



RETINAL DETACHMENT

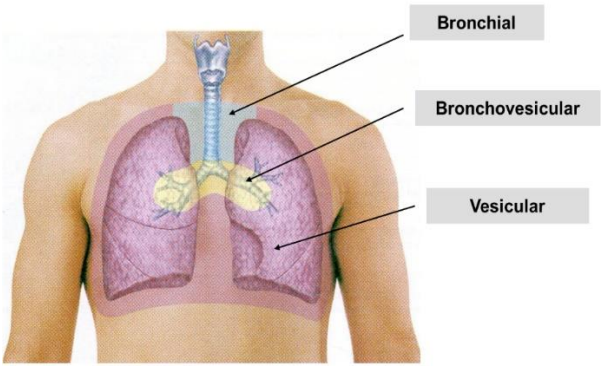
Separation of the Retina from the Epithelium.
P: Vitreous humor builds up behind the retina, which pushes the retina away from the back of the eye and causes it to detach.
RF: Aging, injury, ocular tumor.
S/S: Curtain or shadow over visual field across one eye. Sudden visual disturbances, floaters, flashing lights. Painless.
Dx: Ophthalmic Examination.
Tx: Emergency surgery to repair the detached retina.



Respiratory System

LUNGS

- **Tracheal Sound:** Harsh, hollow
- **Bronchial Sound:** High pitched, loud, hollow
- **Bronchovesicular:** Low Pitched, hollow,
  Anterior and Posterior
- **Vesicular:** Low pitched, blowing
  Anterior and Posterior



ADVENTITIOUS BREATH SOUNDS

Name	Location	Cause	Sound
Crackles	R+L lung bases	Sudden reinflation of alveoli or fluid in small airways	Crinkle of crackle Fine and short Coarse of Medium Can be cleared with cough
Ronchi	Trachea Bronchi	Fluid or Secretions in large airways	Loud and low pitched Heard on expiration Fluid through a straw
Wheezing	Can be heard over all lung fields. Usually heard louder posteriorly	Narrowed or obstructed Bronchi	High pitched Prolonged Heard on expiration
Pleural Rub	Lateral Lung Fields	Inflamed Pleura	Rubbing or grating sound heard on inspiration
Stridor	Upper lungs	Disrupted air flow of larynx or Trachea Croup, foreign body in airways, infection	High pitched, wheezing Mostly heard on inspiration

ASK ABOUT:

- ✓ Tabaco Use or Smoking
- ✓ Persistent cough or sputum production
- ✓ Chest Pain
- ✓ Environmental Exposures
- ✓ Chronic hoarseness
- ✓ Uncharacteristic Shortness of Breath
- ✓ Family history of TB

Normal (eupnea)	Regular and comfortable at 12–20 breaths/minute.
Tachypnea	20 breaths/minute.
Bradypnea	<12 breaths/minute.
Hyperventilation	Rapid, deep respiration >20 breaths/minute.
Apneustic	Neurological—sustained inspiratory effort.
Cheyenne-Stokes	Neurological—alternating patterns of depth separated by brief periods of apnea.
Kussmaul's	Rapid, deep, and labored—common in DKA.
Air trapping	Difficulty during expiration— emphysema.

Respiratory System

DIAGNOSTIC TESTS

Bronchoscopy: Insertion of a tube in the airways to allow for visualization and collection of specimens.
Pre-Procedure: NPO for 4-8 hours, prepare patient for sedation.
Post-Procedure: Ensure patient gag reflex has returned before allowing patient to eat/drink. Sore/dry throat and blood-tinged sputum is expected. Monitor for pneumothorax, which can occur within 24 hours after procedure.

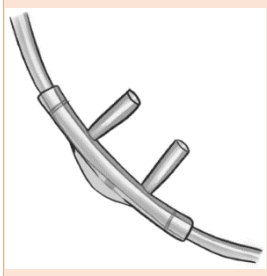
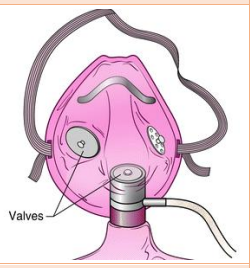
Thoracentesis: Insertion of a needle in the posterior chest to aspirate fluid (<1L) or air from pleural space.
Pre-Procedure: Patient sits upright, with arms supported on pillows or overhead table (tripod position). Educate patient to not move, talk, or cough during procedure.
Post-Procedure: Monitor patient for mediastinal shift, pneumothorax, bleeding, hypotension. Chest X-ray performed if complications are suspected. Encourage deep breaths to expand lungs.

CHEST TRAUMA

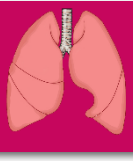
Pneumothorax: Air in the pleural space.
Hemothorax: Blood in the pleural space.
Tension Pneumothorax: Air in pleural space that doesn't escape. Increased air in the pleural space shifts organs and increases intrathoracic pressure. Tracheal deviation towards unaffected side, absent breath sounds on affected side.
Flail Chest: Fracture of two or more adjacent ribs in two or more places with loss of chest wall stability.
Cardiac Tamponade: Blood rapidly collects in pericardial sac, compresses Myocardium because pericardium doesn't stretch, and prevents ventricles from filling.

NURSE - Chest Drainage:
- Never elevate the system to the level of the patient's chest (fluid drain back into the lungs).
- If tube disconnect, place distal end of the tube in sterile water container at 2cm level.
- Milking or stripping chest tubes is NO recommended.
- Observe for Air fluctuation (tidaling) and bubbling in water seal chamber.
- If tidaling is NOT observed, the drainage system is blocked, the lungs are re-expanded or the system is attached to suction.
- If bubbling increases, there may be an air leak (briefly clamp the chest tube, if the leak stops, the air is coming from the patient.
- Report drainage >100 mL/hr to health care provider.

Oxygen Therapy

Device	Name	O_2 Rate	Advantage	Disadvantage
	Nasal Cannula	1-6 L/min FiO_2 24-44%	Lightweight Inexpensive Pt. can talk and eat	Easily dislodged, skin breakdown Mucosal drying
	Simple Face Mask	6-10 L/min FiO_2 40-60%	Simple to use, inexpensive. Can have humidification	Poor fitting, must remove to eat
	Partial-Rebreathing	6-12 L/min FiO_2 50-75%	Moderate O_2 Concentration	Warm, poorly fitting, remove to eat
	**Non-Rebreathing**	10-15 L/min FiO_2 80-95	**HIGH FLOW O_2 Concentration**	Poorly fitting, remove to eat
	**Venturi**	4-10 L/min FiO_2 24-60%	**MOST PRECISE & ACCURATE**	Remove to eat

Respiratory System



SLEEP APNEA

Breathing disruption in sleep that lasts >10sec and occurs >5 times per hour.
Patho:
Obstructive: Upper airways become blocked by overly relaxed airways muscles, or by tongue/soft palate.
Central: The brain doesn't send signals to the muscles that control breathing.
Rel Factors: Obesity, large tonsils, neuromuscular or endocrine disorders.
S/S: Persistent daytime sleepiness, irritability.
Dx: Polysomnography, overnight sleep study.
Tx: CPAP (Continuous Positive Airway Pressure), or BiPAP (Bi-Level Positive Airway Pressure), adenoidectomy, tonsillectomy.

CYSTIC FIBROSIS

Genetic Disorder that severely impairs lung function and causes dysfunction in other organs/tissues that make mucus or sweat.
Patho: Autosomal recessive disorder causes obstruction of NaCl transport within cell membranes, producing secretions with low water content. This results in abnormally thick, sticky mucus that plugs organ ducts (pancreas, lungs, liver, small intestine, reproductive organs), and leads to organ failure.
S/S: Respiratory: Wheezing, coughing, dyspnea, mucus plugs, cyanosis, barrel chest, clubbing, chronic respiratory infections.
GI: Steatorrhea (fatty, malodorous stools), delayed growth, fat-soluble Vit deficiency (A,D,E,K).
Skin: High NaCl content in sweat, saliva, and tears.
Labs/Dx: Sweat chloride test, DNA testing, PFTs, stool analysis.
Tx: Medications: Bronchodilators, anticholinergics, Dornase Alfa, antibiotics (for pulmonary infection), pancreatic enzymes (take with meals and snacks), mucolytics. Procedures: Chest physiotherapy (uses percussion, vibration, postural drainage, and breathing exercises to loosen respiratory secretions). Schedule treatment before meals or 1-2 hours after meals to avoid vomiting. Use bronchodilators 30min-1hr before treatment.
Nurse: Administer O2. Encourage High Fluids, High Protein/Calorie diet. Supplements (Vit A,D,E,K).

Respiratory System

INTERSTITIAL LUNG DISEASE

A group of restrictive lung disorders that causes stiff and noncompliant lungs.
Patho: Chronic Inflammation of the lungs causes replacement of healthy lung tissue with fibrotic scar tissue.
Rel Factors: Environmental inhalants, immune disorders, sarcoidosis.
S/S: Cough, dyspnea, chest discomfort, fatigue, clubbing.
Dx: X-ray, lung biopsy, PFTs.
Tx: Oxygen Therapy.
Medication: Anti-inflammatories (corticosteroids).
Procedures: Lung transplant

PULMONARY HYPERTENSION

High Blood Pressure in the lungs.
Patho: High Vascular resistance and narrowing of the arteries in the lungs causes high pressure in the right ventricle, leading to right ventricular enlargement/failure (Cor Pulmonale).
Rel Factors: Cardiac defects/disease, pulmonary emboli, lung disease.
S/S: Dyspnea, pallor, fatigue, chest pain on exertion, weakness, edema r/t right-side heart failure.
Labs/Dx: Echocardiogram, Cardiac Cath, High PAP and PAWP.
Tx: Diuretics, Digoxin, Vasodilators
Nurse: O2 Therapy, fluid restriction, I&O, Daily weight, Encourage frequent rest periods.

UPPER RESPIRATORY TRACT DISORDERS

Rhinitis, Sinusitis, Pharyngitis, Laryngitis, Tonsillitis
Patho: Viral Infection, Bacterial Infection, or allergies causes release of histamine. This results in local vasodilation, edema.
S/S: Rhinorrhea, Sore Throat, Headache, facial pain, fever, hoarseness, difficulty swallowing.
Labs/Dx: Throat culture to rule out group A beta-hemolytic streptococcal infection (strep throat), influenza, and Covid-19.
Tx: Nasal saline irritation, steam inhalation.
Medication: Expectorants, decongestants, analgesics, antibiotics for bacterial infection.

INFLUENZA

Highly contagious acute viral respiratory infection.
Patho: Influenza A, B, or C virus is spread primarily through droplets from person to person. The virus attaches to epithelial cells in the respiratory tract and replicates.
Prevention: Hand washing, annual vaccination, avoid close contact with infected pts.
S/S: Fever/chills, malaise, muscle aches, headache, rhinorrhea, cough, sore throat.
Labs/Dx: Rapid Influenza diagnostic test.
Tx: Saline gargles, rest, High fluid intake.
Medication: Antiviral agents (take within 48 hours after onset of symptoms), analgesics, antitussives.

TUBERCULOSIS

Infection in the Lungs caused by Mycobacterium tuberculosis.
Patho: Organism is transmitted via aerosolization and attaches to the alveoli. This triggers an immune response, ingestion of the bacilli by macrophages, and formation of granulomas (lesions).
S/S: Cough lasting >3 weeks, purulent and/or bloody sputum, night sweats, weight loss, lethargy.
Labs/Dx:
- **QuantiFERON Gold blood test.**
- **Mantoux Skin Test:** Intradermal injection, read in 48-72 hrs. Induration 10mm= Positive Result (5mm for immunocompromised patients). Past BCG vaccination may produce a false-positive result.
- **Acid-fast bacilli culture:** Use 3 early morning sputum samples.
- **Chest X-ray:** Shows active lesions in lungs.

Tx: Combination Drug Therapy, up to 4 antibiotics for 6-12 months of treatment (Rifampin, Isoniazid, Pyrazinamide, Ethambutol).
Nurse: Place patient in Negative Airflow Room. Wear mask N95 in the room. Patient should wear surgical mask when leaving the room. Screen family member for TB. Teach patient that sputum samples will be needed every couple week. Patients are considered not infectious after 3 Negative sputum cultures.

PULMONARY EMBOLISM

Life-threatening blockage in the pulmonary vasculature.
Patho: Embolus (DVT) becomes lodged in pulmonary circulation. Pulmonary vascular occlusion leads to impaired gas exchange and circulation.
Rel Factors: Immobility, smoking, combined oral contraceptives, obesity, surgery, AFIB, long bone fractures (fat emboli), pregnancy.
S/S: Shortness of Breath, anxiety, chest pain wit inspiration, tachycardia, tachypnea, hypotension, petechiae, diaphoresis.
Labs: High D-dimer (indicates presence of clot).
Dx: CT scan
Tx: Medication: Anticoagulants (heparin, warfarin), thrombolytics.
Surgery: Thrombectomy (removal of clot), vena cava filter (prevents new emboli from entering the lungs).
Nurse: Sit patient Upright, administer O2.
Warfarin Therapy: Frequent blood draws needed to monitor PT/INR levels. Maintain consistent intake of Vit K. Prevent bleeding (no aspirin, prevent falls, use an electric shaver and soft toothbrush, avoid blowing nose forcefully).
Prevent DVTs: Stop smoking, Increase mobility, Wear compression stocks.

ACUTE RESPIRATORY DISTRESS SYNDROME (ARDS)

Respiratory failure with non-cardiac associated pulmonary edema.
Patho: Systemic inflammatory response leads to alveolar permeability, inflammation, and collapse.
Rel Factors: Sepsis, Shock, trauma, pneumonia, pancreatitis, inhalation of chemicals or water (with near-drowning).
S/S: Dyspnea, rapid/shallow breathing, tachycardia, substernal retractions, cyanosis/pallor, crackles.
Labs/Dx: ABGs, Chest X-ray (showing bilateral infiltrates).
Tx: Correct underlying cause, oxygen, mechanical ventilation.
Nurse: Maintain patient airways, monitor cardiac status (HR, BP), provide mechanical ventilation care.

ASTHMA

Patho: Chronic lung disease that causes narrowing and inflammation of bronchi and bronchioles. Intermittent and Reversible.

Asthma Attack:

1- Sooth muscle constricts = Chest Tightness dyspnea
2- Mucosa lining + goblet cells = more inflamed + excessive mucus production
goblet cells: collect bacteria to prevent going in the airways

S/S:

Early S/S
1- Shortness of breath
2- Easy fatigue
3- Cough at night, trouble sleeping
4- Sneezing, tired, scratchy throat
5- Wheezing
6- ↓Peak flow best

Active S/S:
1- Chest Tight
2- Wheezing
3- Cough
4- Dyspnea
5- ↑HR
6- Tachycardia
7- O_2Sat <90%

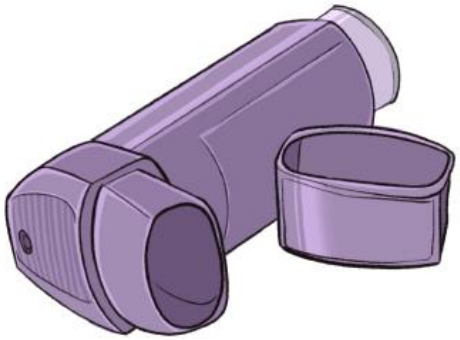
VERY BAD!
1- Rescue inhaler doesn't work
2- Can't speak
3- Chest retractions
4- Cyanosis lips/Skin
5- Sweaty

Triggers: Smoke, pollen, pollution, perfume, dander, dust, pest, mold, cool and dry air, GERD, respiratory infection, exercise, hormonal shift, beta blockers/NSAIDS, Aspirin, sulfites

Interventions: V/S, Keep Patient calm. High Fowlers. Oxygen / Bronchodilators.
Assess: lungs, cyanosis, ease of speak

Bronchodilators:

1- ALBUTEROL – Short Acting, fast relieve
-NOT for daily Tx-
2- SALMETEROL – Long Acting
-NOT for acute attack-
3- IPRATROPIUM – Short acting



Anti-Inflammatories:

1- CORTICOSTEROIDS – "-sone" "solone"
-NOT for acute attack-
2- MONTELUKAST – Oral – Relaxes smooth muscle, ↓mucus. <u>for CONTROL and MAINTENANCE</u>
-NOT for acute attack-

CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Patho:

- COPD is characterized by airflow obstruction that is caused by chronic bronchitis or emphysema
- The obstruction is caused by inflammation which changes the structural function of the lung that makes it harder to expire CO2
- The air becomes trapped causing the chest to hyper expand and become **barrel shaped**. This prevents more air from being expired.
- Because of decreased expiration the pt. will become hypercapnic (↑CO2) and hypoxic (↓O2)
- The excess pressure can damage alveoli further causing a snowball effect of decreased function.

Complications:

Pulmonary Insufficiency - Impaired gas exchange **r/t** backflow from the Pulmonary Artery to Right ventricle

Acute Exacerbation - Worsening or Symptoms. **Tx:** Assess ABGs, maintain fowler's position, suction airway if necessary

Pulmonary hypertension - Excess Pressure in Lungs. **Tx:** Diuretics, vasodilators, anticoagulants + Calcium Channel Blockers

Cor Pulmonale - Right Ventricle Hypertrophy. **Tx:** Treated with diuretics + management of underlying cause

Risk Factors:

- **Smoking** - The major risk factor for developing COPD - hyperplasia, ↑mucus, ↓cilia
- **Occupational** - Chemicals + Dusts (Dusts, vapors, irritants, fumes can increase the risk of COPD)
- **Air pollution** - Urban air pollution coal + biomass fuels used for heating
- **Infection** - Recurring infection in childhood are linked to reduced function
- **Genetics or AAT Deficiency** - Linked to poor lung function.
- **Aging** - Loss of recoil, stiffening of chest wall + impaired gas exchange
- **Asthma** - Can be secondary to COPD or contribute to progression of it

S/S:

Early Stages

- Symptoms develop slowly
- Chronic intermittent cough
- Dyspnea that increase in severity
- Inability to take a deep breath
- Prolonged expiration and ↓lung sounds

Late Stages

- Dyspnea at rest
- Relies on accessory muscles to breathe
- Wheezing, chest tightness
- Fatigue, weight loss, anorexia

Diagnosis:

- History and physical Exam
- Spirometry - required
- Chest X-Ray
- A1 - antitrypsin levels (AAT)
- Blood gasses - in severe stage
- 6 min walk test

SPIROMETRY MEASURES FEV

↓FEV_1 = ↑Obstruction

FEV_1 / FVC < 70% = COPD

FEV_1 = Forced Expiratory Vol/1Sec

Classification	Severity	FEV_1
Stage 1	Mild	>80%
Stage 2	Moderate	50-80%
Stage 3	Severe	30-50%
Stage 4	Very Severe	<30%

COPD

Treatment:

Minimally invasive
- Smoking cessation
- Airway clearance techniques
- Hydration (if indicated)
- Long - term O2 (if indicated)
- Exercise Plan (walking + upper body)

Pharmacology
- Bronchodilators (↓Dyspnea, ↑FEV_1)
- Anticholinergics (↓Exacerbations)
- Corticosteroids

Surgical
- Lung volume reduction
- Bullectomy
- Lung transplant

Pulmonary rehab
- Exercise training (ambulation + upper limb exercises)
- Smoking cessation
- Nutrition counseling
- Education (Importance of sleep and good nutrition)

NURSING MANAGEMENT

Assessment

Subjective Data
- Hx of exposure to pollutants/irritants?
- Hx of recent infection or hospital stay?
- Do they use O_2 therapy?
- Medications they're on?

1) bronchodilators
2) corticosteroids
3) Anticholinergics
4) OTC

- Smoker? Pack years/ quit date
- Weight Loss or Anorexia?
- Exercise / Activity Level?
- Anxiety / Depression? Sleep Pattern?

Objective Data

General

-Restlessness, Fatigue, Sitting upright

Integument

Cyanosis, poor turgor, clubbing, bruising, edema, thin skin

Respiratory
- Rapid + shallow breathing, prolonged exp.,
- ↓Breath sounds, accessory muscle breathing
- ↓Diaphragm movement, resp. acidosis

Cardiovascular
- Tachycardia, Jugular vein distention, edema in feet, dysrhythmias

Planning

Goals
- Prevent disease progression
- Maintain ability to care for self
- Relieve symptoms – avoid complications

Diagnosis
- Ineffective breathing pattern
- Impaired gas exchange
- Ineffective airway clearance

Implementation

Interventions
- Counsel smoking cessation
- Breathing retraining: Pursed-lip (PLB) To prolong expiration. Easier to learn + should be 1st choice in acute situation
- Diaphragmatic breathing: use of abdomen instead of accessory muscles to prevent Fatigue and slow Respiratory rate
- Airway clearance (ACTs): loosen mucus/secretions then cleared by huff coughing
- Chest Physiotherapy (CPT): Percussion / vibration loosens mucus
- Postural drainage: Repositioning to drain secretions from specific areas
- Nutritional therapy: Increase Kcals and protein

Education
- Encourage Pt. to avoid or control exposure to pollutants
- Caution Pt. to avoid others who are sick and practice good hand hygiene
- Explain importance of reporting changes in conditions to HCP
- Remind Pt. to follow O2 therapy as ordered to prevent oxygen toxicity
- Suggest nutritional meals options

Evaluation
- Assess need to change flow rate
- Evaluate compliance to meds.
- Monitor for signs of complications
- Determine O_2 therapy effectiveness

PNEUMONIA

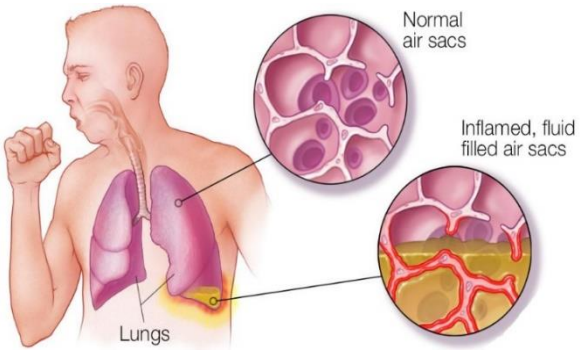
Patho:
An infection of the lung parenchyma. Usually your epiglottis, cough reflex, mucous membranes and bronchoconstriction can protect the lungs from becoming infected, but they can become overwhelmed and allow bacteria and viruses to grow.

Disease Process

Early Symptoms
- Purulent sputum
- Diminished lung sounds
- Fatigue
- Cough
- Sore throat

Late Symptoms
- Chest pain
- Tachycardia
- Sepsis
- Dyspnea
- Activity intolerance
- Hemoptysis
- Respiratory distress

Common Causes:
- Abdominal/thoracic surgery
- IV drug use
- Air pollution
- Immunosuppressive disease/meds
- Age of 65+
- Intestinal/gastric feeding via NG tube
- Altered consciousness
- Malnutrition
- Bed rest/immobility
- Tracheal intubation
- Smoking
- Chronic disease
- Upper respiratory infection
- Exposure to farm animal
- Diabetes
- Lung cancer
- CKD
- Recent antibiotics



NURSING MANAGEMENT

Assessment
Lung sounds, VS, SaO2 %, Health Hx, Medications, Recent Surgeries, Smoking, Mobility Level, Fatigue
LABs ABGs, Sputum Culture, WBCs

Nutritional Considerations
- Fruits + Vegetables build Immune System
- Protein Rich Foods help Repair Tissue
- Drink Plenty of Water and fluid to Maintain Fluid - Electrolyte Balance
- Avoid Throat Irritating Foods Like Milk That Can Cause Excess Secretions

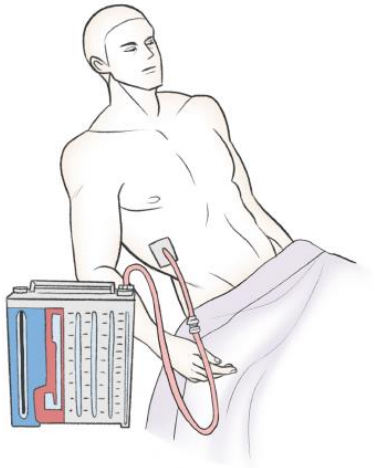
Prevention
- Wash Hands Frequently;
- Eat A Balanced Diet;
- Get Adequate Rest;
- Exercise Regularly
- Cough + Sneeze into Elbow;
- Stop Smoking;
- Avoid Others Who Are ill

Interventions
- Teach good handwashing
- Change position frequently
- Promote expectoration
- Limit visitors to prevent spread of infection
- Encourage adequate rest
- Educate pt. to report chest pain, fever, changes in sputum or altered sensorium
- Provide comfort for pain
- Administer antipyretics as ordered
- Continuously monitor pulse oximetry
- Suction secretion as needed
- Encourage early ambulation/mobilization to speed up recovery

CHEST TUBE

CHEST TUBE

Uses:
- Removing Air, Fluid or Blood
- Preventing drained air and fluid from returning to the pleural space
- Restoring Negative Pressure with the pleural space to re-expand the lung

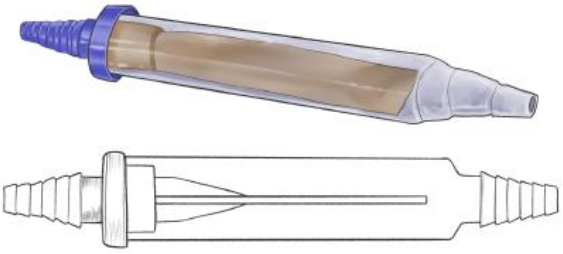


Placement:
Mid-anterior axillary line at the 4th or 5th intercostal space on affected side

Complications:
- Bleeding
- Infection
- Air leak / Crepitus
- Clogged tubing – DO NOT MILK / STRIP TUBING
- Tube disconnects from drainage system – Place chest tube in sterile water until new system is set up

Heimlich Valve:
One-way used with a chest tube to prevent air from entering the pleural space.

Heimlich Valve



Assessments (q2h):
- Pulmonary Status
- Dressing Status
- Assess for crepitus
- Check tubing
- Keep CDU (Chest Drainage Unit) below patient's Chest Level
- Monitor Water Levels
- Assess for bubbling in water chamber
- Assess Drainage

Flail Chest / Tension Pneumothorax

FLAIL CHEST

Patho: Occurs when Rib Cage fractures creating a "free" segment.

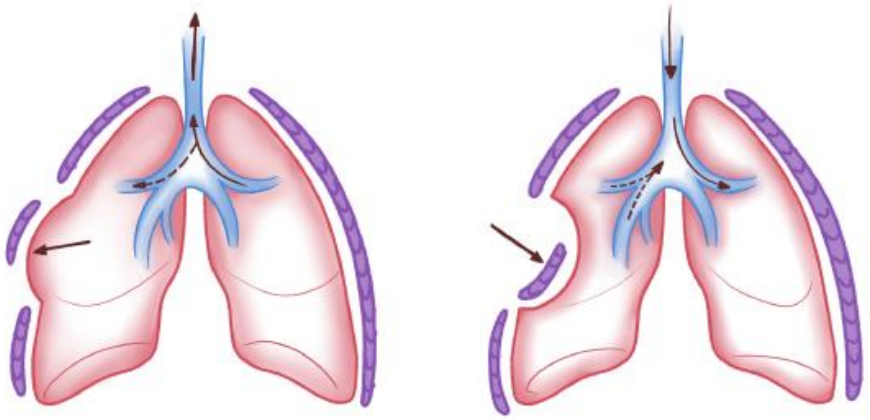
Causes: Severe Blunt Trauma

Symptoms:

- Tachycardia
- Dyspnea/Tachypnea
- Hypotension
- Cyanosis
- Chest Pain
- Anxiety
- Paradoxical Breathing
- Diminished Breath Sounds

Treatment:

- Oxygenation
- Mechanical Ventilation
- IV Hydration
- Possible Surgical Intervention



Expiration | Inspiration

TENSION PNEUMOTHORAX

Patho: Life-threatening condition that develops when air is trapped in the pleural cavity under positive pressure, displacing mediastinal structures. The air that enters the chest cavity with each inspiration is trapped

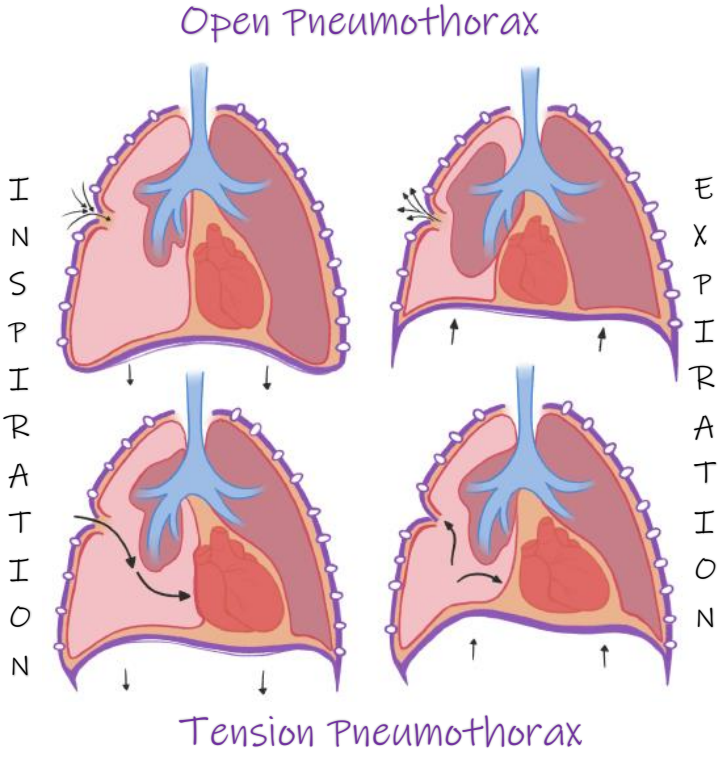
Symptoms:

- Acute Respiratory Distress
- Hypoxia
- Cyanosis
- Agitation
- Distended Neck Veins
- Drop in BP
- Tracheal Deviation away from the affected side

Treatment:

- Emergency Thoracotomy
- Chest Tube Insertion

Thoracotomy: Incision in the chest wall at: 4th Intercostal mid-axillary space 2nd and 3rd space at mid-clavicular line Right-Side ONLY

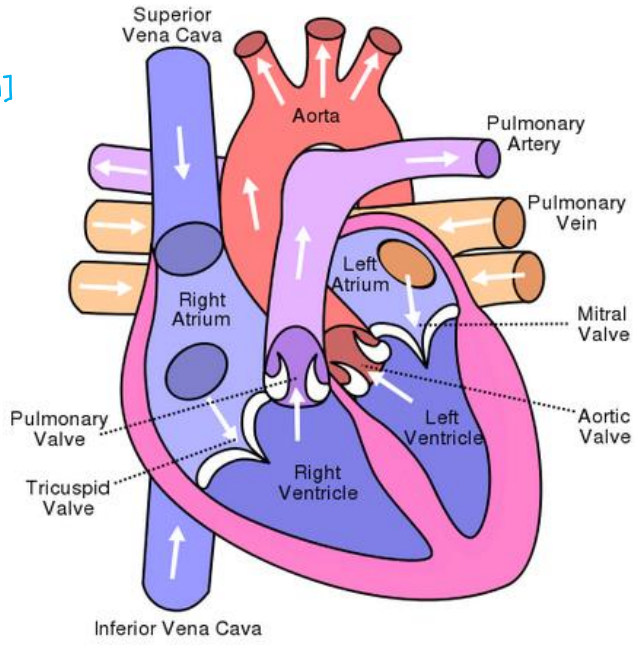


Cardiovascular System

THE HEART

Conducting System

1- Sinoatrial (SA) Node [Primary Pacemaker 60-100bpm]
2- Atrioventricular (AV) Node [40-60 bpm]
3- Bundle of His
4- Bundle Branches
5- Purkinje Fibers



Properties of Cardiac Cells

Automaticity: The ability to initiate an impulse
Excitability: The ability to be electrically stimulated
Conductivity: The ability to transmit and impulse along a membrane
Contractility: The ability to respond mechanically to an impulse

Cardiac Output = HR x Stroke Vol
CO = 4-8 L/min (normal)

Mean Arterial Pressure
MAP=(SBP+2DBP)/3
Normal > 60mmHg

Depolarization: When the charges are reversed. Heart Muscle Contract.
Repolarization: When the cells return to their original State

HEART SOUNDS

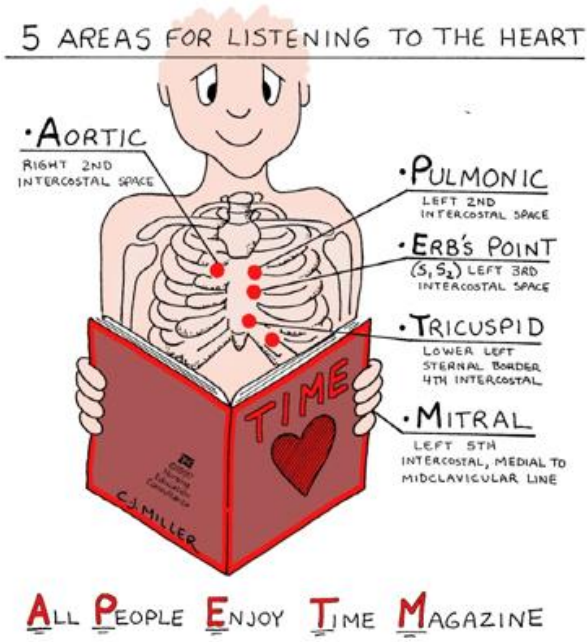
Heart Sounds

S1- AV Valves Close – Heard at Apex
- Beginning of Systole
S2- Semilunar Valves close – Heard at Base
- End of Systole, Beginning of Diastole
S3- Heart Failure and Regurgitation
S4- Resistance w/ ventricular filling

Abormal

S3- VENTRICULAR GALLOP (Lub-de-dub)
Rapid Rush of Blood from the Atrium to the Ventricle as it starts relaxing.
-Low Pitch / -Early Diastole
-May be Normal in Athlete, Pregnancy, Children
-Normal Up To 30 yrs
-Causes: HF, MI, Cardiomyopathy, HT,

S4- ATRIAL GALLOP
Sudden slowing of blood flow by the ventricle as the atrium contracts.
- Low Intensity sound
- May be a sign of Diastolic HF or Ischemia
- Heard at apex
Causes: HF, MI, Cardiomyopathy



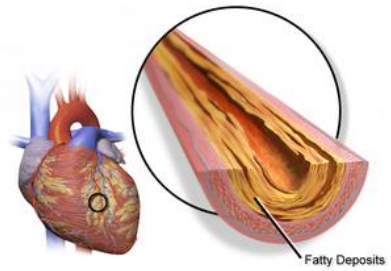
CARDIAC ENZYMES

Cardiac Enzymes are released when the Heart suffers Ischemia.
Troponin is the Most Specific.

Cardiac Enzyme	Expected Range	Onset	Duration
Creatine Kinase MB	0% of total CK	3 - 6 hrs	2 - 3 days
Troponin T	< 0.1 ng/mL	2 - 3 hrs	10 - 14 days
Troponin I	< 0.03 ng/mL	2 - 3 hrs	7 - 10 days
Myoglobin	< 90 mcg/L	2 - 3 hrs	24 hrs

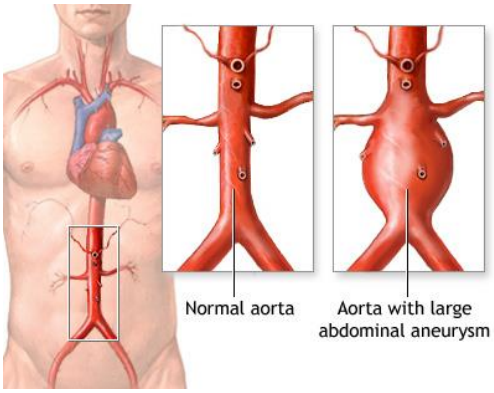
CORONARY ARTERY DISEASE

Patho: Narrowing or obstruction of a coronary artery due to plague buildup/ atherosclerosis
Dx: ECG, Catheterization, blood lipids
N: Educate about ↓ Kcal/fat, ↑ fiber diet & exercise
C: ↓ Perfusion, HTN, angina, MI



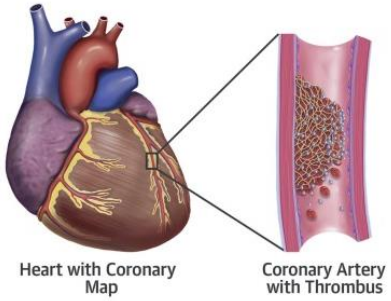
AORTIC ANEURISM

Patho: Stretching of the medial wall of an artery caused by vessel weakness
S/S: Thoracic - neck, shoulder, ↓back pain, ↑HR, dyspnea
Abdominal - pulsating mass in abdomen, Abd/back pain
Ruptured - severe Abd/back pain, shock, ↓BP
Dx: Ultrasound, CT Scan, arteriography
N: Monitor Vitals, check peripheral pulses, assess for abdominal tenderness, ask pt. if abdominal or back pain is present.



CARDIOGENIC SHOCK

Patho: Reduced cardiac output and tissue perfusion. Usually caused by a corona artery blockage
S/S: Hypotension, pallor, tachycardia, disorientation, chest pain, cool, clammy skin
N: Administer O2, morphine sulfate as ordered. Prep for intubation, Monitor blood gas levels



Dysrhythmias

SINUS DYSRHYTHMIAS

Sinus Tachycardia: Regular cardiac rhythm, HR > 100 bpm.
Causes: Physical activity, anxiety, fever, pain, anemia, medications, compensation for low cardiac output or BP.
Tx: Treat underlying cause.

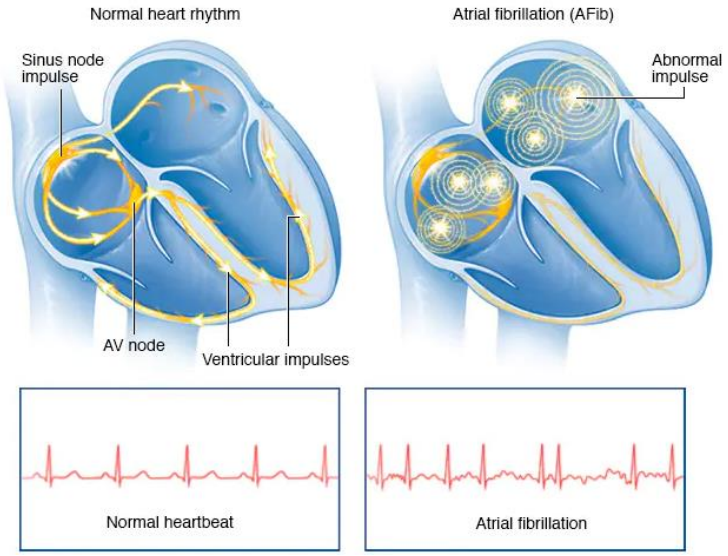
Sinus Bradycardia: Regular cardiac rhythm, HR < 60 bpm.
Causes: Excess vagal stimulation, cardiovascular disease/infection, hypoxia, medications. Normal in athletes.
Tx: Atropine, Pacemaker (for symptomatic bradycardia).

Sinus Arrhythmia: Normal variant from normal sinus rhythm where the heart rate increases slightly with inspiration and decrease slightly with expiration.
Causes: Common in children and typically disappears with age.
Tx: Not necessary

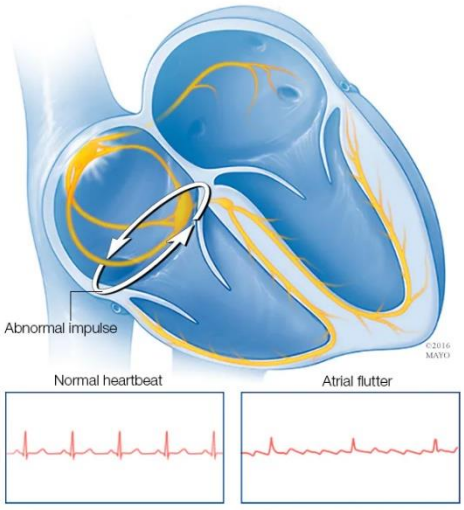
ATRIAL DYSRHYTHMIAS

Rel Factors: Heart disease, cardiac surgery, Older Age, Diabetes.

A-FIB: Atrial: 350-600 beats/min. Rapid and disorganized depolarization of the atria, causing the atria to quiver or fibrillate instead of fully squeezing. This causes blood to collect on the atria, placing the patient at High risk for clots.
Tx: Cardioversion, antiarrhythmics, anticoagulants.



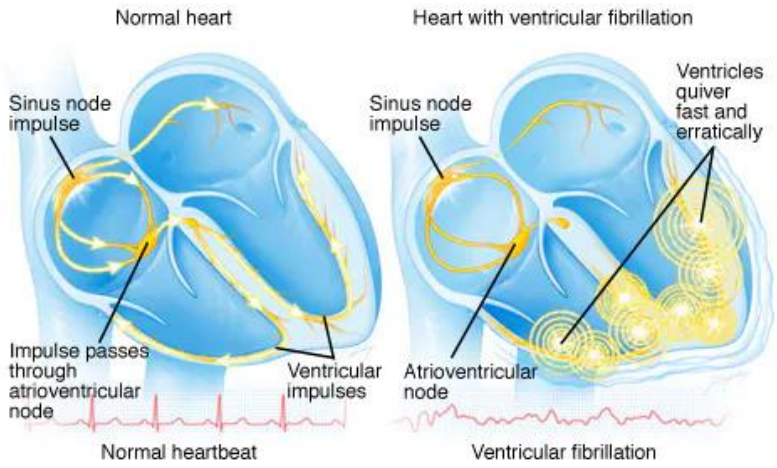
Atrial Flutter: Abnormal electrical circuit forms in the atria, causing the atria to depolarize 250-350 times/min.
Tx: Cardioversion, Antiarrhythmics.



VENTRICULAR DYSRHYTHMIAS

Ventricular Fibrillation:

Patho: Ventricles depolarize in a completely disorganized way
S/S: Cardiac output ceases no pulse, BP, Respirations and Pt. is unconscious
Nurse: Activate Emergency response, Administer CPR, **defibrillate** and administer O_2 as ordered.



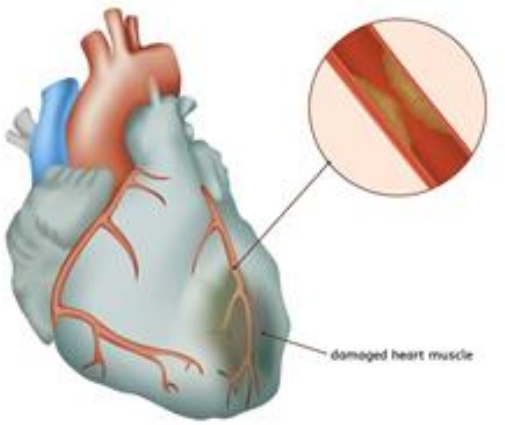
Premature Ventricular Contraction

Patho: Ventricles contract prematurely due to impulse initiation by **purkinje fibers** instead of **SA node.**
Nurse: Assess O_2 saturation. Monitor anticoagulant and electrolytes as ordered.

Bigeminy - PVC every other heartbeat
Trigeminy - PVC every 3rd heartbeat
Quadrigeminy - PVC every 4th heartbeat

MYOCARDIAL INFARCTION

Patho: Cardiac tissue no longer has Oxygen Supply which can lead to necrosis. Blockage of 1 or more arteries of the heart.
S/S: Chest pain, SOB, nausea, low back pain, diaphoresis, pallor, fear + anxiety
Dx: Troponin levels, CK, CK-MB, Myoglobin, ECG
Nurse: Administer O2, Establish IV access, Obtain 12-lead EKG,
Administer thrombolytic therapy, assess pulses, Monitor for Blood Pressure Changes
Morphine – Pain and relaxes the heart
Oxygen – ↑O_2 in the heart
Nitroglycerin - vasodilates
Aspirin – blood thinner



Percutaneous Coronary Intervention (PCI)

Procedure to open Coronary Arteries. Performed within 2 hours of onset of MI symptoms. Catheter with a balloon is threaded through a blood vessel (usually femoral artery) up to the blocked coronary artery. Balloon is inflated to allow stent placement to restore blood flow.
Nurse (Post-Surgery): Monitor for bleeding at insertion site. Check perfusion to extremity (pulse, temperature, color). Monitor for complications: Artery dissection and thrombosis (reocclusion of vessel).

PACEMAKER

Device that provides electrical stimulation of the heart when the natural pacemaker in the Heart doesn't maintain proper rhythm.

Types of Pacing:

- **Atrial Pacing**: Used with SA node failure.
- **Ventricular Pacing**: Used with a complete AV Block
- **AV Pacing**: Used with SA node failure AND complete AV Block.

Pacemaker Modes:

- Asynchronous: Fires at a constant rate regardless of heart's electrical activity.
- Synchronous: Fires only when the heart's intrinsic rate falls below certain rate.

Post-Op Nursing Care:

- Provide sling and instruct patient to minimize shoulder movement.
- Assess for hiccups, which may indicate pacemaker is pacing the diaphragm.

Patient Teaching:

- Carry pacemaker ID, take pulse daily, avoid contact sports and heavy lifting for 2 months.
- Pacemaker will set off airport security detectors.
- MRIs are contraindicated.
- It's safe to use garage door opener and microwave.

HEART FAILURE

Heart muscle doesn't pump enough blood to meet the body's needs.

Patho: Congenital Heart defect or disorder (ex: coronary heart disease, cardiomyopathy, Hypertension, valvular disease) damages or overworks the heart, decrease cardiac output.

S/S:

Left-Side HF: Results in pulmonary congestion. Dyspnea, cracklets, fatigue, pink/frothy sputum.

Right-Side HF: Results in systemic congestion. Peripheral edema, ascites, jugular vein distention, hepatomegaly.

Labs: High hBNP >100 pg/mL

Dx: Echocardiogram (Low Ejection Fraction), hemodynamic monitoring (High CVP, PAWP, Low CO).

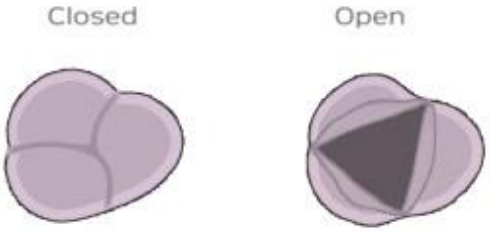
Tx: Diuretics, Digoxin, Beta Blockers, ACE Inhibitors, Angiotensin II blockers, Calcium Channel Blockers, Vasodilators, Anticoagulants.

Nurse: Monitor daily weight, I&O. Sit patient Upright (High-Fowlers). Administer O2, restrict fluid and sodium intake as ordered. Monitor for complications, including pulmonary edema.

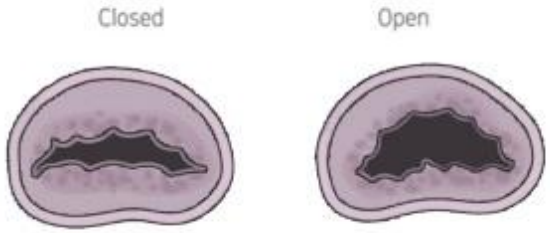
Cardiac Valve Stenosis

Normal Mitral Valve

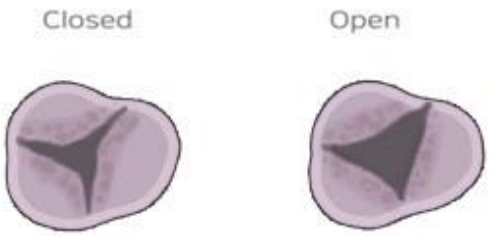
Normal Aortic Valve



Mitral Stenosis



Aortic Stenosis



Caused by

- Rheumatic disease
- Strep Infection

Can lead to

LV Enlargement
Right Side Heart Failure

Treatment

- Valvuloplasty
- Commissurotomy (Removal of Scar Tissue)
- Valve Replacement

Symptoms:

Dyspnea
Fatigue
Palpitations
Hemoptysis
Diastolic Murmur

Symptoms:

Fatigue
Chest Pain
Shortness of Breath
Syncope

Valve Regurgitation

AORTIC VALVE REGURGITATION

Blood leaks backward from aorta unto Left Ventricle.
Leads to Left Ventricle enlargement due to volume overload from inadequate / incomplete emptying during systole.

Symptoms:

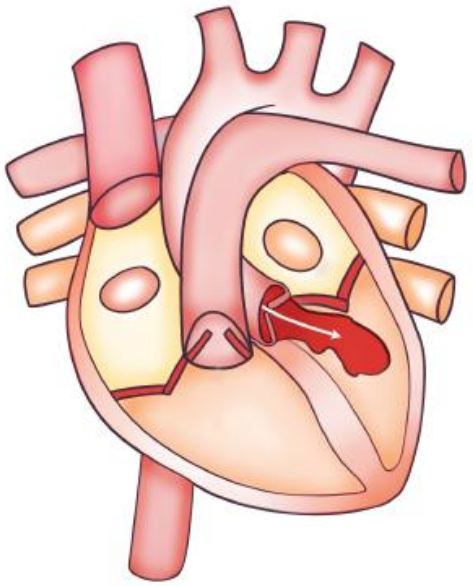
- Varies depending on cause/severity
- Increased CO (early compensation)
- Paradoxical Nocturnal Dyspnea
- Pulmonary Edema
- Right Side Heart Failure
- Shock – Acute A.R.

Causes

Congenital Heart Valve Disease
Age-Related heart changes
Endocarditis
Rheumatic Fever
Trauma

TREATMENT

- Balloon Valvuloplasty
- Annuloplasty
- Commissurotomy
- Valve Replacement



MITRAL VALVE REGURGITATION

Backward of Blood from the Left Ventricle to Left Atrium due to an incompetent valve.

Symptoms

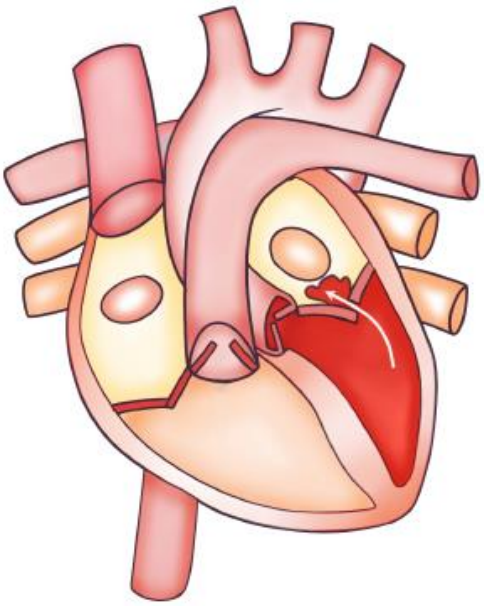
- Weakness
- Fatigue
- Paradoxical Nocturnal Dyspnea
- Murmur
- A-Fib

Causes

- Mitral Valve Prolapse
- Rheumatic Fever
- Endocarditis
- Heart Attack
- Cardiomegaly
- Trauma

TREATMENT

- Medication to Increase CO
- Annuloplasty
- Valvuloplasty
- MV Repair / Replacement



ANGINA

Angina / Chest Pain: A narrowing of the coronary artery that supply the heart with blood and oxygen. It occurs in times of HIGH demand for Oxygen (Exercise or Emotional Stress). If it goes untreated, ischemia or myocardial infarction can occur.

Risk Factors: Smoking, diabetes, High BP, High Cholesterol, sedentary lifestyle, obesity, family history, MEN>45 | WOMEN >55

Dx: Coronary Angiography – CT scan with dye to see occlusion
EKG + Echocardiogram
LFT's
Lipid Profile – Cholesterol
Stress test to the heart
Blood test to see risk for Myocardial Infarction

S/S: Chest Pain constricting that radiates, pressure to the jaws, arms, back. Depending on the severity: Nausea, pallor, SOB, diaphoresis, upper GI discomfort

Treatment:
1- Immediate relief – Nitroglycerin (dilates heart arteries to ↑ blood flow)

PILL	PATCH
1. For **stable angina**	1. For **Unstable Angina**
2. 1 pill q5m (up to 3 doses)	2. Rotate daily
3. Call 911 if symptoms persist 5 min after 1st tablet	3. Clean, dry, shaved area
4. Heat + Light sensitive. keep it in dark bottle	4. Shower ok
5. Don't take with **Sidenafil**.	5. Wear gloves
6. HA and flushing are normal	

2- Surgical: PCI- Stent in Artery | CABG-reroute around artery
3- Beta Blockers; CCB; -statins, anticoagulants

STABLE	UNSTABLE
1- Occurs with **exertion or stress**	1- Occurs with exertion, stress and **REST**
2- Short duration – less than 5 min	2- Longer duration - > 30min indicative of Heart attack
3- Sx of CP relieved by rest or Nitroglycerin	3- Unrelieved by medication or rest
4- **Predictable**	4- **Unpredictable**

* **Angina VS MI:** Chest Pain unrelieved by rest or Nitroglycerin, lasting >30min is indicative of MI

INFECTIVE ENDOCARDITIS

Patho: Bacteria or fungi adhere to the heart and form vegetative growths on the heart valve or endocardium. This leads to necrosis and possible embolization of the growth.
Rel Factors: Congenital Heart disease, Valvular Heart Disease, prosthetic valve, IV drug use.
S/S: Fever, flu-like symptoms, murmur, petechiae, splinter hemorrhages (red streaks under nail beds).
Labs/Dx: Positive blood culture, echocardiogram.
Tx: Antibiotics, valve replacement/repair.

RHEUMATIC CARDITIS

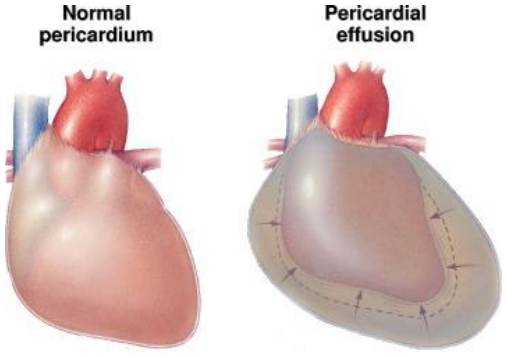
Infection of the Heart that develops after a respiratory infection with group A beta hemolytic streptococci bacteria
Patho: Strep infection triggers an autoimmune response (rheumatic fever), which leads to the development of inflammatory lesions **(Aschoff bodies)** in the heart. These lesions cause damage to the myocardium, pericardium, and heart valves.
S/S: Tachycardia, Cardiomegaly, murmur, friction rub, chest pain.
Labs/Dx: Throat culture + for Streptococcal Infection, Positive ASO titer, echocardiogram
Tx: Antibiotics, valve replacement/repair.

PERICARDITIS

Patho: Inflammatory response is triggered by Infection, Autoimmune disorder, or Trauma.
S/S: Chest Pain (worse when supine, relieved by sitting up and leaning forward), friction rub, fever, dysrhythmias, dyspnea.
Labs/Dx: High WBC, EKG showing ST ot T spiking, echocardiogram.
Tx: -Meds: NSAIDs, corticosteroids, antibiotics (bacterial pericarditis).
-Procedures: Pericardiectomy
Nurse: Monitor for complications (Cardiac Tamponade)

CARDIAC TAMPONADE

Compression of the Heart due to the accumulation of fluid in the pericardial sac.
Patho: MI, Infection, Inflammatory disease, Autoimmune disease, or neoplasm leads to a build up of pericardial fluid, which compresses the Heart, restricts blood flow into the ventricles, and reduces cardiac output.
S/S: Muffled Heart Sounds, Paradoxical Pulse, Jugular Vein Distension, Hypotension, electrical alternans, dyspnea, fatigue
Dx: Chest X-Ray, Echocardiogram
Tx: Pericardiocentesis (removal of fluid from pericardial sac).



CARDIOMYOPATHY

Patho: Heart muscle becomes enlarged, thickened, and/or rigid, which can lead to HF, arrhythmias, pulmonary edema.
Types:
- **Dilated (most common):** Ventricles enlarge and weaken (starting with the left ventricle), affecting systolic function.
- **Hypertrophic:** Ventricles and septum enlarge and thicken, affecting diastolic function and obstructing outflow.
- **Restrictive:** Ventricles become stiff/rigid, restricting filling during diastole.

Rel Factors: Genetics, Coronary Artery Disease, Aortic stenosis, Hypertension, Viral Infection, alcohol/drug use.
S/S: Shortness of breath, fatigue, dizziness, edema, arrhythmias, murmurs.
Dx: Echocardiogram, Coronary angiogram, EKG
Tx: -Meds: Digoxin, diuretics, antidysrhythmic, antihypertensive - Surgery: Septal myectomy, septal ablation, implanted devices (CRT, ICD, LVAD, pacemaker), heart transplant.

ATHEROSCLEROSIS

Patho: Blood vessel damage causes inflammation and formation of plaques. Plaque deposits can become large enough to narrow the lumen, reducing blood flow. Plaque rupture can lead to formation of a thrombus or embolus, causing a MI or Stroke.
Rel Factors: Aging, Immobility, smoking, family history, hypercholesterolemia, diabetes, obesity, stress.
S/S: Hypertension, bruits
Labs: High LDL and Triglycerides.
Dx: Echocardiogram, CT/MRI, stress test, angiography.
Tx: Cholesterol-lowering meds (Ex: statins)
Nurse: Teaching about Smoking cessation, weight loss, exercise, heart-healthy diet.

PERIPHERAL BYPASS GRAFT

Surgery to restore blood flow to an extremity due to a Peripheral Arterial Disease.
Nurse: Closely monitor pedal pulses, capillary refill, skin color and temperature. Patient needs to keep leg straight for 24 hours after surgery.
Complications:
- **Graft Occlusion:** S/S: pallor, low pedal pulses and temperature, pain)
- **Compartment Syndrome:** S/S: Numbness, pain with passive movement, edema, taut skin.

CORONARY ARTERY BYPASS GRAFT ≒CABG≒

Surgery to bypass one or more coronary arteries due to blockage or persistent ischemia, using the patients own blood vessels (ex: saphenous vein) or synthetic grafts.
Nurse (Post Surgery): Monitor BP. Hypertension can cause bleeding from grafts. Hypotension can cause collapse of grafts. Monitor Temperature. Treat hypothermia with rewarming procedures. Monitor for bleeding. Notify Dr for Chest Tube drainage >150ml/hr. Monitor LOC, fluids and electrolytes, cardiac rhythm, pain, neurovascular status of donor site. Monitor for complications (cardiac tamponade).

Arterial Disorders

PERIPHERAL ARTERIAL DISEASE (PAD)

Inadequate Blood flow to the lower extremities.
Patho: Atherosclerosis causes partial or total arterial occlusion, depriving the lower extremities of oxygen and nutrients.
Rel Factors: Hypertension, diabetes, smoking, obesity, hyperlipidemia.
S/S: Intermittent claudication (ischemic leg pain that increase with exertion, and decrease with dangling), pallor with elevation, dependent rubor, low capillary refill and pedal pulses, lack of hair on calves, cool/shiny skin, thick toenails, dry/necrotic eschar on toes, delayed wound healing.
Dx: Ankle-brachial index (ABI), doppler ultrasound.
Tx: Meds: Antiplatelets, statins.
Surgery: Angioplasty, peripheral bypass graft.
Nurse Teaching: Walk until the point of pain, stop and rest, then walk a little more. Avoid crossing legs and restrictive clothing. Maintain a warm environment, wear socks. Avoid cold, stress, caffeine, nicotine (which causes vasoconstriction).

BUERGER'S DISEASE

Inflammatory condition that impairs circulation to extremities.
Patho: Chemicals in tobacco cause vasculitis, scarring and occlusion of blood vessels in the arms/legs.
Rel Factors: Smoking
S/S: Claudication, numbness/tingling, low pedal pulse and temp, cyanosis in extremities.
Dx: Arteriogram
Tx: Vasodilators (ex: nifedipine)
Nurse Teach: Stop smoking, avoid extreme cold.

RAYNAUD'S

Rare vascular disorder that causes vasospasms in the arterioles/arteries, low blood flow to the extremities.
Patho: Raynaud's Disease (primary Raynaud's): Idiopathic.
Raynaud's Phenomenon (secondary Raynaud's): Connective tissue disorder (ex: lupus or scleroderma) damage the arteries.
S/S: Upon exposure to cold or stress, fingers become cyanotic, cold, numb, and painful. After spam, tissue becomes hyperemic.
Dx: Clinical S/S, ANA titer to ID underlying autoimmune disease.
Tx: Vasodilators (ex: nifedipine), sympathectomy for severe symptoms.
Nurse: Avoid cold, wear warm clothing, no caffeine, stress. Stop smoking

Peripheral Venous Disease

VENOUS THROMBOEMBOLISM (VTE)

Blood clot that starts in the vein. Two types: Deep Vein Thrombosis (DVT) & Pulmonary Embolism (PE)

Patho: Thrombus (blood clot) forms in a deep vein (usually lower leg, thigh, pelvis) due to Virchow's triad (endothelial injury, impaired blood flow, hypercoagulability). Inflammation occurs around the thrombus and it breaks loose (becoming an embolus). The embolus travels to the pulmonary artery, causing a pulmonary embolism (PE).

Rel Factors: Hip/knee replacement, Heart Failure, Immobility, Pregnancy, combined oral contraceptives, family history, African Americans.

S/S:

- DVT: Calf/thigh pain, edema, erythema
- PE: Shortness of breath, dyspnea, anxiety, chest pain with inspiration, tachycardia, tachypnea, hypotension, petechiae.

Labs/Dx: Positive D-dimer, venous duplex ultrasound, CT.

Tx: Meds: Anticoagulants (heparin, warfarin), thrombin inhibitor (ex: argatroban), thrombolytics (alteplase) .

Procedures: Thrombectomy (removal of clot), vena cava filter (prevents new emboli from entering the lungs).

Nurse:

- DVT: **Elevate extremity** (no pillow or knee gatch under knee), warm/moist compresses, No massaging limb, apply compression stocking, monitor for S/S of PE.
- PE: Sit patient upright (High-Fowler's position), administer Oxygen

VENOUS INSUFFICIENCY

Veins in the lower extremities do not transport blood back to the heart effectively.

Patho: Valves in the lower leg become damaged due to prolonged venous hypertension or previous blood clot.

Rel Factors: Obesity, immobility, pregnancy, history of DVT.

S/S: Edema, aching pain in legs, venous stasis ulcers (heavily draining, around the ankles), brown discoloration (stasis dermatitis).

Tx: Elevate legs to increase venous return, apply compression stocking, monitor for complications (cellulitis).

Nurse: Avoid sitting/standing still for too long, change position often. Avoid crossing legs and restrictive pants. Apply compression stocking before getting out of bed in the morning.

VARICOSE VEINS

Superficial veins enlarged and twisted. Most common in lower extremities and esophagus.

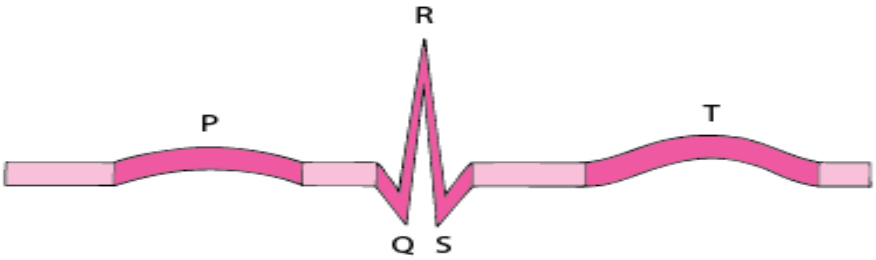
Patho: Pooling of blood in the legs causes the veins to become enlarged/weakened, impairs valve function, and allows blood to flow backwards.

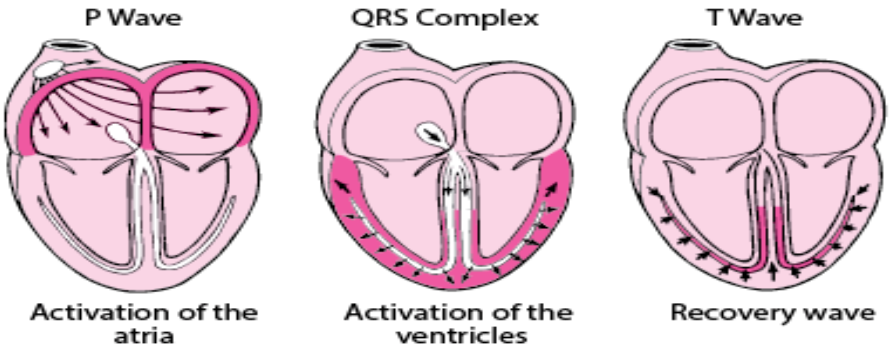
Rel Factors: Female, prolonged standing, pregnancy, obesity, family hx.

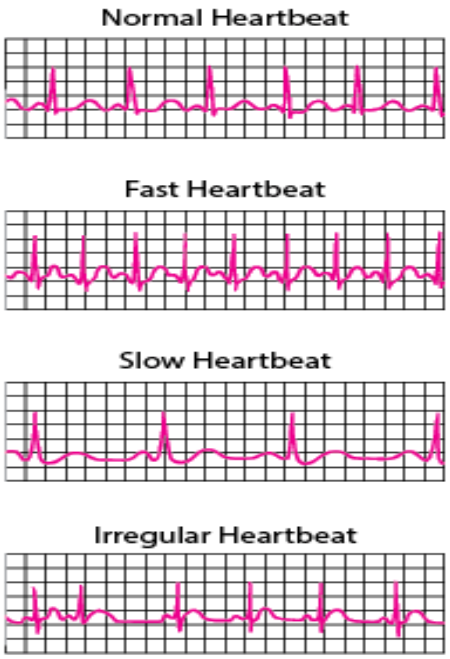
S/S: Enlarged, tortuous veins in lower extremities, visible below skin, aching pain, edema, pruritus.

Tx: Compression stocking, elevation, sclerotherapy (chemical injection), vein stripping (surgery/removal), laser treatment.

EKG INTERPRETATION







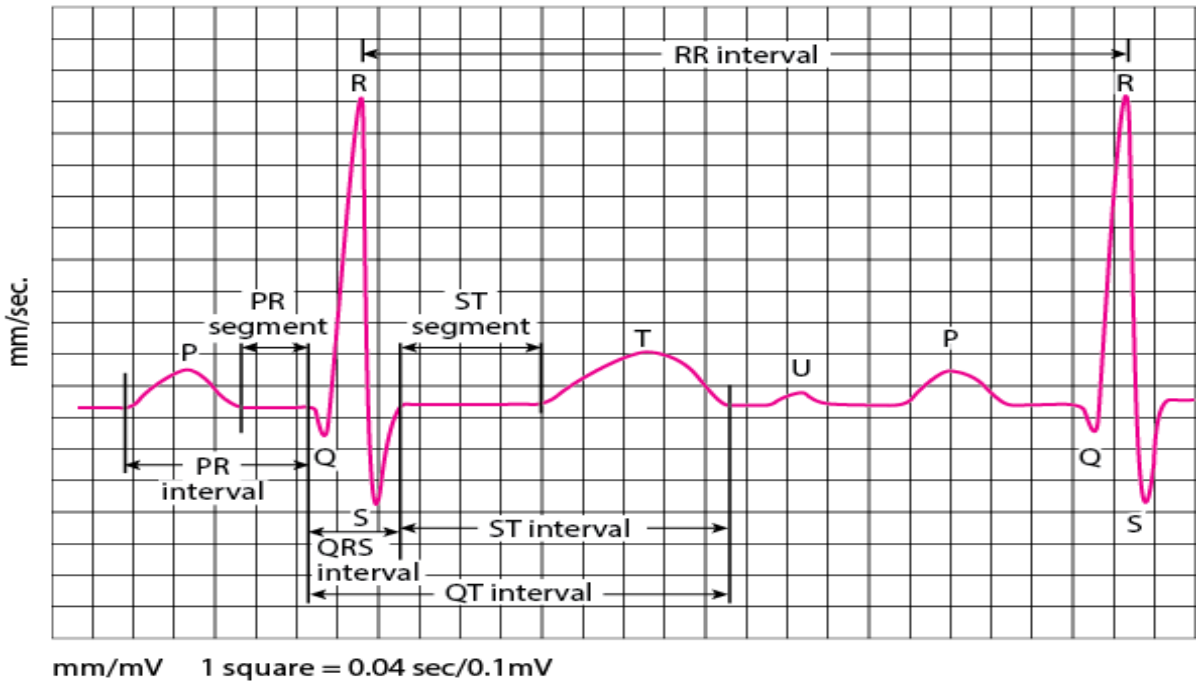
P-wave: Atrial Depolarization
QRS Complex: Ventricular Depolarization
T-wave: Ventricular Repolarization

Cardiac Cells have a (-) charge when resting. When Depolarization occurs, Cell becomes Positive (Na+ and Ca+ enter the cell), Heart Muscle Contract.
When Repolarization occurs, Cell becomes (-) (K+ Channels open and K+ leave the cell) Heart Muscle Relax, cells return to their original (resting) state.

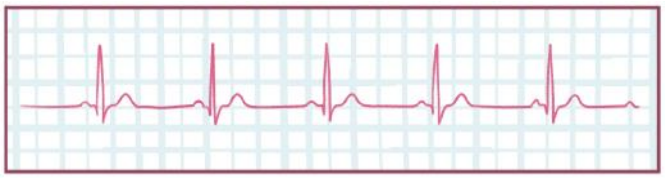
Normal Sinus Rhythm: 60-100 bpm
Sinus Bradycardia: <60 bpm
Sinus Tachycardia: >100
Supraventricular Tachycardia: >150 bpm
PR Interval (Atrial Depolarization time): 0.12 - 0.20sec
QRS Complex (Ventricular Depolarization time): 0.04 - 0.12sec
U wave: electrolyte abnormal (Hypokalemia)

Assessment

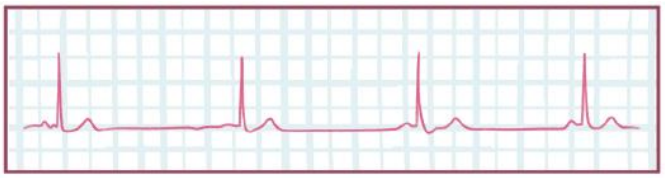
Rate: Is it Normal? (60-100) Fast (>100) Slow (<60)
Rhythm: Is it Regular? Irregular?
P Waves: Are they present? Are they 1:1 with the QRS?
PR Interval: Is it normal? Does it remain consistent?
QRS Complex: Is it Normal? Or is it wide? (>10)
Extra: Are there any extra or abnormal complexes?



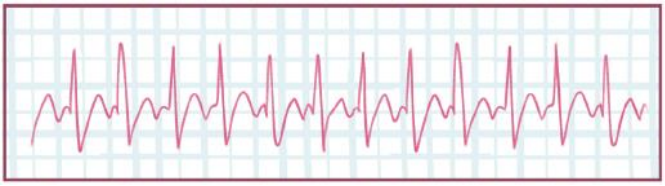
Normal Sinus Rhythm



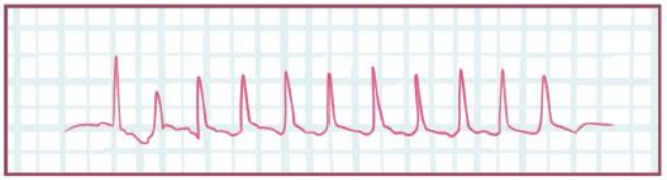
Sinus Bradycardia



Sinus Tachycardia

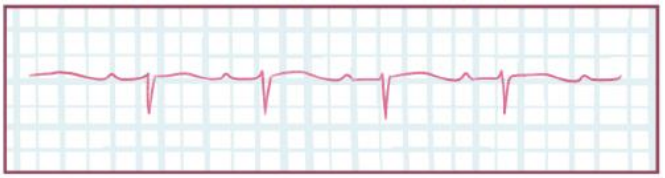


Paroxysmal Supraventricular

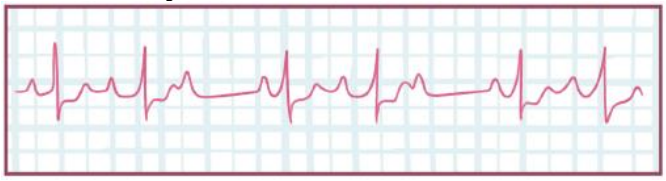


Atrial Flutter

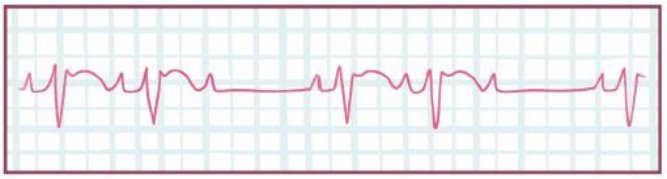
1st Degree AV Block



2nd Degree AV Block – Type I

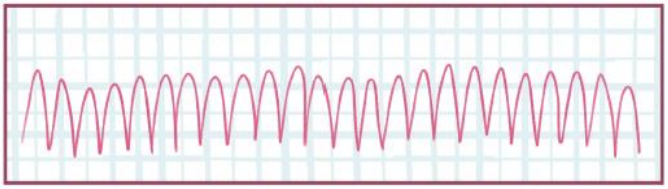


2nd Degree AV Block – Type II

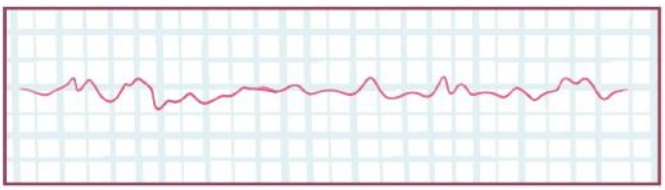


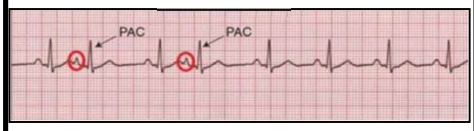
3rd Degree AV Block

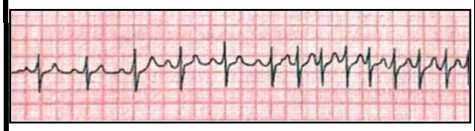
Ventricular Tachycardia

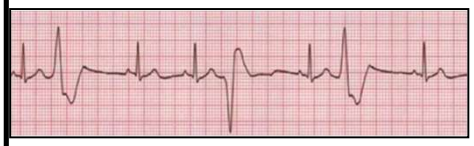
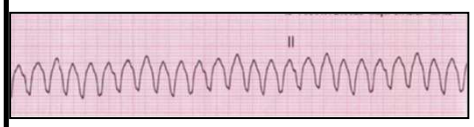


Ventricular Fibrillation



Arrhythmias	Description	Causes	Treatment
Sinus Arrhythmia 	- Irregular Atrial and Ventricular rhythms. - Normal P wave preceding each QRS complex.	-Normal variation of normal sinus rhythm in athletes, children, and the elderly. - Can be seen in digoxin toxicity and inferior wall MI.	Atropine if rate decreases below 40bpm.
Sinus Tachycardia 	**Regular** Atrial and Ventricular rhythms. - Rate> 100 bpm. - Normal P wave preceding each QRS complex.	- Normal physiologic response to **fever**, exercise, anxiety, dehydration, or pain. - May accompany shock, left-sided heart failure, cardiac tamponade, hyperthyroidism, and anemia. - Atropine, epinephrine, quinidine, caffeine, nicotine, and alcohol use.	- Correction of underlying cause. - Beta-adrenergic blockers or calcium channel blockers for symptomatic patients.
Sinus Bradycardia 	- Regular Atrial and Ventricular rhythms. - Rate < 60 bpm. - Normal P wave preceding each QRS complex.	- Normal in a well-conditioned heart (e.g., **athletes**). - Increased intracranial pressure; increased vagal tone due to straining during defecation, vomiting, intubation, mechanical ventilation.	- Follow ACLS protocol for administration of Atropine for symptoms of low cardiac output, dizziness, weakness, altered LOC, or low blood pressure. - **Pacemaker**
Sinoatrial Block 	- Atrial and Ventricular rhythms are normal except for missing complexes. - Normal P wave preceding each QRS complex. - Pause not equal to multiple of the previous rhythm.	- Infection - Coronary artery disease, degenerative heart disease, acute inferior wall MI. - Vagal stimulation, Valsalva's maneuver, carotid sinus massage.	- Treat symptoms with Atropine I.V. - **Temporary pacemaker** or **permanent pacemaker** if considered for repeated episodes.
Wandering Atrial Pacemaker 	- Atrial and Ventricular rhythms vary slightly. - Irregular PR interval. - P waves irregular with changing configurations indicating that they aren't all from SA node or single atrial focus; may appear after the QRS complex. - QRS complexes are uniform in shape but irregular in rhythm.	-Rheumatic carditis due to inflammation involving the SA node. - Digoxin toxicity - Sick sinus syndrome	- No treatment if patient is asymptomatic - Treatment of underlying cause if patient is symptomatic.
Premature Atrial Contraction (PAC) 	- Premature, abnormal-looking P waves that differ in configuration from normal P waves. - QRS complexes after P waves except in very early or blocked PACs. - P wave often buried in the preceding T wave or identified in the preceding T wave.	- May prelude supraventricular tachycardia. - Stimulants, hyperthyroidism, COPD, infection and other heart diseases.	- Usually no treatment is needed. - Treatment of underlying causes if the patient is symptomatic. - Carotid sinus massage.

Arrhythmias	Description	Causes	Treatment
Paroxysmal Supraventricular Tachycardia 	- Regular Atrial/Ventricular rhythms. - **HR > 160 bpm**; rarely exceeds 250. - P waves regular but aberrant; difficult to differentiate from preceding T waves. - P wave preceding each QRS complex. - Sudden onset and termination of arrhythmia - When a normal P wave is present, it's called **paroxysmal atrial tachycardia**; when a normal P wave isn't present, it's called **paroxysmal junctional tachycardia.**	- Physical exertion, emotion, stimulants, rheumatic heart diseases. - Intrinsic abnormality of AV conduction system. - Digoxin toxicity. - Use of caffeine, marijuana, or central nervous system stimulants.	- **Unstable Patient**: prepare for immediate cardioversion. - **Stable Patient**: vagal stimulation, or Valsalva's maneuver, carotid sinus massage. - **Adenosine** by rapid I.V. bolus injection to rapidly convert arrhythmia. - If normal ejection fraction, consider **calcium channel blockers, beta-adrenergic blocks or amiodarone.** - If ejection fraction <40%, consider **amiodarone.**
Atrial Flutter 	- Atrial rhythm regular, **Rate: 250 to 400 bpm.** - Ventricular rate variable, depending on degree of AV block - **Saw-tooth shape P wave configuration.** - QRS complexes are uniform in shape but often irregular in rate.	- Heart failure, tricuspid or mitral valve disease, pulmonary embolism, car pulmonale, inferior wall MI, carditis. - Digoxin toxicity.	- Unstable patient with ventricular rate > 150 bpm, prepare for immediate cardioversion. - If the patient is stable, drug therapy may include **calcium channel blockers, beta-adrenergic blocks, or antiarrhythmics.** **- Anticoagulation therapy may be necessary.**
Atrial Fibrillation 	- Atrial rhythm grossly irregular **Rate > 300 to 600 bpm.** - Ventricular rhythm grossly irregular, rate 160 to 180 bpm - PR interval indiscernible. - No P waves, or P waves that appear as erratic, irregular base-line fibrillatory waves	Heart failure, COPD, thyrotoxicosis, constrictive pericarditis, ischemic heart disease, sepsis, pulmonary me bolus, rheumatic heart disease, hypertension, mitral stenosis, atrial irritation, complication of coronary bypass or valve replacement surgery	- If unstable with ventricular rate > 150bpm, prepare for immediate cardioversion. - If stable, drug therapy (**calcium channel blockers, beta-adrenergic blockers, digoxin, procainamide, quinidine, ibutilide, or amiodarone.)** - **Anticoagulation therapy** to prevent emboli. - Dual chamber atrial pacing, implantable atrial pacemaker, or surgical
Junctional Rhythm 	- Regular Atrial/Ventricular rhythms. - Atrial rate 40 to 60 bpm. - Ventricular rate is usually 40 to 60 - **P waves** preceding, hidden within (**absent**), or after QRS complex; usually inverted if visible. - PR interval (when present) < 0.12 second - QRS complex configuration and duration normal, except in aberrant conduction.	- Inferior wall MI, or ischemia, hypoxia, vagal stimulation, sick sinus syndrome. - Acute rheumatic fever. - Valve surgery - Digoxin toxicity	- Correction of underlying cause. - **Atropine** for symptomatic slow rate - Pacemaker insertion if patient is refractory to drugs - Discontinuation of digoxin if appropriate.
Premature Junctional Conjunctions 	**- Irregular Atrial and ventricular rhythms.** - **P waves inverted**; may precede be **hidden** within, or follow QRS complex. - QRS complex configuration and duration normal.	- MI or ischemia - Digoxin toxicity and excessive caffeine or amphetamine use.	- Correction of underlying cause. - Discontinuation of digoxin if appropriate.
Asystole 	- No Atrial or Ventricular rate or rhythm. - No discernible P waves, QRS complexes, or T waves	- Myocardial ischemia or infarction, aortic valve disease, heart failure, hypoxemia, hypokalemia, severe acidosis, electric shock, ventricular arrhythmias, AV block, pulmonary embolism, heart rupture, cardiac tamponade, hyperkalemia, electromechanical dissociation. - Cocaine overdose.	Start CPR

Arrhythmias	Description	Causes	Treatment
First-Degree AV Block 	- Regular Atrial and ventricular rhythms. - PR interval > 0.20 second. - P wave preceding each QRS complex. - QRS complex normal.	- Inferior wall MI or ischemia, or infarction, hypothyroidism, hypokalemia, hyperkalemia. - Digoxin toxicity. - Use of quinidine, procainamide, beta-adrenergic blocks, calcium	- Correction of the underlying cause. - Possibly **Atropine** if PR interval exceeds 0.26 second or symptomatic bradycardia develops. - **Cautious use of: digoxin, calcium channel blockers**, and **beta-adrenergic blockers.**
Second-Degree AV Block Mobitz I (Wenckebach) 	- Regular Atrial rhythm - Irregular Ventricular rhythm - Atrial rate > Ventricular rate. - PR interval progressively, but only slightly, longer with each cycle until QRS complex disappears. - PR interval shorter after dropped beat.	- Severe coronary artery disease, anterior wall MI, acute myocarditis. - Digoxin toxicity	- **Atropine, epinephrine, and dopamine** for symptomatic bradycardia. - Temporary or permanent pacemaker for symptomatic bradycardia. - Discontinuation of digoxin if appropriate.
Third-Degree AV Block Complete Heart Block 	- Regular Atrial rhythm. - Ventricular rhythm regular and rate slower than atrial rate. - No relation between P waves and QRS complexes. - No constant PR interval. - QRS interval normal (nodal pacemaker) or wide and bizarre (ventricular pacemaker).	- Inferior or anterior wall MI, congenital abnormality, rheumatic fever.	- **Atropine, epinephrine, and dopamine** for symptomatic bradycardia. - Temporary or permanent pacemaker for symptomatic bradycardia.
Premature Ventricular Contraction (PVC) 	- Regular Atrial rhythm. - Irregular Ventricular rhythm. - QRS complex premature, usually followed by a complete compensatory pause. - QRS complexes are wide and distorted, usually >0.14 second. - Premature QRS complexes occurring singly, in pairs, or in threes; alternating with normal beats; focus from one or more sites. - Ominous when clustered, multifocal,	- Heart failure; old or acute myocardial ischemia, infarction, or contusion. - Myocardial irritation by ventricular catheters such as a pacemaker. - Hypercapnia, hypokalemia, hypocalcemia. - Drug toxicity by cardiac glycosides, aminophylline, tricyclic antidepressants, beta-adrenergic. - Caffeine, tobacco, or alcohol use. - Psychological stress, anxiety, pain	- If warranted, **procainamide, lidocaine, or amiodarone I.V.** - Treatment of underlying cause. - Discontinuation of drug causing toxicity. - **Potassium chloride** IV if PVC induced by hypokalemia. - **Magnesium sulfate** IV if PVC induced by hypomagnesaemia.
Ventricular Tachycardia 	- Called "V-tach" - Ventricular rate 140 to 220 bpm, regular or irregular. - QRS complexes wide, bizarre, and independent of P waves - P waves no discernible - May start and stop suddenly	- Myocardial ischemia, infarction, or aneurysm - Coronary artery disease - Rheumatic heart disease - Mitral valve prolapse, heart failure, cardiomyopathy - Ventricular catheters. - Hypokalemia, Hypercalcemia. - Pulmonary embolism. - Digoxin, procainamide, epinephrine, quinidine toxicity, anxiety.	- **If pulseless:** initiate CPR; follow ACLS protocol for defibrillation. - **If pulse:** If hemodynamically stable, follow ACLS protocol for administration of **amiodarone**; if ineffective initiate synchronized cardioversion.
Ventricular Fibrillation 	- Called "V-fib" - Electrical chaos in ventricles. No Cardiac Output or Pulse. FATAL if more 3-5 min. - Ventricular rhythm and rate are rapid and chaotic. - QRS complexes wide and irregular, no visible P waves	- Myocardial ischemia or infarction, R-on-T phenomenon, untreated ventricular tachycardia, - Hypokalemia, hyperkalemia, Hypomagnesemia, alkalosis, electric shock, hypothermia. - Digoxin, epinephrine, or quinidine toxicity.	- **If pulseless:** start CPR, follow ACLS protocol for defibrillation, ET intubation, and administration of **epinephrine** or **vasopressin**, **lidocaine**, or **amiodarone**; ineffective consider magnesium sulfate.

Practice

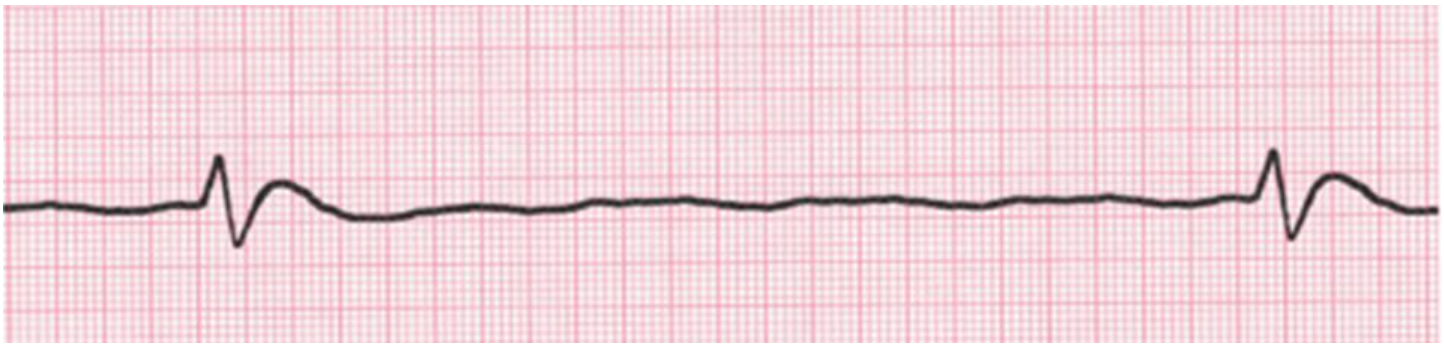
PAC: PREMATURE ATRIAL CONTRACTION

PVC: PREMATURE VENTRICULAR CONTRACTION

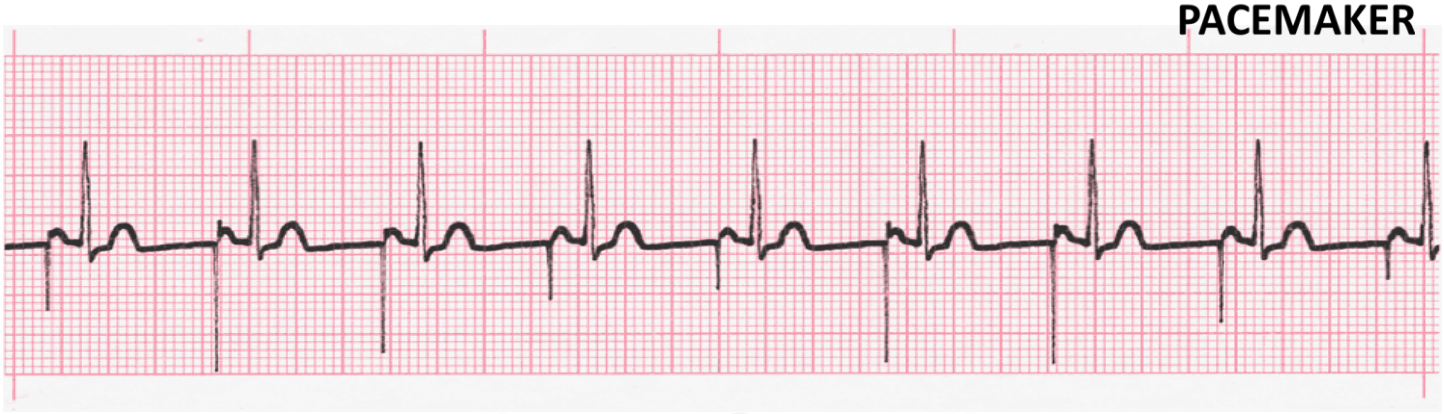
SINUS TACHYCARDIA

SUPRAVENTRICULAR TACHYCARDIA

AGONAL RHYTHM



PACEMAKER



HYPERKALEMIA

HYPOKALEMIA

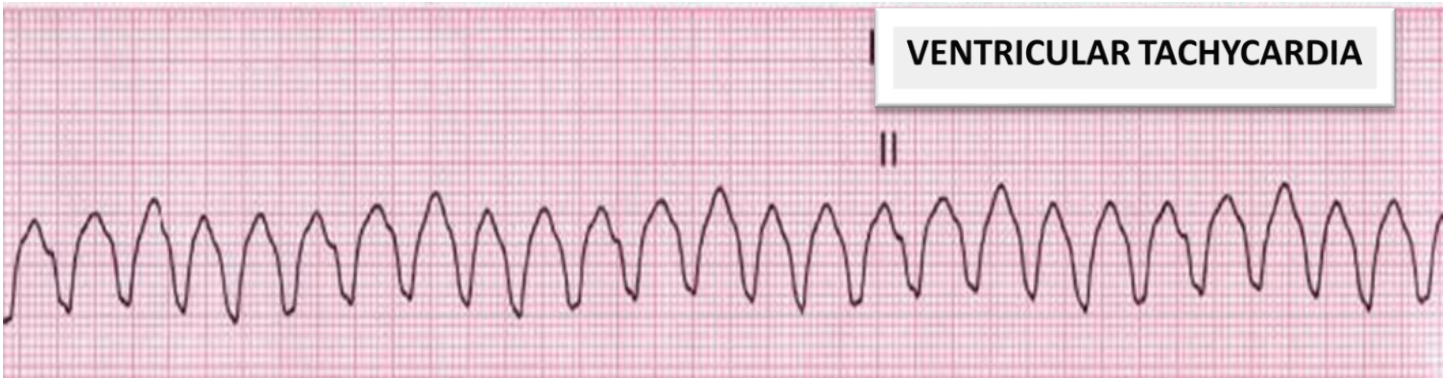
NORMAL NODAL or JUNCTIONAL RHYTHM

ATRIAL FLUTTER

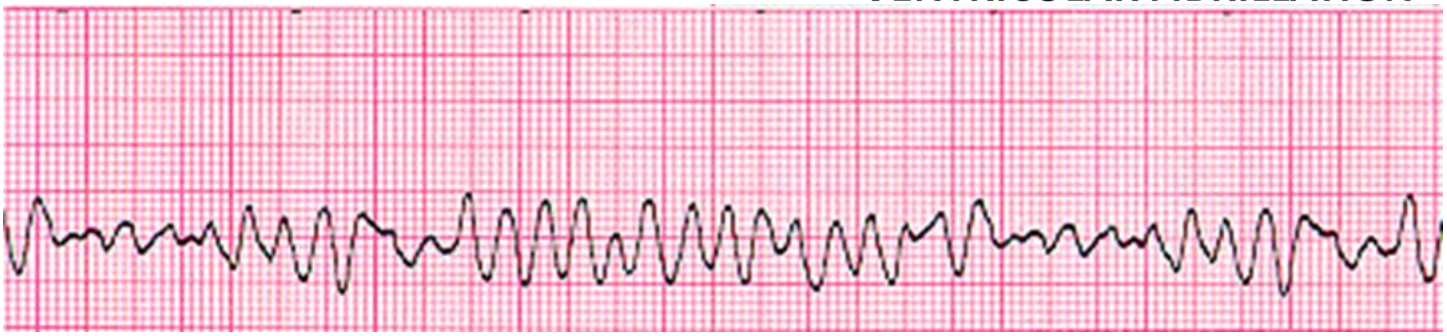
SINUS TACHYCARDIA

SINUS BRADYCARDIA

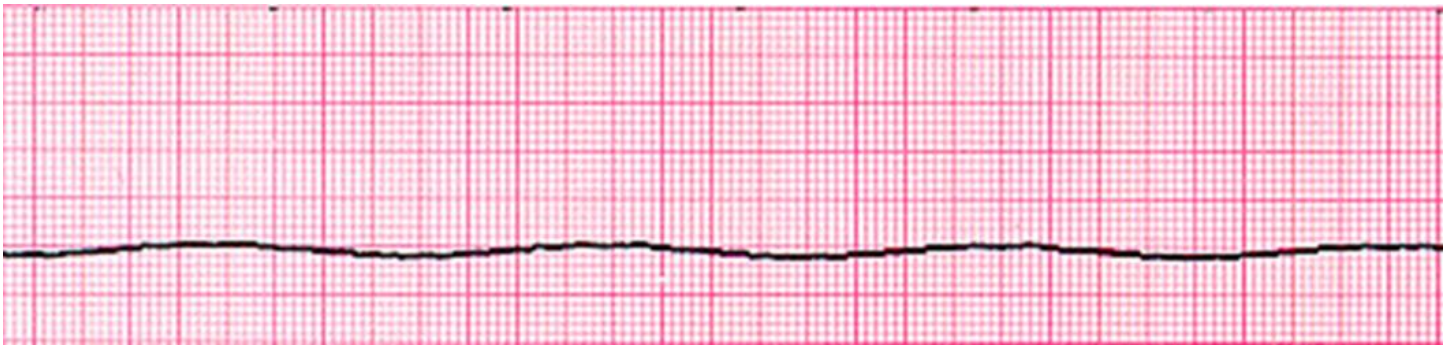
ATRIAL FIBRILLATION



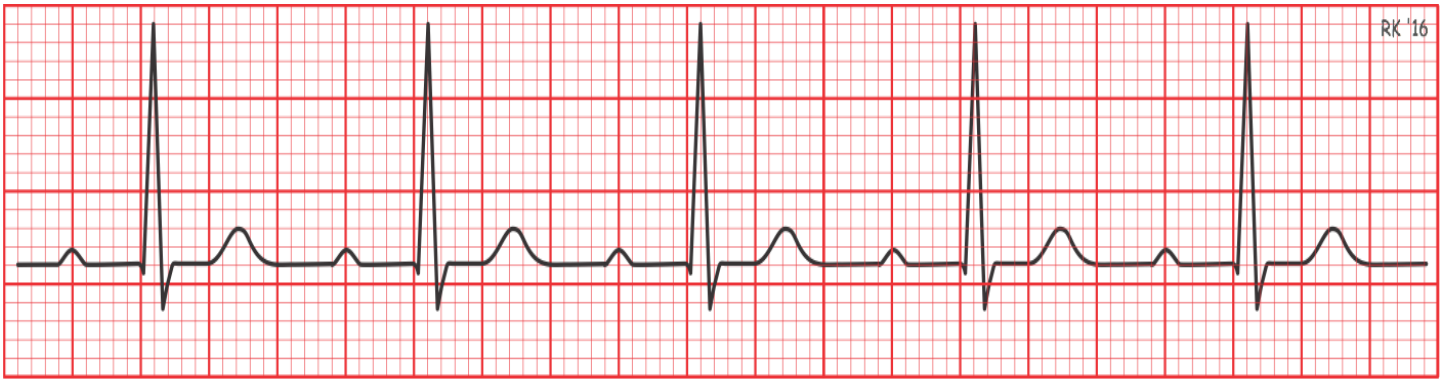
VENTRICULAR FIBRILLATION



ASYSTOLE



AV BLOCK FIRST DEGREE

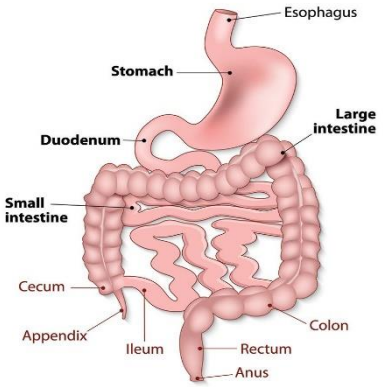


AV BLOCK SECOND DEGREE

AV BLOCK THIRD DEGREE

AV BLOCK SECOND AND THIRD DEGREES

GASTROINTESTINAL DISORDERS



Mouth – Amylase breaks down starch
Esophagus - Peristalsis brings foods to Stomach
Stomach - HCL breaks up food + activates enzymes. Pepsin converts proteins
Small Intestine - Duodenum contains bile, pancreatic ducts
Large Intestine - H_2O absorption + waste elimination. Vit K synthesis
Pancreas - Maltase – Maltose > monosaccharides
Lactase – Lactose > galactose/glucose
Gallbladder – Stores, Concentrates Bile
Liver - Kupffer cells remove bacteria in the portal venous blood

GASTROESOPHAGEAL REFLUX DISEASE GERD

P: Backflow of gastric and duodenal contents up into the esophagus caused by a dysfunctional lower sphincter
S/Sx: Frequent heartburn and epigastric pain, nausea, dyspepsia, dysphagia, regurgitation
N: Teach pt. to avoid irritants like peppermint, chocolate, coffee, fatty foods, alcohol, smoking. Avoid eating 2 hrs before bedtime. Avoid anticholinergics, NSAIDs. Keep HOB elevated after eating

PEPTIC ULCER DISEASE

P: An ulceration that erodes the lining of the stomach or S.I. Caused by irritation, H. pylori, NSAIDs
S/Sx: Sharp pain in left/mid epigastric area after meals 30-60 mins=gastric 90-180mins= duodenal
Rx: Proton pump inhibitors + H2 blockers
Tx: Surgical: resection, vagotomy. Total gastrectomy, pyloroplasty

CHOLECYSTITIS

P: Inflammation of the gallbladder can be caused by slow bile emptying, contracted gallbladder or bacterial invasion
S/Sx: Murphy's sign > can't take deep breath when fingers are placed on the hepatic margin due to pain
Belching, flatulence, RUQ pain
N: Maintain NPO status during exacerbations. Educate pt. to eat small low-fat meals.

INFLAMMATORY BOWEL DISEASE ≥IBS - UC - CROHN'S≤

P: Inflammatory diseases of the bowel
S/Sx: Diarrhea, abdominal cramps for > 6 weeks
N: Educate about a low FODMAP diet, help decrease triggers and stress, avoid use of NSAIDS to ↓ GI bleeding

APPENDICITIS

P: Acute inflammation of the appendix + surrounding tissue
S/Sx: Sharp, constant, abdominal pain that moves to the RLQ (McBurney's point)
N: Administer pain meds, prep for imaging or surgery. If sudden relief of pain, indicate rupture of appendix.

PANCREATITIS

P: Acute inflammation of pancreas
S/Sx: Nausea, vomiting, diarrhea, diffuse abdominal pain and cramping. Cullen's Sign & Turner's Sign.
Labs: ↑ Amylase, lipase, WBCs, bilirubin, glucose. ↓ Calcium, magnesium, platelets.
N: Pain control, nausea medication administration, limit oral intake. Pancreatic enzymes (w/ meals)

GASTROINTESTINAL DISORDERS

HIATAL HERNIA

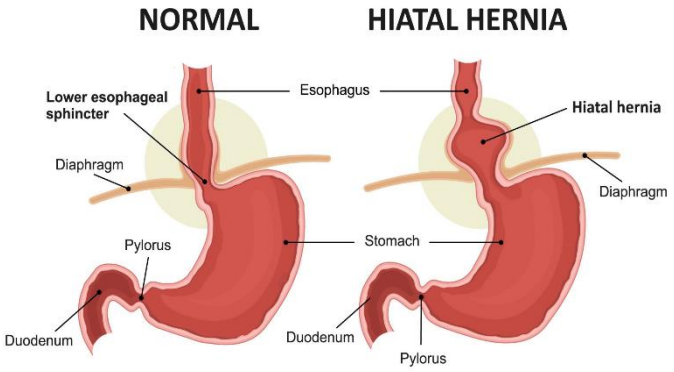
Protrusion of the stomach through the diaphragm into the chest cavity.

P: Weakening of the diaphragm allows the fundus of the stomach to protrude through the esophageal hiatus (opening in the diaphragm where the esophagus passes from the thorax to the abdomen). High risk of strangulation.

S/Sx: Heartburn, dysphagia, chest pain after meals.

Dx: Barium swallow study, EGD

Tx: GERD medications, fundoplication surgery.



Nurse: Teach pt. to avoid irritants like peppermint, chocolate, coffee, fatty foods, alcohol, smoking. Elevate head of bed. Avoid coughing and straining (use stool softeners).

ABDOMINAL HERNIA

Section of intestine protrudes through a weakness in the abdominal muscle wall (inguinal or umbilical hernia)

P: Muscle weakness and/or increased intra-abdominal pressure allows for herniation. Risk of strangulation, obstruction, and bowel necrosis.

R/F: Obesity, pregnancy, lifting of heavy objects.

S/S: Lump or protrusion at affected site. Severe pain and Decreased bowel sound with strangulation or obstruction.

Tx: Truss (belt), surgical repair of hernia, bowel resection for bowel necrosis.

Nurse (post-op): Avoid coughing, if possible, splint when coughing/sneezing, avoid heavy lifting and straining.

INTESTINAL OBSTRUCTION

Complete or partial blockage of the intestines, Potentially life-threatening condition.

P: **-Mechanical**: Bowel is physically blocked.

R/F: Adhesion from surgery, tumor, hernia, fecal impaction.

-Non-Mechanical (paralytic ileus): Neuromuscular disorder causes decreased/absent peristalsis.

R/F: Abdominal surgery, electrolyte imbalances, inflammation/infection, intestinal ischemia.

S/S: Abdominal distention and pain, constipation, n/v, absent bowel sounds distal to obstruction.

Small bowel: Profuse vomiting (bilious or feculent), severe fluid and electrolyte imbalances, metabolic alkalosis.

Large bowel: Minimal/no vomiting, no major imbalances.

Dx: Abdominal CT with contrast.

Tx: NPO, NG tube, IV fluids and electrolytes. Surgical: Colon resection, colostomy, lysis of adhesions.

Nurse: Strict I&O, monitor electrolytes and acid/base balance.

Peptic Ulcer Disease PUD

A peptic ulcer is an excavation (hollowed-out area) that forms in the mucosa of the stomach, in the duodenum or in the esophagus.

CAUSES:

Everything that reduces the protective mucosa layer:

1- H. Pylori – Bacteria that attacks the mucosa

2- NSAIDs – Inhibit prostaglandins - ↓Bicarbonate, = ↓Defense - ↑Acid

3- Smoking, ETOH, Genetics, STRESS

When damaged: histamine release - parietal cells stimulated to release more HCL acid

GASTRIC ULCER:

-Food makes it worst. Pain occurs IMMEDIATELY after eating.

-Pyrosis vomiting, constipation or diarrhea, and bleeding.

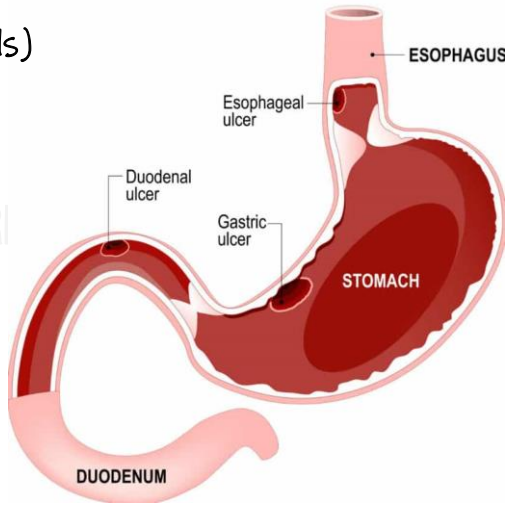
-If bleeding ulcer, hematemesis or melena (black, tarry stools)

DUODENAL ULCER:

-Food makes it better. Pain occurs 2-3 hours after meals.

- Pt. awake with pain during the night.

- Stool- Dark, Tarry



TREATMENT:

Medication:

- PPI – Proton Pump Inhibitors (-prazole)
- Antibiotics – If confirmed H. Pylori
- Bismuth (Pepto-Bismol)
- H_2 Blockers (-tidine)
- Antacids (Mag. Hydroxide, Calcium Carbonate, Sucralfate, Carafate)

FOODS TO AVOID

Gastroesophageal Reflux Disease GERD

Backflow of gastric or duodenal contents into the esophagus, due to a weak/damaged lower esophageal sphincter (LES)

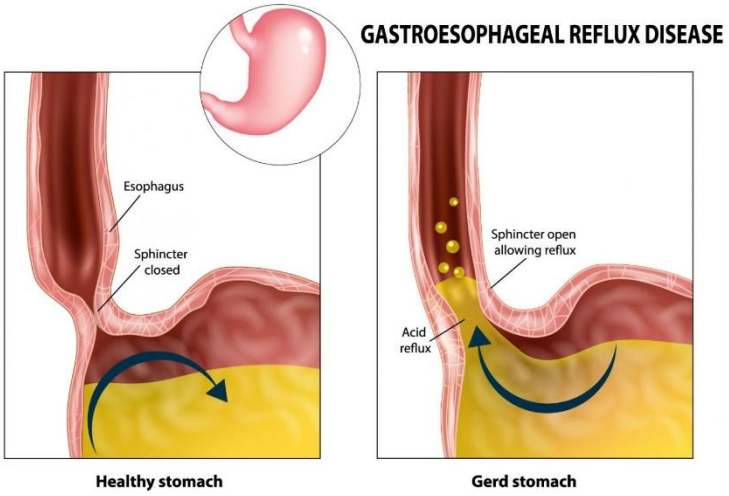
DIAGNOSTICS:

Endoscopy – Will assess narrowing or ulcers formed
pH Monitoring – Measures the amount of acid in the esophagus

SIGNS/SYMPTOMS:

Most Common – Pyrosis (heartburn)
- Epigastric Pain
- Regurgitation
- Dry cough worse at night/ hoarseness
- Nausea
- Difficulty swallowing
- symptoms may mimic those of a heart attack

[Brunner & Suddarth's Med Surg 14e page 1283]



TREATMENT:

Lifestyle changes: Small meals
- last meal 30min before bedtime
- Sit up 1hr after meals
- Weight loss, smoking cessation

Avoid: fatty, ETOH, coffee, peppermint, acid foods (citrus, tomatoes)

Medication
- Antacids – Interferes with many drugs. Give alone, wait 1-2 hrs before taking another meds
- Histamine Receptors Blockers – lowers Histamine – Lowers Inflammation
- PPIs – Protect lining of the stomach
- Bethanechol – Protect lining of stomach

Fundoplication Surgery – Reinforces the LES by wrapping a portion of the stomach around the esophagus

Crohn's Disease

Inflammation or ulceration (or both) of the bowel.

Characterized by periods of remission and exacerbation.

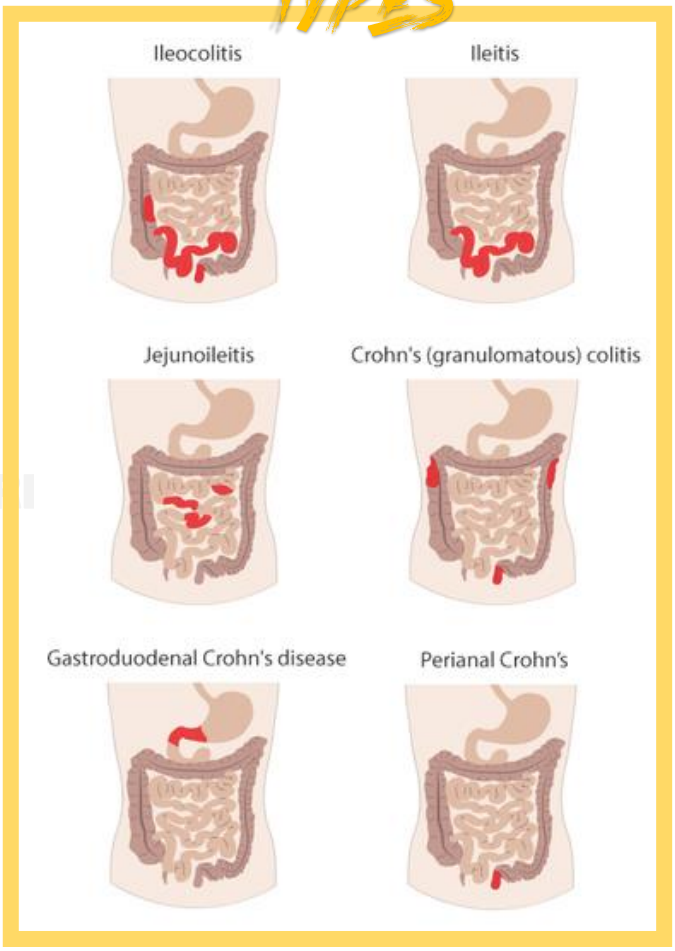
May affect anywhere in the GI. Most common in ileum and the ascending colon.

Scattered patches – Not continuous with cobblestone appearance

SIGNS/SYMPTOMS:

1- Right Lower abdominal pain
- Mouth or GI ulcers
- Diarrhea (sometimes with blood, pus, mucus)
- Loss of appetite / weight
- Fissures with anal bleeding
- Abdominal bloating

TYPES



COMPLICATIONS:

1- Abscesses: Form in the intestinal wall
2- Fistula: Worsening of abscess may lead to a hollow hole
3-Malnourishment: If affecting the Small Intestine
4- Fissures: If affecting anal area – loss of integrity
5- Strictures: Narrowing, Intestinal Blockage

TREATMENT:

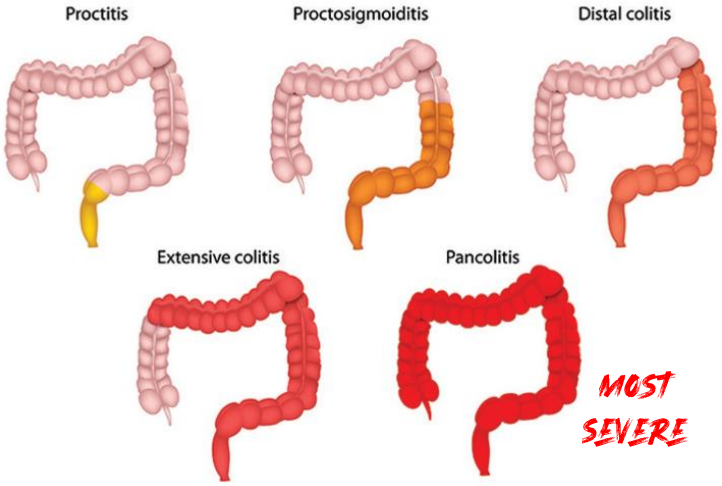
1- Diet Education – AVOID high fiver, nuts vegies, fruits, dairy, spicy, high fat, gas causing food
Encourage- LOW fiber, HIGH protein, HIGH fluids
2- Medication
1st Line- Mild case: sulfasalazine.
Steroids: ↓Inflammation, NOT long term, ↑ Infection risk
2nd line- Immunosuppressors: ↑risk of infection, cancer, ↓Inflammation
3- Teach Ostomy care if surgery occurs
4- Smoking Cessation
5- In severe cases, TPN for malnourishment – Monitor weight
6- Monitor bowel movement, frequency and characteristics/ Bowel sounds

Ulcerative Colitis

Chronic ulcerative and inflammatory disease in the INNERMOST lining of the Colon and Rectum ONLY. (There is NO abscesses, fistulas or fissures -usually)
"Continuous - Not Scattered"

SIGNS/SYMPTOMS

- Cells of intestinal lining die from ulcers that pus and bleed.
- Intestine can't absorb water as usual – Watery diarrhea that Includes Pus and Blood
- Urge to defecate frequently
- Periods of remission and exacerbation. Ulcer sites heal, but lining stays damaged, may form polyps

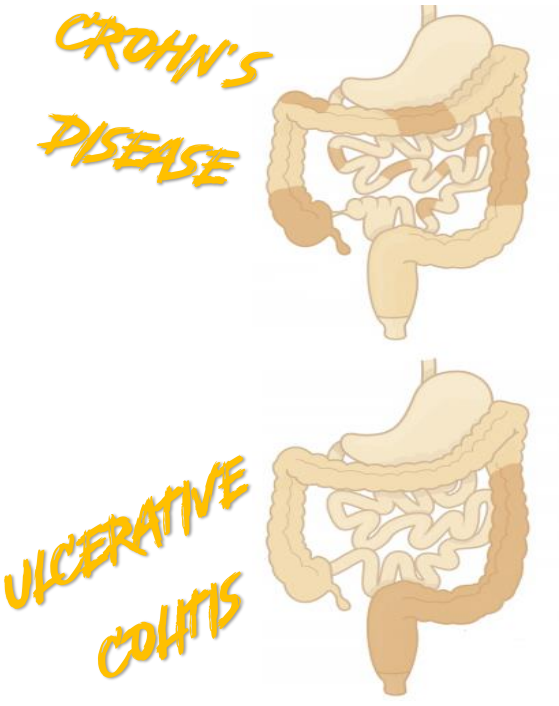


SEVERE

- Lead-pipe Sign – large intestine starts to lose its form. Will appear smooth (no Haustra)
- Repeated Ulceration – Rupture of bowels – peritonitis
- Toxic Megacolon – Large intestine dilates due to inflammation – Unable to function properly

TREATMENT

1- Surgery – Proctocolectomy ileoanal anastomosis
2- Diet Education – AVOID high fiver, nuts vegies, fruits, dairy, spicy, high fat, gas causing food
Encourage- LOW fiber, HIGH protein, HIGH fluids
3- Medication:
1st Line- Mild case: sulfasalazine.
Steroids: ↓Inflammation, NOT long term, ↑ Infection risk
2nd line- Immunosuppressors: ↑risk of infection, cancer, ↓Inflammation
Also, Abx during flares up Antidiarrheals



GASTROINTESTINAL DISORDERS

OSTOMIES

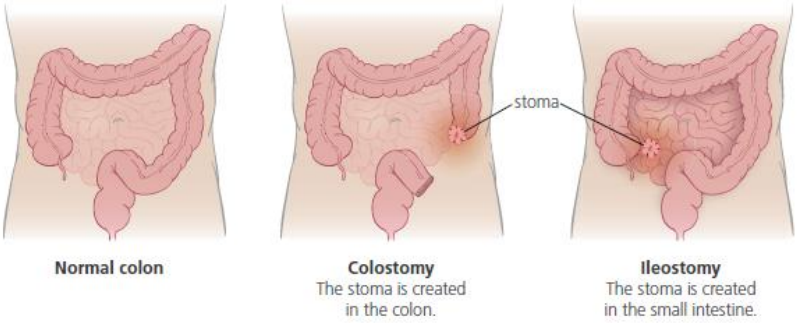
Surgical procedure that reroutes part of the intestine through the abdominal wall, forming a stoma.

<u>Types of Ostomies:</u>

Ileostomy: Created from the ileum (small intestine). Bowel movements are loose/watery.

Colostomy: Created from the large intestine. Bowel movements vary in consistency.

- Ascending colostomy: liquid
- Transverse colostomy: semi-solid
- Descending/Sigmoid colostomy: formed.



Nurse: Assess stoma regularly, should be pink/moist. Pale or blue stoma indicates ischemia. Empty bag when it is 1/3 – ½ full. Change immediately for leaking. Cut opening in skin barrier <1/8" bigger than measured stoma size to prevent skin damage from contact with ostomy output. Chew food thoroughly. Consume low-fiber diet for first 6-8 weeks. Avoid foods that cause gas/odor.

*A loop, or double-barrel stoma, is usually temporary. Stool will be expelled from the proximal stoma only.

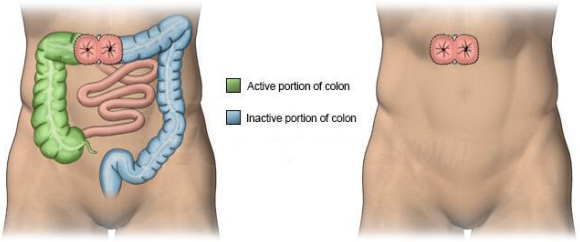


Figure 1
Loop Transverse Colostomy

Figure 2
Loop Transverse Colostomy

PERITONITIS

P: Peritoneal cavity becomes contaminated by bacteria, resulting in inflammation.
RF: Infection, trauma, perforation r/t appendicitis, diverticulitis, peptic ulcer disease.
S/S: Rigid, board-like abdomen, abdominal pain, n/v, rebound tenderness, fever, tachycardia.
Dx: Abdominal X-ray, CT, ultrasound.
Tx: NPO, NG tube, IV fluids, antibiotics, analgesics. <u>Surgery</u>: Repair/removal of perforated organ, intra-abdominal lavage.
Nurse: Monitor patient closely for sepsis.

DIVERTICULITIS

P: High intraluminal pressure causes diverticula to form in weak spots in the GI wall. Undigested food and bacteria accumulate in the diverticula, leading to inflammation.
RF: Low-fiber diet, genetics, obesity, smoking, alcohol, NSAIDs, corticosteroids.
S/S: LLQ abdominal pain (descending, sigmoid colon), bloating, fever, n/v.
Labs: High WBCs, ESR, Decrease Hgb/Hct with bleeding.
Dx: Barium Enema, Colonoscopy, CT, lower GI series.
Tx: Antibiotics, analgesics.
Nurse: Monitor for signs of complications (perforation, peritonitis, bleeding, fistula). NPO or clear liquid diet during exacerbations, then progress to a low-fiber diet. Ongoing, eat a high-fiber diet.

GASTROINTESTINAL DISORDERS

ESOPHAGEAL VARICES

Swollen/fragile blood vessels in the esophagus that can hemorrhage (life-threatening)

P: Blood flows is impaired into the liver (due to cirrhosis, hepatitis), which leads to increased pressure in the portal vein (portal hypertension). This causes blood to be pushed into the surrounding blood vessels, including those in esophagus.

R/F: Portal Hypertension, portal vein obstruction.

S/S: Increased AST, ALT. With bleeding: hypotension, tachycardia, Decreased Hct/Hgb.

Tx: Blood transfusion.

- **Meds:** Vasoconstrictors, non-selective beta blockers.
- **Procedures:** Endoscopic sclerotherapy or band ligation, balloon tamponade, esophageal stent, transjugular shunt.

HEPATITIS

Inflammation of the liver due to a virus or hepatotoxic drug/chemicals.

Types of Viral Hepatitis:

- Hep A: Acute Infection, fecal/oral transmission (ex: contaminated food/water). Self-resolving. Prevention with HepA Vaccine.
- Hep B: Acute/chronic infection, blood/body fluids transmission. Prevention with HepB vaccine.
- Hep C: Acute/chronic infection. Blood/body fluids transmission.
- Hep D: Acute/chronic infection. Blood/body fluids transmission. Only occurs with HepB infection.
- Hep E: Acute infection. Fecal/oral transmission (contaminated water) or undercooked meat.

S/S: Fever, lethargic, n/v, jaundice, dark-colored urine, clay-colored stools, arthralgia, abdominal pain.

Labs/Dx: Increased ALT, AST, and bilirubin. Serological assays.

Tx: Antiviral medications, supportive treatment.

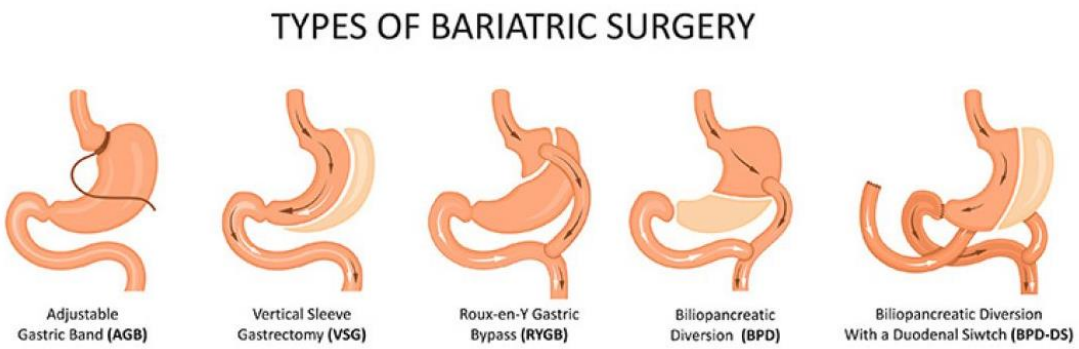
Nurse: Encourage Hep A&B Vaccines, safe sex practices.

BARIATRIC SURGERY

Reduction of gastric capacity or absorption in morbidly obese patients.

Post-op: Monitor for dumping syndrome (S/S: abdominal cramping, tachycardia, nausea, diarrhea, diaphoresis).

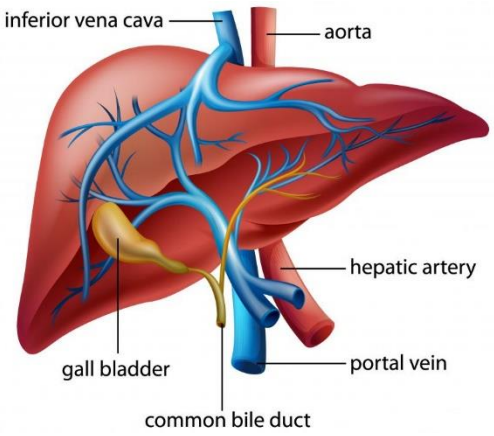
Nurse: Chew food slowly and completely. Eat 6 small meals a day. Do NOT consume liquids with meals. Do recline after meals to slow gastric emptying (with dumping syndrome). Avoid foods high in sugar, fat, carbohydrates. Avoid foods high in sugar, fat, carbs. Take vitamin/minerals supplements as directed.



Hepatic System

THE LIVER

- Largest gland of the body
- Located in the RUQ of abdomen
- Stores glucose (as glycogen)
- Converts ammonia to urea for excretion by the kidneys
- Synthesizes blood proteins, clotting factors
- Stores vit. A, D, K, Iron, copper
- Makes bile which aids in digestion by emulsifying fats
- Metabolizes drugs + binds them to be excreted in urine



GLUCOSE METABOLISM

- Glycogenesis: Glucose into glycogen
- Glycogenolysis: Breakdown of glycogen to glucose
- Gluconeogenesis: Glycerol, amino acids or lactate into glucose
- Ketogenesis: Fatty acids or protein breakdown
- Ammonia conversion: Ammonia into urea

When there is not enough glucose, Fatty acids are converted into ketones

IMPORTANT CONCEPTS

- Bile aids in digestion by forming bile salts which help emulsify fats.
- Bilirubin is a byproduct of hemoglobin breakdown.
- Metabolism of drugs by the liver are slowed in older adults which can increase their effects.
- Bile is made up of water, electrolytes, lecithin, fatty acids, cholesterol, bilirubin, bile salts.

Cirrhosis

DIAGNOSTICS

- Radioisotope Liver Scan: Uneven uptake of isotopes
- Abdominal ultrasound: Shows ascites
- Laparoscopy: Can visualize tissue directly
- ERCP: Shows biliary structures
- CT Scan: Shows dense fatty areas
- MRI: Shows neoplasms, cysts, obstructions
- Liver Biopsy: Large needle inserted into liver.

pt. has risk for hemorrhage

LABS

- ALP -Increased
- ALT + AST -Increased
- LDH -Increased
- PT / INR -Prolonged
- Electrolytes: ↓k+, ↓Na+
- Bilirubin: Increased levels
- Protein: ↓Albumin/globulin
- Ammonia: Increased levels
- BUN: ↓Decreased

LIVER DISEASE

Pathophysiology

- Usually a gradual decline in function as liver tissue is slowly destroyed.
- hepatocyte + liver lobule destruction causes decreased metabolic function
- Fibrous connective tissue forms which disrupts the flow of blood and bile, causing portal hypertension

Manifestations

- Jaundice: r/t increased bilirubin levels
- Portal HTN: r/t Narrowed Vessels
- Ascites: r/t portal HTN
- Esophageal varices: r/t portal HTN

POSSIBLE COMPLICATIONS

Portosystemic Encephalopathy

r/t Accumulation of Neurotoxins

S/Sx: Asterixis, alteration in mental status, Sleep

I. Normal LOC + Some lethargy

II. Lethargy, disoriented, agitation

III. Stupor, difficulty waking, incoherent

IV. Comatose, no response to stimuli

Tx: Small frequent meals, ↑ protein intake

Hemorrhage

r/t ↓ clotting factors

S/Sx: Tachycardia, hypotension

Tx: Transfusion, fluid replacement emergency surgery

Cirrhosis

Etiology

- Malnutrition r/t alcoholism
- Infection
- Diabetes
- Nutritional deficiency
- Hypersensitivity

Manifestations

- Jaundice
- Portal hypertension
- Ascites
- Varices
- Hepatic Encephalopathy

Early

- Enlarged liver
- Weight loss
- Weakness
- Anorexia

Later

- Portal HTN
- Jaundice

Nursing Interventions

- Encourage pt. to avoid alcohol
- Maintain fluid balance, I/O, Weight, Assess urine
- Assess LOC, mental status
- Minimize bleeding, Bleeding precautions, PT/INR
- Promote nutrition + protein

Treatment

Slow progression of disease

-Stop drinking

- Eat healthier diet

Liver transplant

- C/I w/ alcoholism or malignancy

Minimize bleeding

- Monitor coagulation
- Institute bleeding precautions

Paracentesis (Aspiration of peritoneal cavity fluid)

- Helps relieve respiratory distress
- 500 - 1000ml removed daily
- Albumin given during large vol.

Nursing Interventions for paracentesis

- Ensure informed consent obtained
- Instruct client to void to prevent puncturing bladder
- Assess weight, Abd Girth + vital signs
- Place client in high fowler's/ upright

Rx

- Iron + folic acid - Treat anemia
- Diuretics - Reduce fluid retention
- Lactulose - ↓Nitrogen + Ammonia
- B blockers - Prevent varices bleeds

Renal System

LABS

- **Creatinine:** 0.6 – 1.2 mg/dL [Best Indicator Renal Disease]
- **BUN:** 12 – 20 mg/dL [Elevated doesn't always means Real Disease]
- **Urine pH:** 4.0 – 8.0
- **Specific Gravity:** 1.003 – 1.030 [Ability of Kidneys to concentrate Urine]
  - **Increased**: More Concentrated Urine. Low fluid intake, decreased renal perfusion, Increased ADH
  - **Decreased**: Less Concentrated Urine. High fluid intake, Diabetes Insipidus, Kidneys Disease or inability to concentrate urine.
- **Osmolality:** 300-1300 mOsm/kg (mmol/kg)
- **Creatinine Clearance Test** [Provides the best estimate of Glomerular Filtration Rate (GFR)] "Saunders"
- **GFR:** 125 mL/min in adults [GFR decreases with Age. By 65yo, GFR is 65 mL/min]

RENAL SYSTEM FUNCTIONS

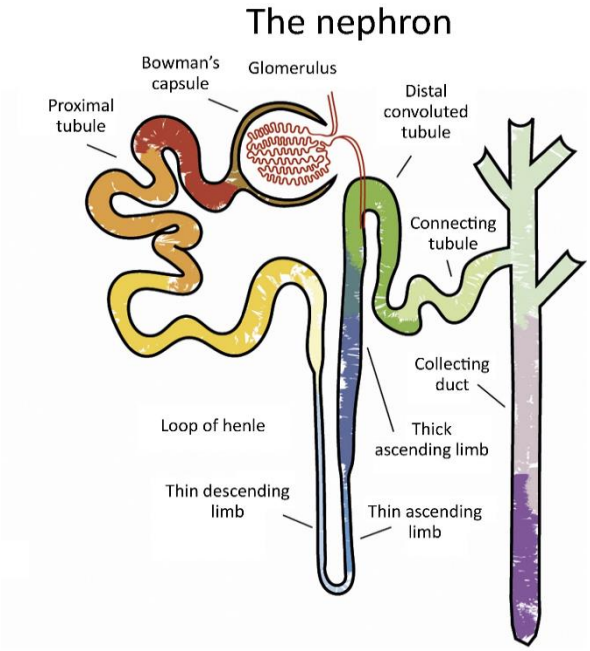
- Maintain body fluid, regulate electrolytes and acid-balance.
- Eliminate waste products (uric acid, urea, ammonia, creatinine)
- Regulate BP through the release of Renin (When BP or fluid concentration is low in the Distal Convoluted Tubule (DCT)
- Secrete Erythropoietin to stimulate RBC production in the bone marrow.
- Synthetize Vit D for Calcium absorption
- Total Bladder Capacity is **1L**.

NEPHRON

Functional units of the Kidney. Consists of glomerulus (surrounded by the Bowman's Capsule) and tubules.

Functions:

- Filtration: Blood enters the glomerulus from the afferent arteriole and is filtered at a rate of 125mL/min (Glomerular filtration rate). Non-filterable components exit via the efferent arteriole.
- Reabsorption & Secretion: Glomerular filtrate moves through the proximal convoluted tubule, loop of Henle, distal convoluted tubule, and collecting tubule, where water, electrolytes, and other substances are either reabsorbed into circulation, or excreted into the urine, through the Renal Pelvis, Ureters, Bladder, and Urethra.



Hormones and Enzymes

RENIN - ANGIOTENSIN - ALDOSTERONE

- Renin (an enzyme) is released from the Nephron when BP or fluid concentration is LOW.
- Renin converts Angiotensinogen (from the liver) to Angiotensin I.
- Angiotensin-Converting Enzyme (ACE, from the Lungs) converts Angiotensin I to Angiotensin II.
- Angiotensin II (potent vasoconstrictor) stimulates the secretion of Aldosterone.
- Aldosterone stimulate the Distal Convoluted Tubules to reabsorb Sodium and Secrete Potassium. That extra Sodium increases water reabsorption and Increases Blood Volume and BP, returning BP to normal.

ANTIDIURETIC HORMONE (ADH)

Responsible for the reabsorption of Water by the Kidneys.
- ADH is produced in the Hypothalamus and secreted by the Posterior Lobe of the Pituitary Gland.
- It is secreted when Dehydration, High Sodium Intake, or LOW Blood Volume.
- Makes the Distal Convoluted Tubules and Collecting Duct reabsorb water.
- Lack of ADH → Diabetes Insipidus (DI). Patients with DI produce large amount of dilute urine.

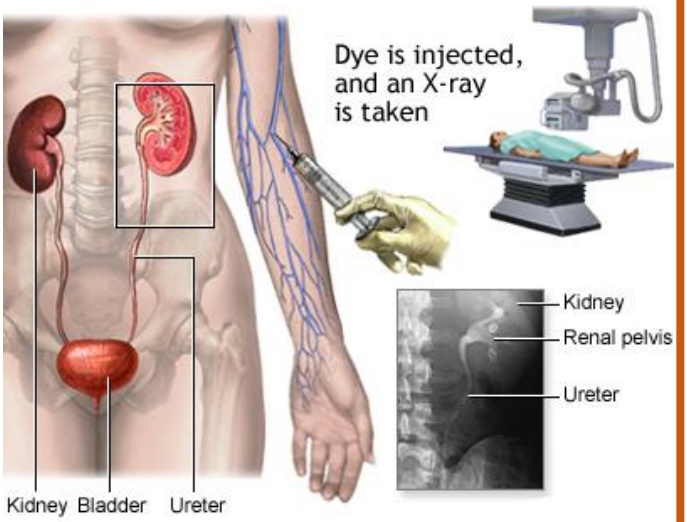
NATRIURETIC HORMONES (ANP & BNP)

- Atrial & Brain Natriuretic Hormones (AND & ANP) are secreted from cardiac muscle in response to atrial stretch (High BP). ANP & BNP stimulates diuresis, which decreases Volume and BP.

*TEST

→ Intravenous Urography: X-Ray with **radiopaque dye**. Use to visualize abnormalities in Renal System.

- Assess patient for Allergies to Iodine, seafood, radiopaque dyes. Contraindicated Pregnant Women, caution if Asthma, Cardiac Disease, and Renal Insufficiency.
- S/E: Possible Throat Irritation, Flushing of face, Warmth, or Salty or Metallic Taste during Test.



Renal Problems

URINARY TRACT INFECTION (UTI)

Patho: Bacteria in the urinary tract, contaminate the periurethral area, the colonize the urethra, and migrate to the bladder. Most common causative: E. coli.
Risk F: Female (urethra is close to the rectum, also women have shorter urethra), uncircumcised males, menopause, foley catheters, frequent sexual intercourse.
S/S: Burning urinating, frequency and urgency, dysuria, cloudy urine, foul-smelling urine, confusion (elderly).
Lab: Urinalysis – Positive for Bacteria, WBC > 11,000 mm^3, hematuria, leukocyte esterase, nitrites.
Nurse: Increase Fluids 3000 mL/day. Discourage caffeine, tea, and cola. Avoid Alcohol. Use Antibiotics.
Prevention: Female- wipe front to back, wear cotton underwear, avoid bubble baths, tight clothing. Urinate before and after intercourse. Uncircumcised males, clean under foreskin. Cranberry juice decreases risk of UTI.

INCONTINENCE

- Stress Incontinence: Small urine loss when sneezing, coughing, laughing (abdominal pressure). Caused by weakened pelvic floor.

Risk F: Menopause, obesity, constipation, pelvic surgery.
Nurse: Kegel exercise, weight reduction, estrogen, vaginal cone therapy.
- Urge Incontinence: Inability to reach the bathroom in time due to overactive detrusor muscle. Unknown cause.
Risk F: Neurologic disorders (stroke), bladder irritation.
Nurse: Anticholinergics (oxybutynin), bladder training, toilet schedule, avoid caffeine and alcohol.

PYELONEPHRITIS

Patho: Inflammation of the renal pelvis caused by bacterial infection. Chronic pyelonephritis occurs due to chronic urinary flow obstruction with reflux. Acute Pyelonephritis occurs as a new infection or previous.
S/S: Costovertebral tenderness, Flank pain on affected side, fever, dysuria, tachycardia and tachypnea, hypertension, nausea and vomit.
Tx: Antibiotics, opioids analgesics. Pyelolithotomy (Removal of a large stone from kidney). Nephrectomy (Removal of the Kidney). Ureteroplasty (Repair or revise the ureter)
Nurse: Monitor vitals, electrolytes, specific gravity, and dehydration. Increase Fluids 3000 mL/day. Warm bath for pain. Provide warm, moist compresses to flank area to relieve pain.

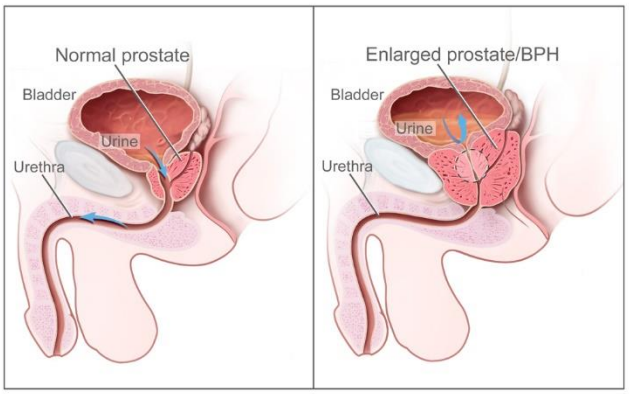
Renal Problems

GLOMERULONEPHRITIS

Patho: Kidney disorders characterized by Inflammation injury un the glomerulus, most of which are caused by an immunological reaction.
Causes: Often following a streptococcal Infection. Immunological disease. Autoimmune disease. History of pharyngitis or tonsillitis 2-3 weeks before symptoms.
S/S: Dysuria, Oliguria, Anorexia, brown-colored urine (hematuria), Proteinuria, Hypervolemia (cause Hypertension, dyspnea, crackles, periorbital and facial edema), weight gain.
Labs: Urinalysis- hematuria, proteinuria. GFR decreased. Increased BUN, creatinine, WBC. Positive Antistreptolysin O titers.
Tx: Antibiotics for infection, antihypertensives. Dialysis or plasmapheresis if necessary.
Nurse: Monitor I&O, daily weight. Decrease Fluids, Sodium, Protein.

BENIGN PROSTATIC HYPERTROPHY

Patho: Slow enlargement of the prostate gland that can compress the urethra.
S/S: Hematuria, Nocturia, Decrease in urine force, UTIs.
Dx: Digital Rectal Exam, Cystoscopy, Prostate-specific antigen (PSA)
Tx: Antibiotics, Alpha blockers to promote urinary flow (Terazosin, Tamsulosin, Alfuzosin, Doxazosin). Enzyme inhibitor to decrease size of prostate gland (Dutasteride, Finasteride).

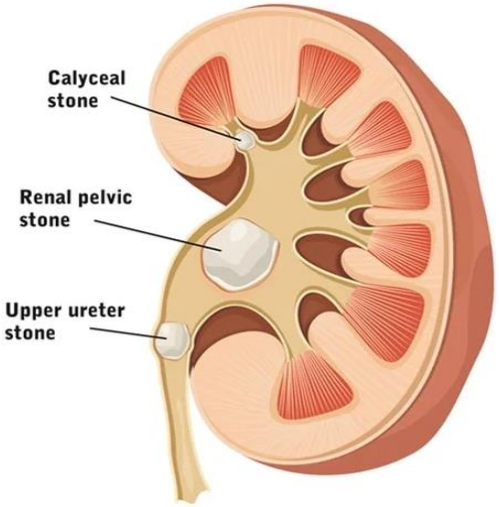


Transurethral Resection of Prostate (TURP): Enlarged portion of prostate is removed through endoscopic instrument.
Pre-Op: Insert Urinary catheter. Antibiotics
Post-Op: Monitor for Shock and Hemorrhage. Avoid heavy lifting, prolonged sitting, constipation, straining. Monitor for continuous bladder irrigation. Fluid 3L/day.
Assess for TURP syndrome (Hyponatremia, confusion, bradycardia, hypo/hypertension, nausea, vomiting, visual changes). Keep catheter taped tightly to the client's leg. Teach Kegel exercises.

POLYCYSTIC KIDNEY DISEASE (PKD)

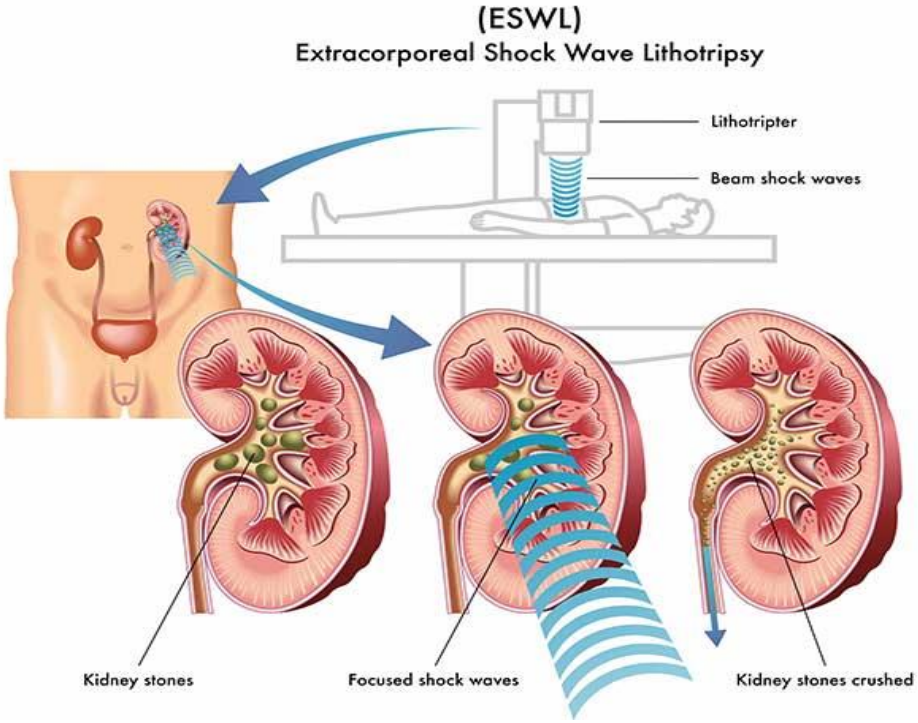
Patho: Cyst formation and hypertrophy of the kidneys causing scar tissue, infection, nephron damage. PKD is hereditary. Most common in Caucasian patients.
S/S: Flank or lumbar pain that worsens with activity + improves upon lying down, Hematuria, proteinuria, recurrent UTI, Hypertension, Hyponatremia.
Nurse: Control BP, manage HT with medication. Monitor for hematuria which could indicate a rupture. Increase sodium + water intake. Educate about possible need for surgical interventions

RENAL CALCULI



Patho: Stones that form in the urinary tract. Most of the stones are composed of calcium phosphate or calcium oxalate, but can contain other substances (uric acid, struvite, cystine). A diet high in Calcium is not believed to increase the risk of stones, unless there is a metabolic disorder.
S/S: Severe intermittent pain, nausea, vomiting, low-grade fewer, hematuria. Decreased urine flow with particles (calcium).

Stone locations:
Nephrolithiasis: Stones formation in the Kidneys. Pain in the Costovertebral region.
Ureterolithiasis: Stones formation in the Ureter. Excruciating Pain described as wave-like.
Nurse: Monitor temperature, encourage increased fluids, apply heat to flank area, diet modification, increase ambulation.
Procedures: Extracorporeal Shock Wave Lithotripsy (ESWL) uses sound, laser, or shock-wave energies to break calculi into fragments. Nonsurgical Chemolysis uses chemical agents to dissolve calculi. Surgical **Intervention:** Stenting, Retrograde Ureteroscopy, Percutaneous Ureterolithotomy/Nephrolithotomy, Open surgery.
Complications: Scar tissue formation, infection and obstruction.



Acute Kidney Injury

AKI

Patho: Sudden loss of kidney ability to regulate volume, remove waste products, release hormones or maintain body's acid-base balance. Occurs abruptly and can be reversible.

Causes:
- Prolonged Renal Ischemia
- Nephrotoxic Injury leading to tubular necrosis

PRERENAL

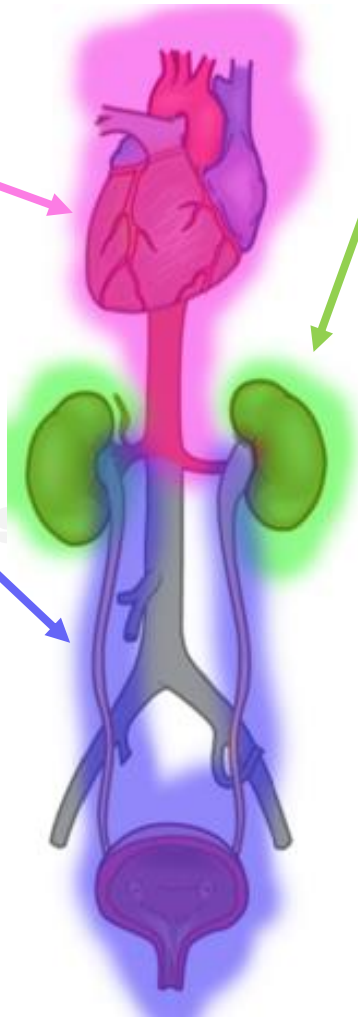
Caused by a reduced blood flow to the kidneys.

Causes:
- Vasoconstriction
- Hypotension
- Hypovolemia
- Decreased cardiac output

INTRARENAL

Injury occurring from disease within the kidneys

Causes:
- Acute Tubular Nephritis
- Nephritis
- Nephrotoxic Injury
- Acute Glomerular Nephritis
- Thrombolytic Disorders
- Malignant Hypotension
- SLE
- Infection



POSTRENAL

Occurs when there is an obstruction of urinary flow causing intraluminal pressure

Causes:
- BPH
- Bladder Cancer
- Calculi
- Prostate Cancer
- Trauma

PHASES

Initiation Phase: Onset of Injury / Onset of symptoms

Oliguria Phase: Decrease urine output to 400ml/day, usually 1-7 days after injury

Diuretic Phase: Increase urine output to 1-3L/day, caused by inability to concentrate

Risk of: hyponatremia, hypokalemia, dehydration

Recovery Phase: Increase in filtration rate, BUN/Creatinine

Nurse: Monitor V/S (HT, Tachycardia, Tachypnea, Irregular HR). Urine and I&O hourly. Daily weight. Changes in BUN, Creatinine. Monitor for acidosis. LOC. WBC for infection. Prepare for dialysis if prescribed.

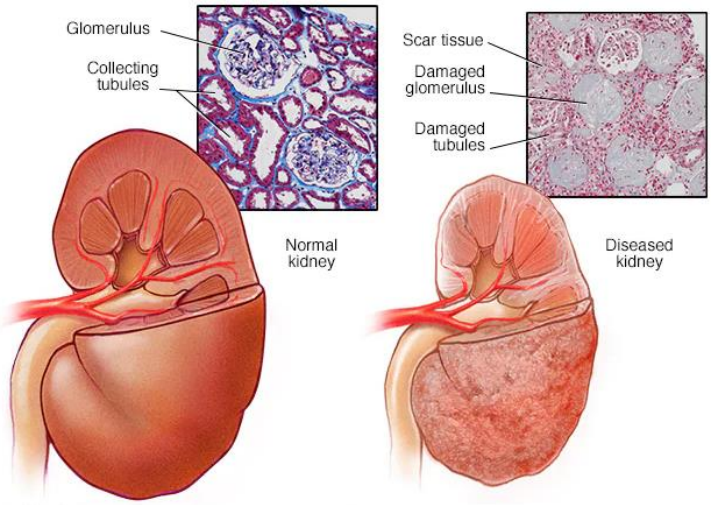
Chronic Kidney Disease

CKD

Patho: Slow progressive loss of kidney function resulting in uremia and hypervolemia - the inability to conserve sodium and water. **Decrease of Kidney Function >3 months**
S/S: Polyuria, decreased skin turgor, edema, diluted urine, proteinuria
Nurse: low protein, potassium, phosphorus diet. Educate about fluid restriction and possible dialysis treatment
Causes: Diabetes, Hypertension, AKI, Recurrent Infections, Renal Occlusions

Stages

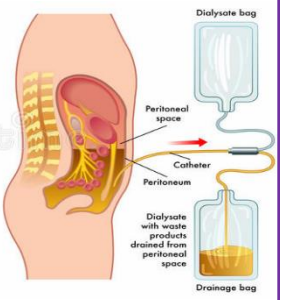
Stage 1: GFR ≥90 mL/min
Stage 2: GFR = 60–89 mL/min
Stage 3: GFR = 30–59 mL/min
Stage 4: GFR = 15–29 mL/min
Stage 5: GFR <15 mL/min
GFR: Glomerular Filtration Rate



DIALYSIS

Hemodialysis

The Process of filtering the blood through a dialyzer (Artificial Kidney)
Frequency: 3 times a Week / 5-6 hrs/day
Complications: Air Embolism, Hypotension, Muscle Cramps, Blood Loss, Hepatitis, Sepsis, Disequilibrium Syndrome
Nocturnal Hemodialysis: It's done 5-6 days/week – 2-3 hrs/day.
If Air Embolism: Stop Hemodialysis, Turn patient on left-side, head down (Trendelenburg). Admin Oxygen



Peritoneal

Continuous Abdominal Peritoneal Dialysis (CAPD)
Uses Peritoneal Cavity as "Artificial Kidney"
Uses dextrose as osmotic agent
Complications: Peritonitis

Withhold Antihypertensive Medication until after hemodialysis treatment. Also, water-soluble Vit, antibiotics and digoxin (could be removed by dialysis).

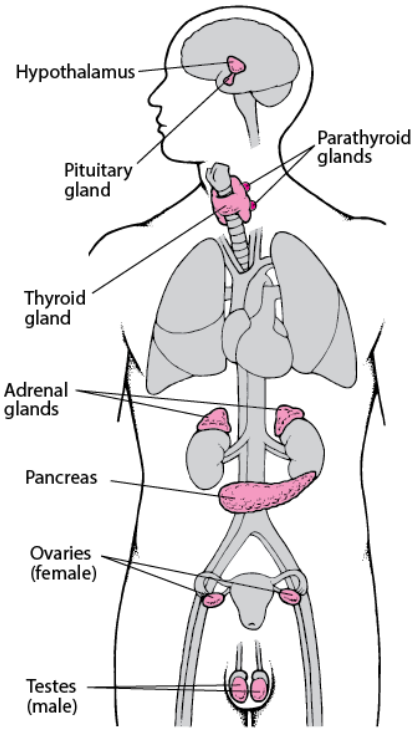
Endocrine System

CONCEPTS

Endocrine Glands:

Hypothalamus:

CRH – Corticotropin Releasing Hormone
GnRH – Gonadotropin Releasing Hormone
GHIH – Growth Hormone Inhibiting Hormone
GHRH – Growth Hormone Releasing Hormone
MIH – Melanocyte Inhibiting Hormone
PIH – Prolactin Inhibiting Hormone
TRH – Thyrotropin Releasing Hormone



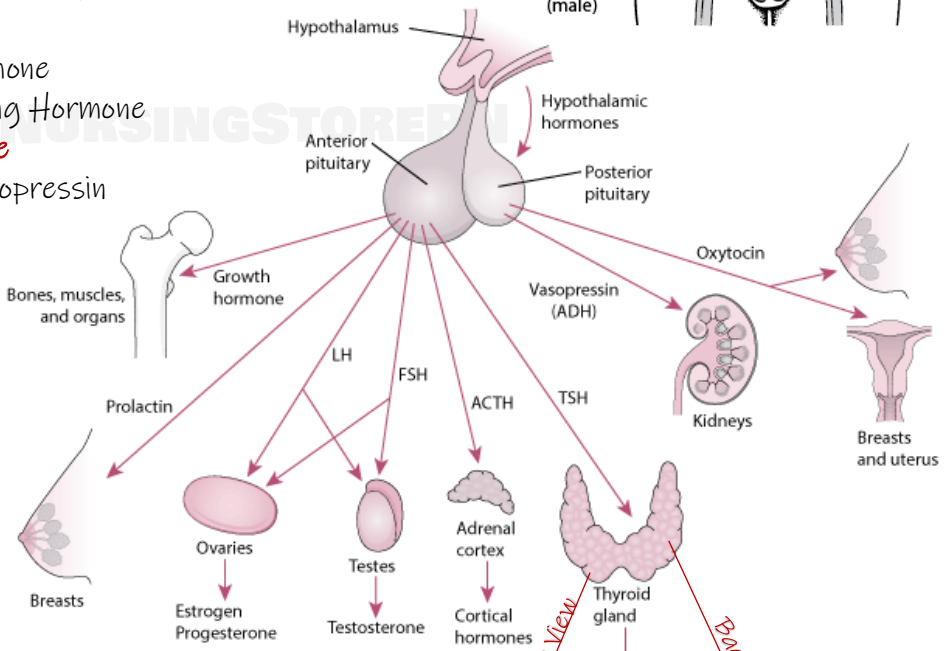
Pituitary Gland

Adenohypophysis - Anterior Lobe

ACTH – Adrenocorticotropic Hormone
FSH – Follicle Stimulating Hormone
GH – Growth Hormone
LH – Luteinizing Hormone
MSH – Melanocyte Stimulating Hormone
PRL – Prolactin
TSH – Thyroid Stimulating Hormone
Somatotropic Growth Stimulating Hormone

Neurohypophysis - Posterior Lobe

ADH – Antidiuretic Hormone/Vasopressin
Oxytocin



Thyroid Gland

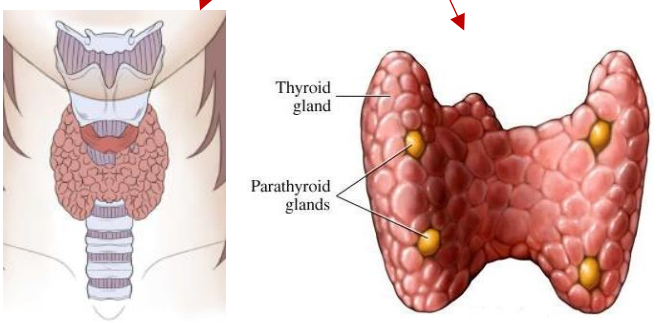
T_3 – Triiodothyronine
T_4 – Thyroxine
Thyrocalcitonin (Calcitonin)

Parathyroid Glands

PTH – Parathyroid Hormone

Adrenal Glands

Adrenal **Cort**ex (Outer shell of the Adrenal Gland)
Glucocorticoids: **Cort**isol (hydrocortisone), Cortisone, Corticosterone
Mineralocorticoids: Aldosterone
Adrenal Medulla (Inner part of the Adrenal Gland)
Epinephrine and Norepinephrine



Pancreas	Ovaries	Testes
Insulin	Estrogen	Testosterone
Glucagon	Progesterone	

Endocrine System

CONCEPTS

PITUITARY GLAND

Growth Hormone (GH): "Somatotropin". Controls growth and metabolism in the body (including protein synthesis).
Pathway: **GHRH** (Hypothalamus) -> **GH** (Ant Pit)
Prolactin: Promotes lactation (primarily). Levels are controlled by levels of dopamine, estrogen, and other hormones in the body.
ADH (Antidiuretic Hormone): Controls BP and Blood Volume by regulating reabsorption/excretion of water in the kidneys. Higher levels cause reabsorption of water, lower levels cause excretion of water. ADH is secreted from the posterior pituitary gland when body senses: low blood volume, low BP, and/or hypernatremia.
Oxytocin: Females: causes Contraction of Uterus; promotes lactation. Males: Controls production of testosterone and sperm release.
- Controlled through a positive feedback mechanism.
- In women, it's released in response to uterine contractions and breastfeeding.

THYROID GLAND

Thyroid Hormones (T_3/T_4): Regulates metabolism, growth and development, heart function, brain function, muscle function, digestion, bone maintenance. T3 is the active form of T4.
Pathway: **TRH** (Hypothalamus) -> **TSH** (Ant Pit) -> **T_3/T_4** (Thyroid Gland)
Calcitonin: Decreases Calcium levels. Opposite of **PTH**. It decreases activity of osteoclasts in bones, and Increases excretion of calcium in the kidneys.
Increased Blood calcium stimulate thyroid gland -> release **calcitonin**.

PARATHYROID GLAND

Parathyroid Hormone (PTH): Increases Calcium. It pulls calcium out of the bones and into the bloodstream, causes the kidneys to reabsorb more calcium and release Vit D (which allows for absorption of calcium), and Increase absorption of calcium in the intestines.
Decreased Calcium levels stimulates **parathyroid gland** -> release **PTH**

ADRENAL GLAND - CORTEX

Cortisol (Glucocorticoid): Stress hormone. Regulates metabolism, **Suppress Immune Response/Immune System. Raises blood glucose.** Plays a bigger role in chronic (vs acute) stress.
Pathway: **CRH** (Hypothalamus) -> **ACTH** (Ant Pit) -> **Cortisol** (Adrenal Cortex).
Aldosterone (mineralocorticoid): Increases BP/Blood Volume by promoting renal **reabsorption of sodium and water** and **excretion of potassium** (in the distal portion of renal tubules). Controlled by the Renin Angiotensin Aldosterone System (RAAS).
Renin Angiotensin Aldosterone System (RAAS): With low renal blood flow (Indicating low BP), kidneys secrete **Renin** – which converts **Angiotensinogen** (from liver) to **Angiotensin I**.
Angiotensin-Converting Enzyme (ACE) (from the lungs) converts **Angiotensin I** to **Angiotensin II**.
Angiotensin II increases BP by:
- Vasoconstriction of the afferent arterioles in the nephrons, which Increases Sodium and Water reabsorption.
- Release of **aldosterone** from the adrenal cortex, which causes the kidneys to Increase reabsorption of Sodium and Water.
- Vasoconstriction of peripheral blood vessels.

Endocrine System

CONCEPTS

ADRENAL GLAND - MEDULLA

Epinephrine (adrenaline) and Norepinephrine: Catecholamines released in response to acute stress. They prepare the body for the "fight or flight" response, causing Vasoconstriction, Increase HR and BP, Bronchodilation, pupil dilation, Increase blood flow to the muscles, and Increase Blood Glucose. Epinephrine has a stronger effect on the Heart. Norepinephrine has a stronger effect on the blood vessels.

Acute stress causes activation of the Sympathetic Nervous System (SNS), which activates nerves connected to the adrenal medulla, causing secretion of Epi/Norepi.

PANCREAS

Insulin: Decrease Blood Glucose levels. Insulin allows glucose to leave the bloodstream and enter the cells, where it can be used for energy.

Rise in blood glucose causes Pancreas' Beta Cells (the Islets of Langerhans) -> release **Insulin**.

Glucagon: Increases Blood Glucose levels. Glucagon stimulates glycogenolysis (conversion of glycogen in the liver into glucose, which is released into the bloodstream), gluconeogenesis (increased production of glucose), and causes adipose tissue to break down fat for energy.

Low Blood Glucose causes Pancreas' Alpha Cells -> release **glucagon**.

OVARIES - TESTES

Estrogen: Stimulates development of female sex organs. Regulates menstrual cycle.

Pathway: **GnRH** (Hypothalamus) -> **LH** & **FSH** (Ant Pit) -> **Estrogen** (Ovaries)

Progesterone: Regulates Menstrual cycle and plays a key role in the maintenance of pregnancy.

Pathway: **GnRH** (Hypothalamus) -> **LH** (Ant Pit) -> **Progesterone** (Ovaries)

Testosterone (Androgen): Stimulates development of male sex organs and sperm production.

Pathway: **GnRH** (Hypothalamus) - **FSH** & **LH** (Ant Pit) - Sperm and Testosterone Production (testes)

FEEDBACK

Negative Feedback Mechanism:

This mechanism regulates most endocrine hormones to achieve homeostasis, similar to a thermostat.

Thermostat: Your heater is on, and your thermostat is set at 75 degrees. The heater runs until temperature gets above 75, and then it turns off. When the temp drops below 75 again, the heater turns back on.

Body: If an endocrine gland senses that there is not enough of a hormone circulating in the body, changes are initiated to increase production of that hormone. If the endocrine gland senses there is too much of a hormone, changes are initiated to decrease production of that hormone.

Thyroid Negative Feedback Loop:

Hypothalamus releases TRH - Anterior pituitary gland release TSH - Thyroid gland release T3/T4. If the Hypothalamus senses that T3/T4 levels are high, it decreases its production of TRH (which causes a decrease in TSH, which causes a decrease in T3/T4).

If the Ant Pit Gland senses that T3/T4 levels are High, it decreases its production of TSH (which causes a decrease in T3/T4).

Positive Feedback Mechanism:

Regulates some Endocrine hormones. Release of a hormone initiates actions that lead to additional release of that hormone. (Ex: Release of oxytocin results in uterine contractions, which causes additional oxytocin to be released. Release of oxytocin stops after childbirth.)

ANTERIOR PITUITARY GLAND DISORDERS

Acromegaly: Hypersecretion of Growth Hormone (GH) that occurs after puberty.
S/S: Enlargement of skeletal extremities. Organ enlargement. Decalcification of the skeleton. Endocrine disturbances similar to hyperthyroidism. Muscle weakness, headache, visual problems, and blindness. Enlarged hands/feet, protruding jaw, kyphosis, arthritis, enlarged larynx (deep/hollow voice).
Dx: Elevated GH levels. CT and MRI of pituitary may show tumor. X-ray show abnormal bone growth.
Tx: Medication: Octreotide (synthetic GH analogue). Bromocriptine mesylate or pergolide-dopamine agonist.
- Surgical removal of pituitary gland (transsphenoidal hypophysectomy).
- Replacement therapy following surgery. Corticosteroids, thyroid hormones.
- Radiation therapy.

Transsphenoidal Hypophysectomy
Nurse: Monitor for S/S of Cerebrospinal Fluid (CSF): "Halo Sign" in drainage (Clear in center, yellow edges), sweet-tasting drainage, presence of glucose in nasal drainage, headache.
Teaching: Avoid activities that increase ICP: coughing, sneezing, blowing nose, bending at waist, straining during bowel movements (increase fiber intake). Decrease sense of smell expected for 1 month. Do not brush teeth for 2 weeks, OK to floss and rinse mouth. Lifelong hormone replacement therapy required.

Gigantism: Hypersecretion of GH that occurs in childhood prior to closure of the growth plates.
S/S: Proportional overgrowth in all body tissue.
Dx: Same as Acromegaly

Dwarfism: Hyposecretion of GH during fetal development or childhood that results in limited growth congenital or result from damage to the pituitary gland.
S/S: Head and extremities are disproportionate to torso (Face may appear younger than peers). Short stature, slow or flat growth rate. Progressive bowed legs and lordosis. Delayed adolescence or puberty.
Dx: MRI to assess pituitary gland. Serum GH level. Comparison of heigh/weight to growth charts.
Tx: Meds: Human GH injections (Somatropin) via SC. Treatment typically stopped when X-Ray shows epiphyseal closure.
Nurse: Teach how to administer supplemental GH, the earliest the therapy is initiated, the better. GH therapy doesn't work in all children.

Somatropin:
Children: 0.16-0.24 mg/kg/wk divided in **6-7 daily doses**
Adult: 0.04 mg/kg/wk initially divided in **6-7 daily doses.**

Diabetes Insipidus vs SIADH

POSTERIOR PITUITARY GLAND DISORDERS

Diabetes Insipidus (DI):

A deficiency of ADH (Antidiuretic Hormone-Vasopressin) that results in kidneys being unable to concentrate urine.

Neurogenic: **Lack of Vasopressin** production or Secretion (Hypothalamus or Pituitary tumor/Injury)

Nephrogenic: **Renal resistance to Vasopressin** r/t Kidney infections or nephrotoxic drugs.

S/S: Polydipsia, Large amount of diluted urine, dehydration, hypotension, anorexia.

Labs:

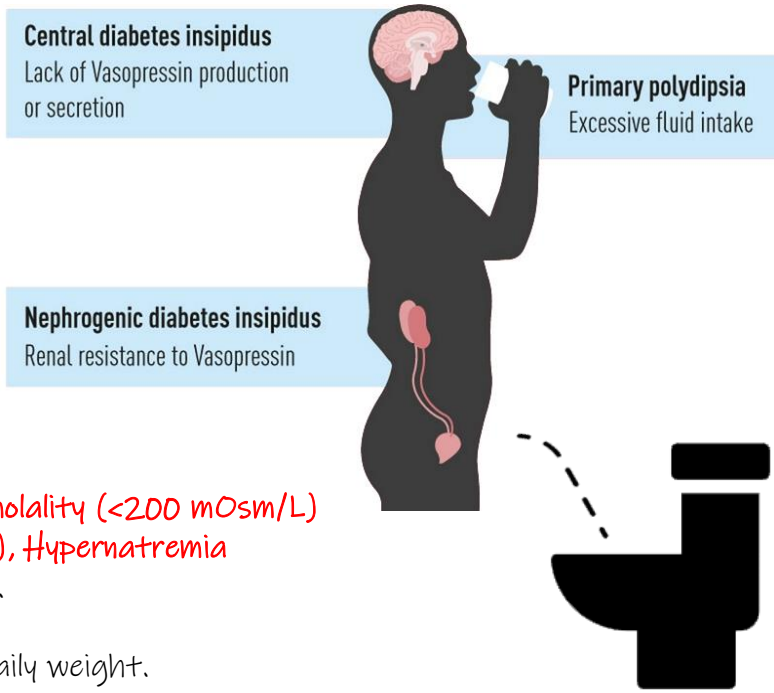
Urine: **Low Specific gravity (<1.005), Low Osmolality (<200 mOsm/L)**

Blood: **High Serum Osmolality (>300 mOsm/L), Hypernatremia**

Dx: Water deprivation Test, Vasopressin Test.

Tx: Vasopressin (Lifetime), Desmopressin

Nurse: Monitor I&O, Urine Specific Gravity, daily weight.



SIADH – Syndrome of Inappropriate Secretion of Antidiuretic Hormone

Excessive release of ADH from the Posterior Pit Gland, causing **fluid retention** and dilutional Hyponatremia

Patho: Neoplastic tumor, head injury, meningitis, respiratory disorders, medication (vincristine, phenothiazines, tricyclic antidepressants, thiazide diuretics)

S/S: Urine Concentrated (in small amounts), fluid vol excess (tachycardia, hypertension, crackles, JVD, weight gain), headache, weakness, muscle cramping, confusion.

Labs:

Urine: **High Specific Gravity (>1.030)**, High Osmolality and Sodium

Blood: **Low Serum Osmolality (<270 mOsm/L) and Hyponatremia** (dilutional hyponatremia).

Dx: Radioimmunoassay of ADH

Tx: Loop Diuretics, Vasopressin antagonists, hypertonic saline (3% NaCl), Demeclocycline

Nurse: Restrict fluid to 500-1000 mL/day. Monitor I&O, daily weight. Monitor mental status frequently, initiate seizure precautions. Monitor fluid vol overload, pulmonary edema.

DIABETES INSIPIDUS

Too Much Diluted Urine

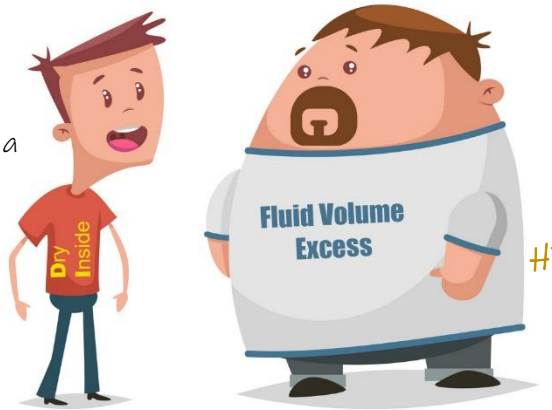
Anorexia, Dehydration, Polydipsia

Urine:

Low Specific gravity, Low Osmolality

Blood:

High Serum Osmolality & Hypernatremia



SIADH

Small amount of Urine

Weight gain, Fluid Vol Excess, Weakness, Confusion.

Urine:

High Specific Gravity, High Osmolality

Blood:

Low Serum Osmolality & Hyponatremia

Addison's vs Cushin's

ADRENAL CORTEX DISORDERS

Addison's Disease (Adrenal Insufficiency)

Hyposecretion of Adrenal Cortex Hormones cause by:
Primary: Autoimmune disorders, or adrenal gland injury/infection.
Secondary: Abrupt cessation of steroids medications.
S/S: Weakness, Fatigue, N&V, weight loss, Hyperpigmentation (bronzed skin), **hypotension**, dehydration, hypoglycemia.
Labs:
LOW Cortisol/Sodium/Glucose
HIGH Potassium/Calcium/BUN
Dx: ACTH stimulation test (differentiates primary and secondary insufficiency), Electrolytes panels
Tx: Hydrocortisone, Prednisone, Cortisone. Medication for Hyperkalemia: Sodium polystyrene sulfonate, Insulin (with glucose), calcium (cardiac protection), sodium bicarbonate.
Nurse: Assess HR and BP. Monitor Fluid and Electrolytes. Monitor and treat Hypoglycemia. Monitor for Addisonian Crisis

Addisonian Crisis (Adrenal Crisis)

Sign of Shock (Severe Hypotension, Tachycardia, Tachypnea, Pallor), Severe Headache, Weakness
Trigger: Infection, stress, trauma, abrupt discontinuation of corticosteroids.
Tx: IV Glucocorticoids, IV fluids with dextrose, Identify/Treat underlying cause.
Nurse: Monitor BP, Neurological Status, V/S, I&O, weight. Provide Bed Rest and quiet environment

Cushing's Disease & Cushing's Syndrome (Adrenal Hypersecretion)

Cushing's Syndrome is caused by exogenous use of **steroid medications**.
Patho: Hypersecretion of Glucocorticoids caused by hyperplasia of the adrenal cortex or pituitary gland tumor.
S/S: Upper body obesity and thin extremities (moon face, buffalo hump, neck fat). Skin fragility, purple striae. Osteoporosis. Hirsutism (Excessive hair growth on unexpected areas), **Hypertension**, sexual disfunction, **Immunosuppression**, Peptic ulcer disease, Backache, bone pain, tenderness.
Labs:
LOW Potassium/Calcium
HIGH Cortisol/Glucose/Sodium
Dx: Dexamethasone suppression test. CT, MRI, ultrasound to identify pituitary or adrenal gland tumor
Tx:
Surgery: Tumor excision, hypophysectomy, adrenalectomy.
Meds: Ketoconazole, Metyrapone, Mitotane (Inhibits cortisol synthesis).
Nurse: Restrict fluid and Sodium. Increase intake Potassium, Calcium and Protein. Monitor for fluid vol overload, pulmonary edema. Prevent injury from skin breakdown, bone fractures, GI bleeding. Prevent Infection.

HYPERALDOSTERONISM ≥CONN'S SYNDROME≤

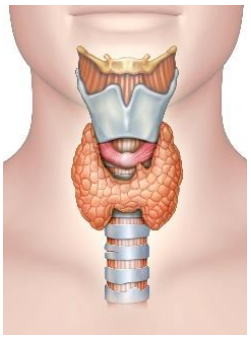
Hypersecretion of Aldosterone from the Adrenal Cortex, usually due to a tumor. Manifestations similar to Cushing's Syndrome
S/S: Hypertension, Weakness, fatigue, headache, tetany, polyuria and polydipsia.
Labs/Dx: Abdominal CT, MRI. Hypokalemia, Hypernatremia, Increased Aldosterone, Decreased Renin.
Tx: Adrenalectomy. Meds: Spironolactone, Eplerenone (blocks action of aldosterone).
Nurse: Monitor Potassium, BP, I&O, and Cardiac activity. Low-Sodium, High-Potassium diet

PHEOCHROMOCYTOMA

Hypersecretion of Epinephrine and Norepinephrine usually because of a tumor in Adrenal Medulla.
S/S: Hypertension, Headache, Hyperhidrosis (excessive sweating), Hypermetabolism, Hyperglycemia, Tachycardia, SOB.
Labs/Dx: 24hr urine test, CT, MRI, PET scan. Adrenal biopsy. Clonidine suppression test.
Tx: Tumor excision, adrenalectomy.
Meds: Calcium Channel Blockers (Nifedipine). Phentolamine and Propranolol prior to surgery.
Nurse: Do not palpate the abdomen, and avoid abdominal pressure, can cause hypertensive crisis. Don't assess for Costovertebral Angel tenderness, can rupture the tumor.

HYPOTHYROIDISM

Hyposecretion of Thyroid Hormones (T_3/T_4) by the Thyroid Gland, causing decreased metabolism.



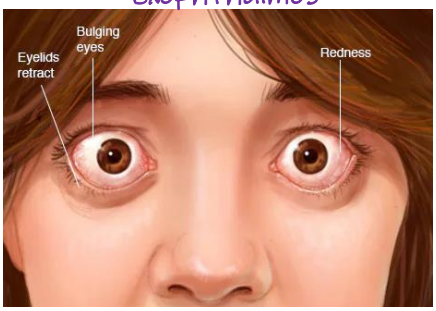
Primary: Injured Thyroid Gland, decreased T_3/T_4 production. Hashimoto's Disease (most common cause, autoimmune issue) causes antibodies to attack and destroy thyroid cells.
Secondary: Thyroid is not being stimulated by the pituitary to produce hormones (No TSH)
Tertiary: Problems with the Hypothalamus (No TRH; which stimulates TSH -> T_3/T_4).
S/S: Lethargy and fatigue, Hypotension, Bradycardia, Cold Intolerance, weight gain, constipation, Myxedema, thin hair, brittle fingernails, loss of memory.
Labs/Dx: Low T_3/T_4 , High TSH (in Primary hypothyroidism), Low TSH (in Secondary and Tertiary), anemia.
Tx: Levothyroxine (lifelong medication therapy).
Nurse: Give medication in the Morning, with empty stomach. Encourage low-calorie, low-cholesterol, low-fat diet. Daily weight. Encourage frequent rest periods.
Monitor for Med Overdose (Palpitations, tachycardia, restlessness, tremors, chest pain, insomnia).

Myxedema: Severe, life-threatening hypothyroidism
Causes: Untreated Hypothyroidism, Infection, Illness, abrupt stop Levothyroxine.
S/s: Hypotension, Bradycardia, Hypothermia, Hyponatremia, Hypoglycemia, Generalized Edema, Coma
Nurse: Maintain patent airways. Administer fluids, Levothyroxine Sodium IV, and Glucose IV. Corticosteroids. Monitor Temp hourly. Monitor LOC.

Endocrine System

HYPERTHYROIDISM

Exophthalmos



Hypersecretion of Thyroid Hormones (T_3/T_4) by the Thyroid Gland, causing Increased metabolism.
Primary: Grave's Disease (most common cause, autoimmune issue) or thyroid nodule – hypersecretion.
Secondary: Anterior Pituitary Gland Tumor (Increased TSH secretion)
Tertiary: Hypothalamus dysfunction (Increased TRH – stimulates TSH – Increase T_3/T_4 production
S/S: Tachycardia, Hypertension, Heat intolerance, **Exophthalmos** (bulging eyes), weight loss, insomnia, diarrhea, warm/sweaty skin.
Labs/Dx: Increased T_3/T_4 (primary hyperthyroidism), High TSH (secondary and tertiary Hyperthyroidism).
Tx: Thyroidectomy.
Meds: Antithyroid Medication (Methimazole or Propylthiouracil), Iodine solutions, Propranolol for Tachycardia.
Nurse: Provide High-calorie and high protein intake. Monitor I&O, weight daily, vital signs.
For Exophthalmos: Elevate HOB, low-salt diet, tape eyelids closed for sleep, give ophthalmic medicine, eye lubricant.

Post-op Thyroidectomy:
Semi-Fowlers position. Assess for signs of hemorrhage. Assess dressing. Assess for hoarseness. Assess for signs of tetany (Chvostek's and Trousseau's Sign), which may indicate **damage to parathyroid gland during surgery** (hypocalcemia). Gradually increase Range of Motion to the neck.

Thyroid Storm: Life-threatening condition when uncontrollable hyperthyroidism.
Causes: Severe infection, stress, DKA, thyroidectomy.
S/S: Fever, Tachycardia, Systolic Hypertension, N&V, irritability, delirium, tremors.
Tx:
Meds: Anti-thyroid medication, Beta blockers, antipyretics
Surgery: Thyroidectomy
Nurse: Maintain patent airways, monitor for dysrhythmias

HYPOPARATHYROIDISM

Hyposecretion of PTH, resulting in **Hypocalcemia** and **Hyperphosphatemia**. Caused by damage to the Parathyroid Gland during Thyroidectomy, or radical neck dissection.
S/S: **Hypocalcemia** ->Paresthesia, muscle cramps, tetany, **positive Chvostek's and Trousseau's Sign**. Numbness and tingling, seizure, dysrhythmias.
Tx: Calcium gluconate, calcium/vit D supplements, phosphate binders.
Nurse: Monitor ECG. High Calcium, Low Phosphorus diet. Give phosphate binders with meals.

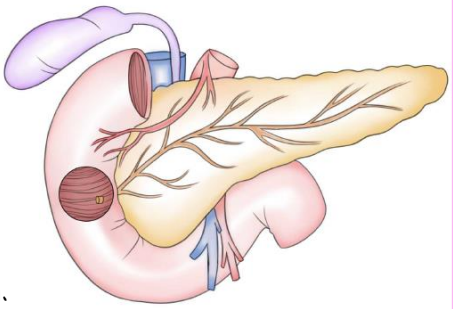
HYPERPARATHYROIDISM

Hypersecretion of PTH, resulting in **Hypercalcemia** and **Hypophosphatemia** (loss of calcium from the bones into the serum). Caused by tumor, renal disease or Vit D deficiency.
S/S: Kidney stones, osteoporosis, **Hypercalcemia** & **Hypophosphatemia**. Hypertension, Cardiac Dysrhythmias. Polyuria/Polydipsia. Constipation. N/V. Fatigue
Tx: Meds: Furosemide, phosphates, calcitonin.
Removal of adenoma, parathyroidectomy.
Nurse: Safety precaution prevention of fractures. Low Calcium, High Phosphorus diet. Increase fluids.

Pancreas – Diabetes Mellitus

PANCREAS DISORDERS

Pancreas has **Exocrine** (secretion of the pancreatic enzymes amylase, trypsin, and lipase, which aid with digestion) and **Endocrine** (secretion of insulin, glucagon, and somatostatin) functions.
Insulin lowers blood glucose by getting glucose into the cell.
Somatostatin lowers blood glucose levels.
Glucagon raises blood glucose by converting glycogen to glycose in the liver.



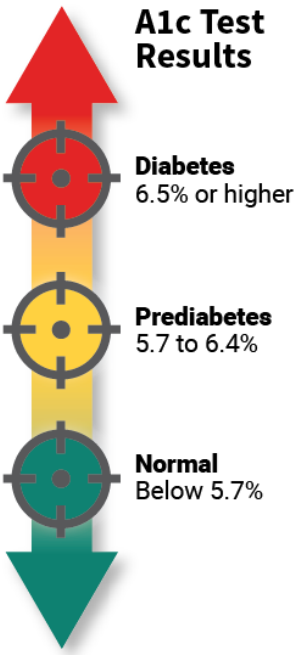
Diabetes Mellitus: Group or metabolic disorders characterized by Hyperglycemia caused by altered Insulin production, action, or both.

DIABETES TYPE 1

Diagnosed in **Children and Young adult**. **Insulin-Dependent**
1- Immune System attacks beta cells responsible for Insulin production.
2- NO Insulin in the bloodstream – Increase glucose
3- Fats are metabolized for energy, results in **Ketoacidosis**

DIABETES TYPE 2

1- Progressive Insulin resistance and Decreased Insulin production.
2- Related to **Obesity**, Inactivity and heredity.
3- Usually occurs over 35y/o. 80%-90% patients are obese



GESTATIONAL DIABETES

Develops during pregnancy. Detected at 24-28 weeks of gestation
Usually, glucose levels normalize at 6 weeks post-partum.
RISKs
Increased risk for C-Section, Perinatal death and neonatal complications.
Increased Risk for developing type 2 DM in 5-10 years

METABOLIC SYNDROME

Also known as Syndrome X. Insulin resistance leads to increased Insulin production to maintain glucose at a normal level. Characterized by: Hypertension, Hypercholesterolemia, and abdominal obesity.
If Beta cells can't produce enough Insulin to meet demands, Diabetes II develops.

DIAGNOSIS

Two or more, on different days:
- Casual Blood Glucose >200 mg/dL
- Fasting Blood Glucose >126 mg/dL
- Glucose >200mg/dL with OGTT
- HgbA1C >6.5%

TREATMENT

Insulin, Oral Hypoglycemic agents (type 2 only).
Goal with therapy: **HgbA1C <7%**

Diabetes Mellitus

HYPERGLYCEMIA

3 Ps (Polydipsia, Polyphagia, Polyuria), warm/dry skin, dehydration (weak pulse, decreased skin turgor), fruity breath odor / Kussmaul respirations (Increased rate and depth of respirations), N&V, weakness, lethargy, weight loss

HYPOGLYCEMIA

Mild: Hunger, Nervousness, Palpitations, diaphoresis, tachycardia, tremors, pallor
Moderate: Confusion, Double vision, drowsiness, emotional changes, headache, poor concentration, numbness of the lips, slurred speech.
Severe: Difficulty arousing, disoriented, loss of consciousness, seizures.

Nurse:
- Provide 15g of simple carbohydrate for conscious patients. Wait 15 min and recheck glucose. Give 15g more if glucose still <70 mg/dL. Give 7g of protein when glucose is normal.
- For patients with Severe Hypoglycemia (semi/unconscious) do NOT administer oral food or fluids (risk of aspiration). Treat with SC or IM glucagon 25-50 mL of 50% dextrose in water

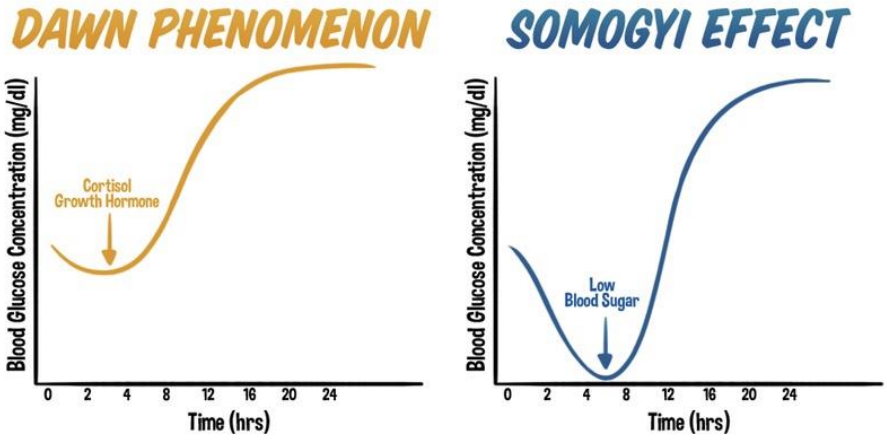
Simple Carbs:
6-10 Life Savers or hard candy. 4 tsp of sugar. 4 sugar cubes. 1 Tbsp of honey or syrup. ½ cup of juice or regular soft drink. 8oz of low-fat milk. 6 saltine crackers. 3 graham crackers.

DAWN PHENOMENON - SOMOGYI PHENOMENON

Both Are Hyperglycemic Conditions in The Morning, But with Different Mechanisms

Dawn Phenomenon: Characterized by Hyperglycemia when waking up because of excessive early morning release of GH and Cortisol.
Tx: Increase Insulin dose or change time of administration

Somogyi Phenomenon: Hyperglycemia when waking up as a response to Hypoglycemia at 2am-3am. Patient may complain of early morning headache, night sweats, or nightmares cause by early morning Hypoglycemia.
Tx: Decrease Insulin dose or give bedtime snack.



Diabetes Mellitus

DIABETES KETOACIDOSIS (DKA)

Life-threatening condition. Associated with Type 1. Related to Infection, Stress, missed Insulin dose.

Signs/Symptoms

- Rapid Onset (4-10 hours)
- Blood Glucose >250 mg/dL
- pH < 7.35 (Acidosis)
- Kussmaul Respirations (rapid, deep breathing)
- Dehydration, Abdominal Pain, Nausea, fatigue and weight loss, Weakness
- 3 Ps - Polyuria, Polydipsia, Polyphagia.
- Ketones in Urine, Fruity breath
- Hyperkalemia (because of acidosis).

Treatment:

1- Treat Dehydration - 0.9% Normal Saline
2- Lower Blood Sugar
>250: IV Regular Insulin only
-Add K+ during IV Insulin (levels decrease with treatment)
<200 or if Ketones resolve
SC Insulin + IV D5W
3- Hourly Glucose Checks + Heart Monitor (K+)

Insulin administration:

- Use short duration only.
- IV bolus Regular (5-10 units) before continuous infusion is begun.
- IV Insulin for continuous infusion prepared in 0.9%-0.45% NS. Always place Insulin infusion on an IV Infusion controller.

Nurse: Monitor patient for Increased ICP. If blood glucose falls too far or too fast, water is pulled from blood into the cerebrospinal fluid and the brain, causing cerebral edema and Increased ICP

HYPEROSMOLAR HYPERGLYCEMIC SYNDROME (HHS)

Extreme Hyperglycemia without Ketosis or Acidosis. Associated with Type 2. Related to inadequate fluid intake, Decreased Kidney function, Infection, stress, unmanaged Diabetes.

Signs/Symptoms

- Gradual Onset
- Blood Glucose > 600 mg/dL (Severe 600-2400mg/dL)
- 3 Ps - Polyuria, Polydipsia, Polyphagia.
- NO Ketones. NO Metabolic Acidosis.
- Potassium Normal or low.
- pH > 7.40
- Dehydration

Treatment:

1- Treat Dehydration – 0.9% NS
2- Lower Blood Sugar
IV Regular Insulin, then titrate with SC Insulin + IV D5W
3- Hourly Glucose Checks
4- Assess Rehydration: Stable BP, Pink skin, warm temp, Urine Output >30mL/hr.

CHRONIC COMPLICATIONS OF DM

- **Diabetic Retinopathy:** Chronic impairment of the retinal circulation that causes hemorrhage. Permanent vision change/loss can occur.
S/S: Blurred Vision from Macular edema. Sudden loss of vision from retinal detachment. Cataracts.
Tx: Early prevention (control HT/glucose levels. Photocoagulation to remove hemorrhagic tissue. Cataract removal.
- **Diabetic Nephropathy:** Progressive decrease in Kidney function.
S/S: Microalbuminuria, Thirst, Weight loss, Anemia, Fatigue, UTIs.
Tx: Early prevention (control HT/glucose levels). Monitor BUN/Creatinine/urine Albumin. Restrict Protein/Sodium/Potassium. Dialysis. Kidney transplant.
- **Diabetic Neuropathy:** Deterioration of the Nervous System.
S/S: Neuropathic pain, Nerve damage, Nonhealing ulcers of the feet, gastric paresis, erectile dysfunction.
Tx: Early prevention. Foot care.

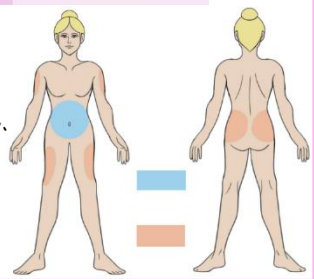
Foot Care
- Inspect feet daily using a mirror. Check shoes for objects.
- Wash feet with warm water and dry thoroughly.
- Avoid treating corns, blisters, or ingrown toenails.
- Apply moisturizer to feet, but NOT between toes.
- Wear loose, cotton socks and shoes (don't go barefoot or wear open-toe shoes).
- Cut toenails straight across.

Illness Care
- Monitor Blood Glucose more frequently when Sick. Do not skip insulin when Sick. Test urine for Ketones. Prevent dehydration. Drink 3L of water/day.

INSULIN

Insulin	Starts to Work In (hours)	Peak Action (hours)	Duration of Action (hours)	Maximum Duration (hours)	When to Take
Rapid Acting					
Lispro (Humalog)	15 to 30 minutes	1 to 2 hours	3 to 6 hours	4 to 6 hours	0 to 15 minutes before meal
Aspart (Novolog)	15 to 30 minutes	1 to 2 Hours	3 to 6 hours	4 to 6 hours	
Glulisine (Apidra)	15 to 30 minutes	1 to 2 hours	3 to 6 hours	4 to 6 hours	
Short Acting					
Regular	30 minutes to 1 hour	2 to 4 hours	3 to 6 hours	6 to 8 hours	30 minutes before meal
Intermediate Acting					
NPH	2 to 4 hours	8 to 10 hours	10 to 18 hours	14 to 20 hours	Does not need to be given with meal
Long Acting					
Glargine (Lantus)	1 to 2 hours	None	19 to 20 hours	24 hours	Does not need to be given with meal
Detemir (Levemir)	1 to 2 hours	None	19 to 20 hours	20 hours	

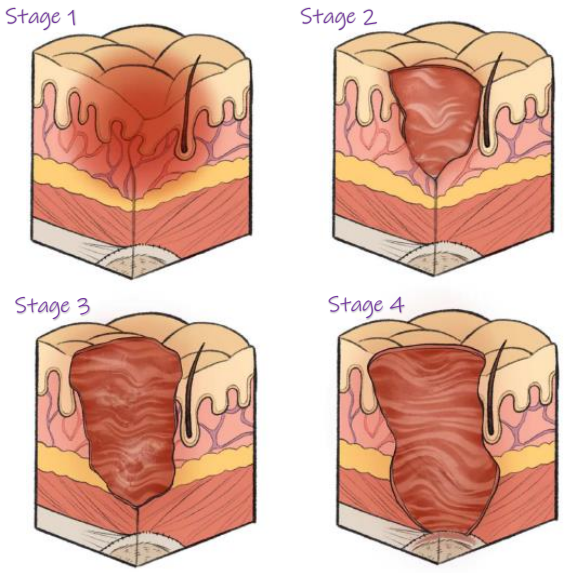
1- Inject air into the NPH (cloudy) FIRST (without touching the insulin)
NPH must be rolled between palms first (Never Shake the vial)
2- Inject remaining air into the Regular Insulin (clear), then withdraw the regular dose.
3- Withdraw the NPH dosage
- Long-Acting Insulin (Glargine, Detemir) CAN NOT be mix with any type of Insulin.
- Use a 45-90-degree angle



PRESSURE INJURY

Injury to the skin and underlying tissue due to prolonged pressure. Typically, over bony prominences. Tissue compression impairs blood flow, which leads to inadequate perfusion and oxygenation. This leads to cell death.

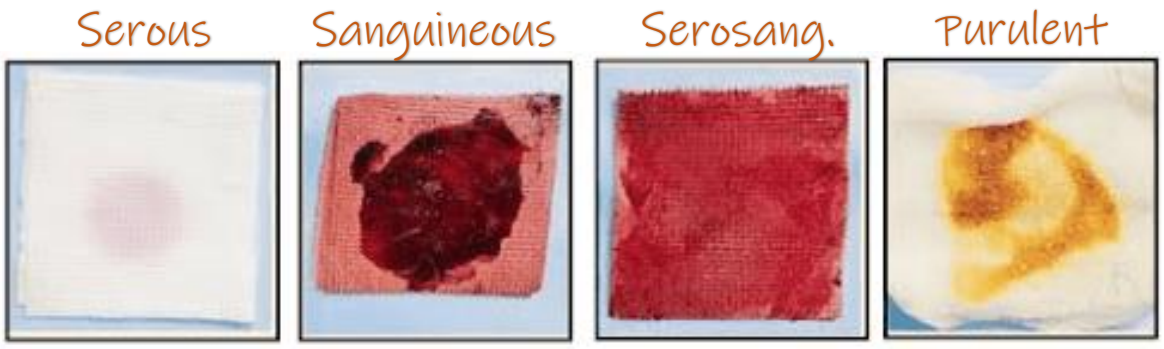
- **Stage 1:** Non-Blanchable but intact/unbroken skin
- **Stage 2:** partial-thickness injury, extends up to epidermis or dermis.
- **Stage 3:** full thickness injury extends past dermis FAT visible.
- **Stage 4:** full thickness injury extends past subcutaneous/ BONE visible.
- **Unstageable:** unable to see thickness layers due to excess exudate.
- Wound healing is promoted by a diet that is rich in protein and vitamin C.



Tx: Debridement (Surgical, chemical, mechanical) of necrotic tissue. Negative pressure wound therapy (wound vac), Hyperbaric Oxygen Therapy (HBOT), skin grafts/flaps.
Nurse: Turn patient every 2 hrs. Keep HOB <30 degrees to more evenly distribute pressure. Do not massage bony prominences. Ensure adequate nutrition, especially Protein.

DRAINAGE TYPES

- **Serous Exudate:** Clean wound. Watery in consistency & contains very little cellular matter. Consist of serum (straw colored fluid that separates out of blood when clot is formed)
- **Sanguineous:** Deep wounds or wounds highly vascular areas. Bloody drainage. Damage to blood capillaries. Fresh bleeding produces bright red drainage, whereas older, dried blood is darker, red blown color
- **Serosanguineous Drainage:** New wounds. Combination of bloody & serous drainage
- **Purulent drainage:** Thick, often malodorous, drainage that is seen in infected wounds. Containing pus, a protein-rich fluid filled w/WBCS, bacteria, & cellular debris.
- **Purosanguineous:** A mix drainage of pus and blood (newly infected wound).



WOUND HEALING

Phases

- **Inflammatory Phase:** From day of injury to 3-5 days. Phagocytosis of bacteria. Local Edema, pain, redness, and warmth. Vasoconstriction, platelet aggregation, clot formation.
- **Proliferative Phase:** Epithelialization (resurfacing with new skin cells. 2-3 days for incisional wounds). Granulation (Wound fills with scar tissue [collagen produced by fibroblasts]. 2-3 weeks for incisional wounds). Contraction (Reduction in wound size [open wounds only]).
- **Maturation:** May last 1 year. Scar tissue becomes thinner and is firm and inelastic on palpation.

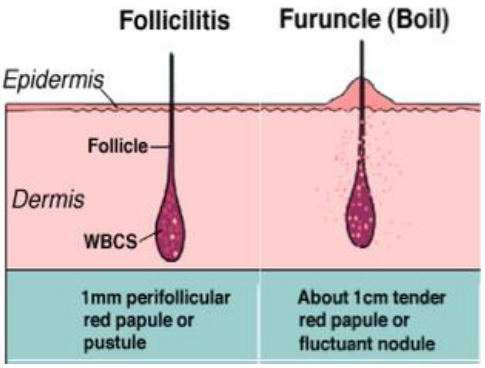
Healing By Intention

- **Primary Intention (1st):** Wound closed surgically, wound edges are approximated (sutures).
- **Secondary Intention (2nd):** Wound left open to heal through process of granulation contraction, and epithelialization.
- **Tertiary Intention (3rd):** Wound left open for Irrigation or Removal of debris and exudates. Once free of debris and inflammation, wound is closed by Primary Intention.

RF for Delay Healing: Age (old), decreased Immune System, impaired nutrition (low protein), decreased prefusion, smoking, diabetes.

BACTERIAL SKIN INFECTIONS

Folliculitis: Inflammation of a hair follicle. Small erythematous pustule. It usually resolves by itself. Topical Antibiotics can be used.



Furuncle (boil): Bacterial Infection of multiple hair follicles and the adjacent tissue. Large erythematous, pus-filled nodule. Solved by Warm compress, incision and drainage.

Cellulitis: Infection of deeper connective tissue. S/S: Erythema, warmth, pain, edema, fever malaise. Treated with Systemic Antibiotics

Cellulitis

FUNGAL INFECTION

Candidiasis

P: Imbalance in local flora allows for overgrowth of C. Albicans, which results in a mucocutaneous infection.
RF: Immunosuppression, Antibiotics, Pregnancy, Diabetes.
S/S: Red, irritated skin with itching and burning, white patches in the mouth (thrush), "cottage cheese" discharge (vaginal).
Dx: HOH test, clinical examination
Tx: Topical Antifungals.
Nurse: Keep skin clean and dry. Wear cotton underwear and avoid tight clothing to prevent vaginal candidiasis. Only take Antibiotics if Necessary (Antibiotics kills beneficial vaginal bacteria)

Oral - Thrush

Yeast Infection (a type of fungus)

Dermatophytosis

P: Direct contact with infected person/animal or item causes: ringworm, tinea pedis (athlete's foot), tinea cruris (jock itch), tinea capitis (head), or tinea corporis (body).

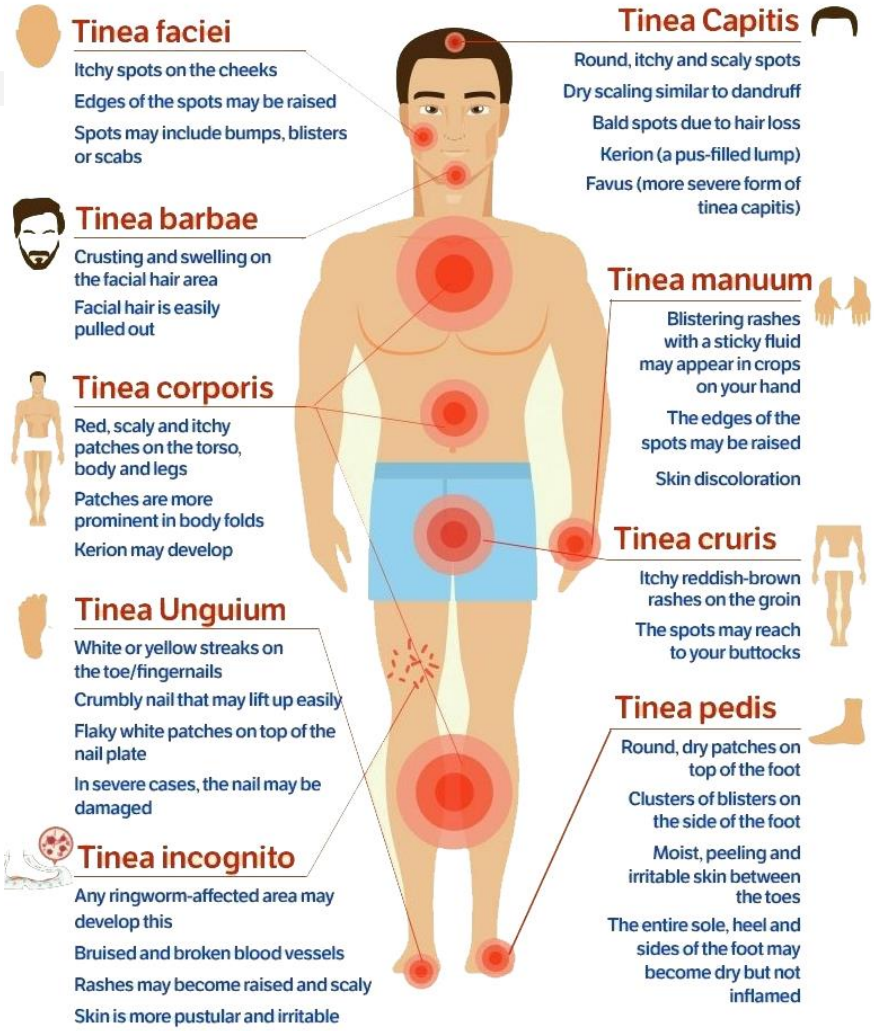
RF: Lockers room, infected pets, warm/moist skin.

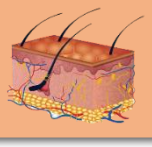
S/S: Itchy skin, ring-shaped rash, red/scaly/cracked skin, hair loss (tinea capitis).

Dx: KOH test, clinical examination.

Tx: Topical Antifungals, selenium sulfide shampoo for tinea capitis.

Nurse: Keep skin clean and dry, don't share personal items, wash hands after playing with pets.





HERPES SIMPLEX VIRUS (HSV)

HSV-1: Spread through contact with contaminated saliva.
HSV-2: Spread by sexual contact.
P: After infection with the Herpes virus, it remains dormant in the nerve ganglia and becomes reactivated during times of stress. Burning, pain and tingling may precede vesicles.
S/S: Painful vesicular or ulcerative lesions on the mouth/lips for HSV-1 and on the genitals for HSV-2. Fever, malaise
Labs: Clinical presentation, Type-specific HSV serologic test.
Tx: No Cure. Antiviral Medication (topical/systemic), analgesics, topical anesthetic agents.
Nurse: Condom use. Abstain from sex when active viral shedding (visible lesions).

Herpes Zoster (Shingles)

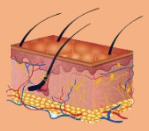
P: After a previous varicella infection, the herpes zoster virus remains dormant in the nerve ganglia until it becomes reactivated. Triggers include immunosuppression, infection, stress, fatigue.
S/S: Pre-Eruptive Phase: Abnormal skin sensations (burning), malaise, low-grade fiver 48 hrs before lesions appear.
Eruptive Phase: Painful, unilateral vesicular rash that runs along a dermatome, low grade fiver, paresthesia.
Labs/Dx: Clinical presentation, PCR test of vesicle.
Tx: Antiviral medication, analgesics.
Nurse: Isolate patient (airborne/contact precautions) until lesions have crusted. Avoid patient contact with people who haven't had chickenpox and are not vaccinated. Monitor for postherpetic neuralgia (pain that last more than 1 month after onset).
Prevention with Zostavax vaccine for adults >60 yo.

PSORIASIS

Autoimmune disorder results in overproduction of keratin in the epidermis. Characterized by periods of exacerbations and remissions. Causes erythematous plaques with silver scales. Non-Contagious.
S/S: Scaly patches, pitting/crumbling nails.
Labs/Dx: Clinical presentation, skin biopsy, increased uric acid.
Tx:
Meds: Topical steroids, immunosuppressants, coal tar.
Procedures: UV light therapy. Provide eye protection to patient. Psoralen may be taken beforehand to enhance the effects of UV light therapy.

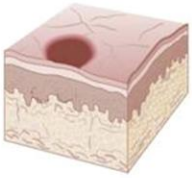
FROSTBITE

P: Damage to tissue/vessels as a result of prolonged exposure to cold
S/Sx: White plaque around redness, blisters, bluish skin and numbness of extremities
Tx: Re-warm slowly with moist heat + monitor CMS and for signs of compartment syndrome



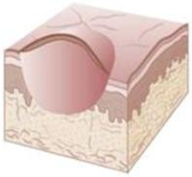
LESIONS

PRIMARY LESIONS



MACULE
Flat area of color change (no elevation or depression)

Example: Freckles

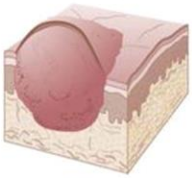


PAPULE
Solid elevation less than 0.5 cm in diameter

Example: Allergic eczema

NODULE
Solid elevation 0.5 to 1 cm in diameter. Extends deeper into dermis than papule

Example: Mole



TUMOR
Solid mass—larger than 1 cm

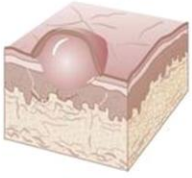
Example: Squamous cell carcinoma

PLAQUE
Flat elevated surface found on skin or mucous membrane

Example: Thrush

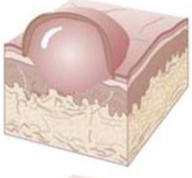
WHEAL
Type of plaque. Result is transient edema in dermis

Example: Intradermal skin test



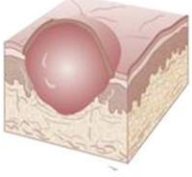
VESICLE
Small blister—fluid within or under epidermis

Example: Herpesvirus infection



BULLA
Large blister (greater than 0.5 cm)

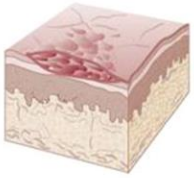
Example: Burn



PUSTULE
Vesicle filled with pus

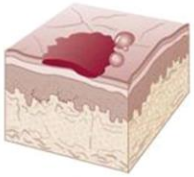
Example: Acne

SECONDARY LESIONS



SCALES
Flakes of cornified skin layer

Example: Psoriasis

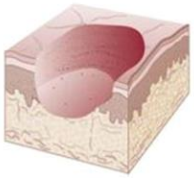


CRUST
Dried exudate on skin

Example: Impetigo

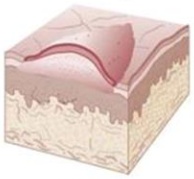
FISSURE
Cracks in skin

Example: Athlete's foot



ULCER
Area of destruction of entire epidermis

Example: Decubitus (pressure sore)



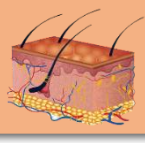
SCAR
Excess collagen production after injury

Example: Surgical healing

ATROPHY
Loss of some portion of the skin

Example: Paralysis

Burns

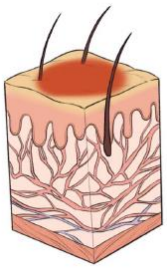


CLASSIFICATIONS

Thermal: liquid, steam, fire
Chemical: powder, gas (inhalation injury)
Electric: usually have an entry or exit wound. Injuries may be internal
Cold: Frostbite
Radiation: Dun, Radiation
Friction: Road rash

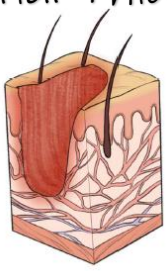
TYPES OF BURNS

Superficial - 1st Degree Burn



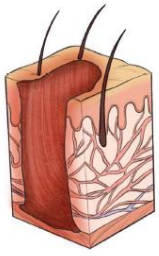
- Only affect Top Layer (Epidermis)
- No Blister or Scars
- Pink or Red
- May be Tender or Painful
- Some pain, minor Edema, and Erythema

Partial Thickness - 2st Degree Burn



- Epidermis and Dermis
- Raw, mottled, red appearance
- Skin is moist; May blister or need grafting
- Painful, blanching
- Shiny, Scars left behind; 2-6 weeks healing time

Full Thickness – 3rd Degree Burn

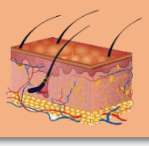


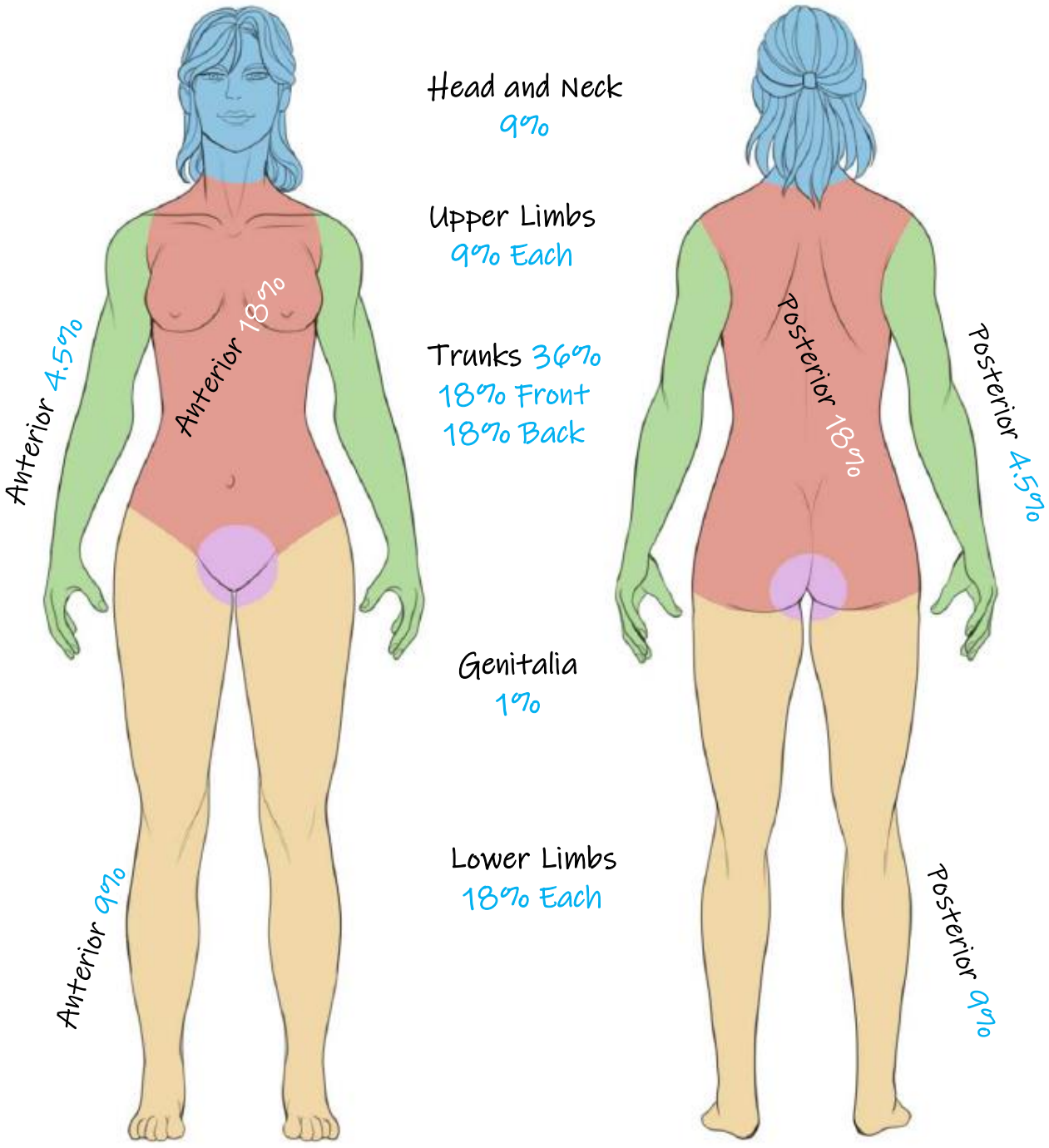
- Through all dermal layers; SQ tissue, muscle, bone, and/or organs involved.
- Nerves burnt away, so, little to no pain.
- May need grafting
- Eschar must be removed

NURSING CARE

- Ensure patient Tetanus shot if >5-10 years
- Watch for temperature loss = shivering
- Pain control – IV rout (best)
- Wound Care – Premedicate debridement – remove necrotic tissue
- No pillows for the ear or neck. Use rolled towel under shoulder
- Watch for Webbing

Rule of 9's - Burns





Head and Neck
9%

Upper Limbs
9% Each

Trunks 36%
18% Front
18% Back

Genitalia
1%

Lower Limbs
18% Each

Once stablished the total body surface area% burned, we use the **Parkland Burn Formula**, for 2nd and 3rd Degree Burn

4mL x TBSA % x Weight (Kg)

1st HALF of the Solution, over the 1st **8 Hours**
2nd HALF of the Solution, over the next **16 Hours** (½ in 8hrs, then ½ last 8hrs)

*TBSA% - Total Body Surface Area Burned

Hematology Disorders

IRON DEFICIENCY

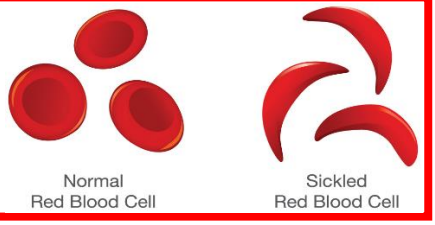
E: Inadequate diet, malabsorption, blood loss, hemolysis - microcytic & hypochromic
L: ↓Hgb, ↓Hct, ↓MVC, ↓MCH ↓MCHC retic. Serum iron, TIBC
S/Sx: Pallor, glossitis, Cheilitis, black stool
T: Replace iron, transfusion, diet teaching, emphasize compliance
R: Pregnancy, premenopausal women, blood loss, older adults, low socioeconomic backgrounds

COBALAMIN ≥B12≤ DEFICIENCY

MEGALOBLASTIC

E: Impaired DNA synthesis, GI surgery, ETOH, Smoking, *Gastric bypass, PPI use.
L: ↓B12, macrocytic RBCs, MCV >100
S/Sx: Neurological - tingling, paresthesia, beefy tongue, weakness
T: B12 injection or intranasally 1/week

SICKLE CELL DISEASE



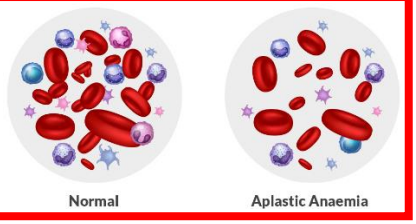
E: Genetically - Autosomal Recessive
L: Sickled RBC
S/Sx: Occlusions, necrosis, ↓perfusion, pain on exertion
T: Avoid ↑Altitude + ↑Temp, bone marrow transplant, O_2 therapy

FOLIC ACID DEFICIENCY ANEMIA

E: Celiac, Crohn's, alcoholism, hemodialysis, malabsorption
L: Macrocytic (MCV > 100) ↓folate
S/Sx: Weakness, fatigue, bruising, No neuro symptoms, weight loss
T: Replacement (green leafy veg) 1 mg/day tablet

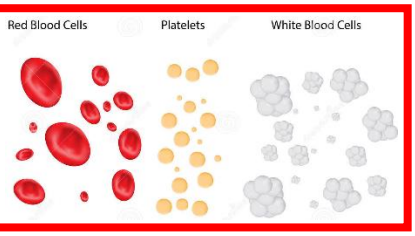
APLASTIC ANEMIA

PANCYTOPENIA



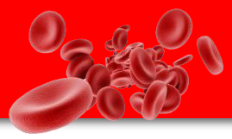
E: Infection or Autoimmune
L: ↓RBC ↓WBC ↓Platelets
S/Sx: Respiratory Fatigue, Weakness
T: Transfusion, ↑WBC, Bone Marrow Transplant

THROMBOCYTOPENIA



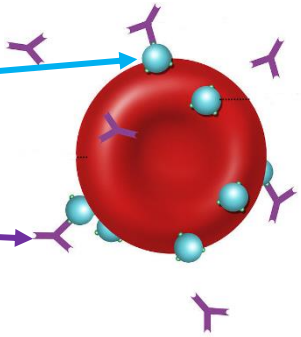
L: ↓Platelets ↑INR + ↑PT/PTT
S/Sx: Prolonged bleeding time.
T: Platelet Transfusion, Bone Marrow Transplant or Corticosteroid Treatment.
N: Avoid lacerations - use electric razors, monitor Hgb, Hct and bleeding times.

BLOOD



Antigens on the blood Identifies the cell

Antibodies protect the cell from certain antigens



BLOOD TYPE

A	A antigen [B antibodies]	Donates to: A, AB Receives from: A, O
B	B antigen [A antibodies]	Donates to: AB, B Receives from: B, O
AB	AB antigen [NO antibodies]	Donates ONLY to: AB Receives from: Universal Recipient
O	NO antigen [AB antibodies]	Donates: Universal Donor Receives ONLY from: O

BLOOD PRODUCTS

Contains:	Uses
RBC WBC Platelets Plasma	To Increase Oxygen Carrying capacity. Restoration of Blood Volume

	Contains:	Uses
	Fresh Frozen Plasma 1 Unit=250mL	Bleeding, r/t coag. factor deficiencies, DIC, Hemorrhage, Vit K Deficiency, Liver disease, Anticoagulated patients.
	Packed RBC 1 Unit=250mL Replaces 500mL Loss Will ↑ HgB 1%, HcT 3%	Increase RBC mass Symptomatic Anemia
	Platelets 1 Unit=50mL Rapid Infusion ↑ Platelets by 10,000/ Units	To Prevent / Control Bleeding
	Cryoprecipitate 6 pooled units prepared from Plasma, contains clotting factors	Significant hypofibrinogenemia. Hemophilia. Excessive anticoagulation DIC Von Willebrand's
	Albumin Moves water – intravascular space Infuse Slowly 5% Isotonic 25% Hypertonic	Hypovolemia Shock Burns Peritonitis Pancreatitis Post-Op Albumin Loss
	Washed RBC Rinsed w/ 1-3L of NS	Given when there is an anticipated risk of Reaction

Adverse Effects
- Pulmonary Edema
- CHF Precipitation
- HTN
- Anaphylaxis
- Hypervolemia
- Tachycardia

Blood Transfusion Therapy NOTES

Overview

Used to replace blood volume, preserve oxygen-carrying capability, or increase coagulation capabilities; autologous blood transfusions: donating your own blood before anticipated surgery; religious considerations.

Initiating a Blood Transfusion

Type and cross-matching; informed consent; infuse each unit of blood within 2 to 4 hours; begin with normal saline with Y administration set to prime tubing; do not infuse any solution containing dextrose (causes blood to lyse or be destroyed); inspect for leakage, unusual appearance (bubbles or purplish color indicate contamination); roller clamp; remain with patient for first 15 to 20 minutes; after transfusion, flush tubing with normal saline; if giving more than one unit, use fresh tubing.

Blood Transfusion Reactions

- "Not feeling right," sense of impending doom, chills, fever, low back pain, pruritus (itching), hypotension, nausea and vomiting, decreased urine output, back pain, chest pain, wheezing, dyspnea (BRONCO CONSTRICTION) ; stop infusion immediately; infuse normal saline solution with new tubing then call provider; keep remaining blood product and send it back to pharmacy, lab, or blood bank for analysis; document all findings; reactions generally happen within first 15 minutes but some reactions occur 60 to 90 minutes or days to weeks later; asses for circulatory overload.
- LOW BACK PAIN DUE TO KIDNEY PAIN/ENLARGEMENT. (SYSTEM WIDE INFLAMMATION) LOW BACK PAIN = BAD
- FEVER IS A SIGN OF INFLAMMATION & INFECTION

Nursing Process

Data Collection / Patient Problems

- Assess risk for fluid, electrolyte, and acid-base imbalances and presence of alterations; monitor vital signs, height, weight, neurological function, intake and output, laboratory studies, past and present medical history, medication history.
- The RN will choose the patient problem such as "compromised blood flow to tissue," "inadequate fluid volume," etc. The LPN must act accordingly.

Expected Outcomes and Planning / Goal / Outcomes

- Prioritize fluid, electrolyte, and acid-base balance.
- Baseline normal vital signs, normal skin turgor, moist mucous membranes, baseline weight, no edema, clear breath sounds; normal urine electrolytes ABG's, intake and output.

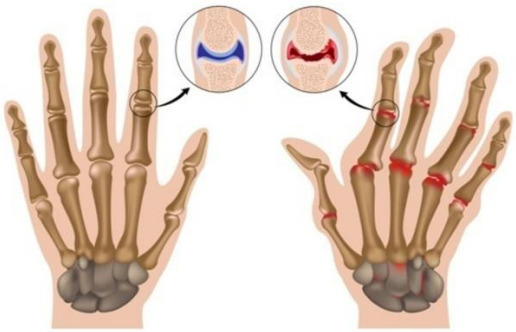
Implementation / Evaluation / Goal / Evaluative Measures

- Prevention of fluid, electrolyte, and acid-base imbalances.
- Obtain daily weight, vital signs, intake and output; auscultate lung sounds, check oral mucous membranes, check tissue turgor, monitor serum electrolyte levels.

Musculoskeletal Disorders

RHEUMATOID ARTHRITIS

P: An autoimmune response that causes deformities
S/Sx: Fatigue, anorexia, stiffness, weight loss
Event may trigger: Childbirth, Infection, Stress
Permanent deformity, Symmetrical
Dx: Rheumatoid factor- Blood Test + - >60 u/mL
↑ Erythrocyte sedimentation rate (ESR) -non specific
CRP, ANA
Radiology showing joint space deterioration
C: Nodular myositis, contractures Sjogren's syndrome, cataracts
Tx: Surgery to restore function



OSTEOPOROSIS

P: Bone demineralization caused by loss of calcium and phosphorus. Bone resorption occurs faster than bone formation
S/Sx: Loss of bone density and easily fractured bones
N: Encourage a well - balanced diet high in protein, calcium, iron, vit D + C

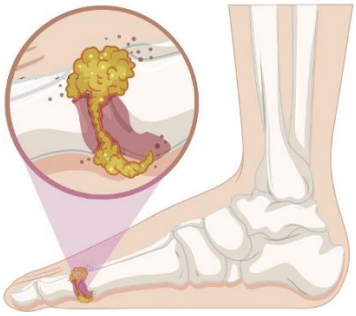
OSTEOARTHRITIS

P: On inflammatory degeneration, gradual loss of articular cartilage. Asymmetrical
R: trauma, aging, obesity, smoking, ↓estrogen, genetic changes
S/Sx: Exacerbated by temperature + climate changes. Joint space narrowing. One leg shorter than other. Pain is increased after rest
T: Regular exercise -> preventative. Avoid prolonged standing, kneeling and squatting. Apply cold for inflammation / Heat for stiffness

HERNIATED DISK

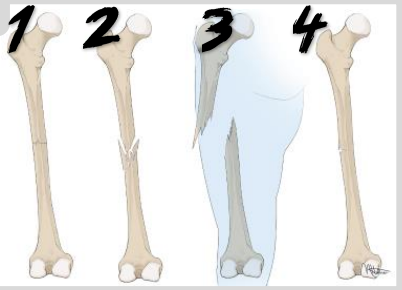
P: A vertebral disk slips out of place which can cause pain due to compression of spinal nerve
R: Numbness and tingling in back and extremities. Severe pain.
Tx: Surgery to realign vertebra, physical therapy and adjustment by a chiropractor can alleviate pain but doesn't fix the herniation

GOUT



P: Uric acid crystals build up in joints and body tissues. Can result from poor metabolism of purine
S/Sx: Swelling + inflammation of joints, low grade fever, malaise, itchiness + pain at joints
N: Low purine diet, increase fluid intake.
Ed: Instruct client to avoid alcohol and excessive use of the joint

FRACTURES



1- Transverse: A break that is perpendicular to the long axis
2- Comminuted: The bone fragments into pieces
3- Open / Compound: Part of the bone is through skin
4- Greenstick: The bone is splintered on one side

CASTS

N: Elevate for 24-48 hours to promote venous drainage. Allow plasters casts to dry for 24-72 Hours
Ed: Instruct client to report skin irritation and hot spot

TRACTION

N: Ensure weights are freely hanging + off the floor. Assess skin integrity frequently with skin traction

FRACTURE COMPLICATION

Fat Embolism: Altered mental status, impaired respiratory function, decreased perfusion distal to embolus site.
Compartment Syndrome: Pressure is an extremity that can't escape, i.e., under a cast.
Numbness + tingling, pain that increase with elevation, Pallor, pain W/ Movement

JOINT INJURIES

Sprains: The ligament connecting two bones becomes torn or stretched
sTrains: The muscle or Tendon attached to a bone becomes injured or over stretched

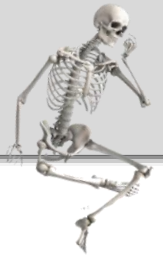
AMPUTATION

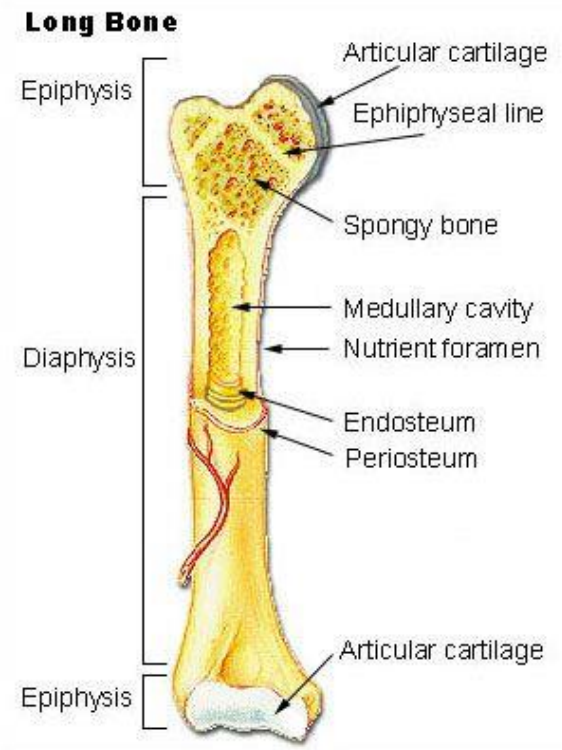
Ensure residual limb sock is worn at all times, position is prone position as prescribed. Educate patient about cleaning prosthesis socket daily.

Above Knee: Prevent internal and external rotation of the hip
Below Knee: Discourage long period of sitting to reduce Flexion.
Don't allow limb to dangle

R
I
C
E

Musculoskeletal Disorders





Active range of motion: Can move joint without assistance

Passive range of motion: Can only move w/ assistance

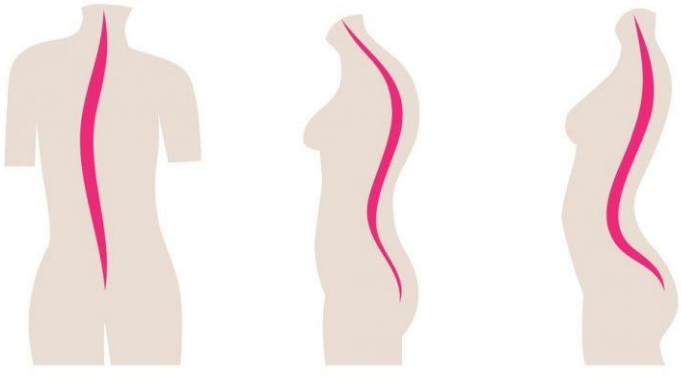
Goniometer: Measures range of motion of a joint

Muscle Strength Scale

0 = No muscle contraction
1 = A barely detectable contraction
2 = Active muscle contraction without gravity
3 = Active muscle contraction against gravity
4 = Active muscle contraction against some resistance
5 = Active movement against full resistance

Abnormalities

Atrophy: Decrease Size / Strength of a muscle
Ankylosis: Stiffness at a joint
Kyphosis: Thoracic curvature of spine
Myalgia: General Muscle Pain / Tenderness
Scoliosis: Asymmetrical elevation of shoulders
Paresthesia: Pins + Needles
Lordosis: Excessive inward curve of spine (pregnancy)



Diagnostics

X – Ray: Remove any radiopaque obj.
CT scan: Verify no shellfish allergy if contrast dye is used
Bone Scan: Ensure bladder is empty

ASSESS

- Joints + muscles for crepitation or tenderness
- Muscle strength
- Range of motion

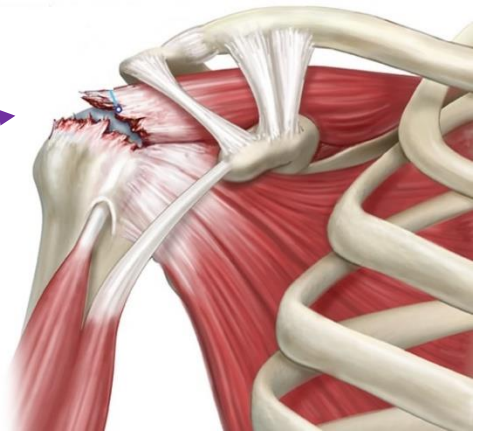
Fall Prevention

- Eliminate scatter rugs
- Use supportive shoes that have good grip
- Use a walker or cone for support

Musculoskeletal Disorders

SPORT RELATED INJURY

Impingement Syndrome
Soft tissue/nerves trapped under coracoacromial arch
Give: NSAIDS, Rest, ROM + Strengthening



Rotator Cuff Tear
Rest, NSAIDS + Strengthening + Surgery if Severe

Shin Sprints
Periostitis in calf -> ice, stretching + supportive shoes

Tendonitis
Inflammation of a tendon -> Rest, Ice, NSAIDS, brace, gradual return

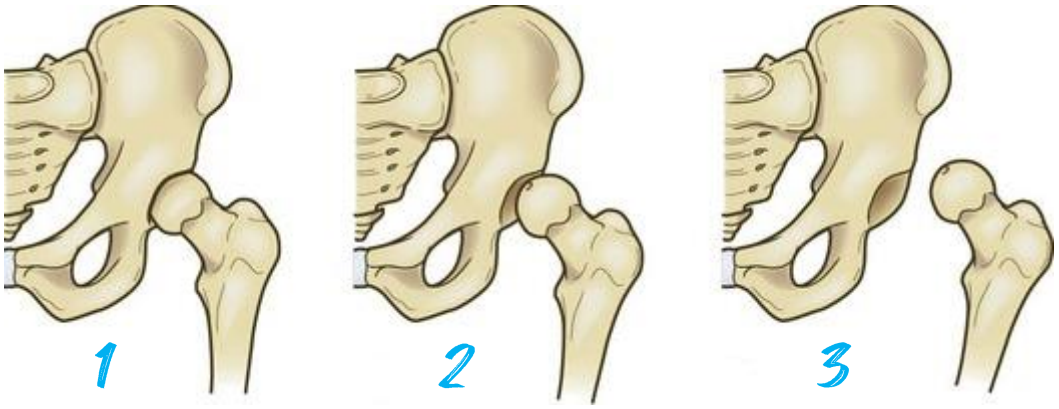
Meniscus Injury
Injury to fibrocartilage discs in knee -> R.I.C.E and arthroscopic surgery PRN

DISLOCATION / SUBLUXATION

Dislocation: Complete displacement or separation of the articular surfaces of a joint
Subluxation: Partial or incomplete dislocation

Nursing Care
Dislocation is an orthopedic emergency r/t the risk of vascular injury. Assist with realignment and pain management. Physical therapy and Rom exercise are imperative to achieve full recovery

1- Normal
2- Subluxation
3- Dislocation



Fractures

COMMON FRACTURE TYPES

Colles' Fracture: Fracture of the distal radius

TX: Closed reduction

Long Bone Fracture

TX: Immobilization, traction, int./ext. fixation

Hip Fraction

TX: Hip compression screw, partial replacement or total replacement

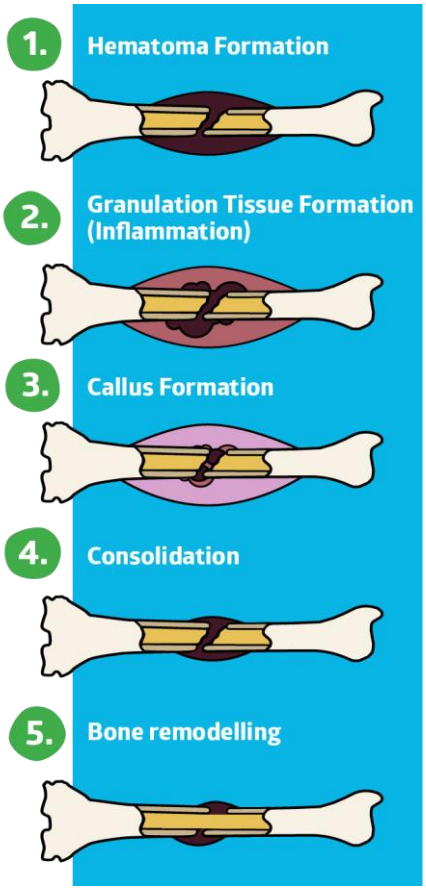
N: encourage early ambulation, assess color, temperature, cap refill, pulses, edema, sensation motor function + pain, do not position on the affected side. Do not allow > 90° knee flexion

Ed: Teach pt. to avoid crossing legs, internally rotate hip or sit in the low chairs

Stable Vertebral Fracture

TX: Immobilize spine, evaluate existence of cord damage, pain meds, kyphoplasty

FRACTURE HEALING



POSSIBLE COMPLICATIONS

Infection: A serious complication

Tx: Antibiotics + surgical debridement

Compartment Syndrome

Swelling causes increased pressure that can compromise nerves and blood vessels.

S/Sx: pain, pressure, paresthesia pallor, paralysis, pulselessness. Cool skin at extremities

Tx: Do not elevate or apply cold.

Fat Embolism

Fat globules from the fracture travel to the lungs, blood vessels or other organs

S/Sx: tachypnea, cyanosis, dyspnea, and low O_2 sat.

Tx: Fluid resuscitation, blood transfusion, intubation

N: encourage cough + deep breathe, provide O_2 therapy

NURSING CARE OF THE ORTHOPEDIC PATIENT

TRACTION

Pulling force to an affected extremity
- Reduces muscle spasm
- Immobilizes
- Reduces a fracture
- Can treat pathologic joint conditions

Skin Traction
- short term (48-72 hours)
- reduce muscle spasms
- applied directly to the skin
- 5-10 pounds

Skeletal Traction
- Long term (>72 hours)
- alignment of bone
- pins or wires are surgically inserted into the bone
- 5-45 pounds

NURSING CARE

1. Ensuring traction weights never touch the floor
2. Keep patient in the correct body alignment to enhance traction
3. Assess for S/Sx of Compartment Syndrome
4. If pulleys are being used, make sure knots have enough slack
5. Check skin integrity around pins or skin traction site frequently
6. Apply ice to prevent swelling
7. Suggest the use of a hairdryer on cool to help relieve itching
8. Teach pt. importance of keeping proximal joints mobile
9. Ensure pt. never inserts any objects inside the cast

Possible Complications

Atrophy: teach isotonic muscle strengthening
Muscle Spasms: heat application reduces spasms
Contracture: reposition frequency + provide ROM
Pain: determine / treat underlying cause

CASTS

A device used for long term immobilization / Allows freedom to perform most ADLS
Hip spica cast: used for femur fx in children
Body jacket brace: used for stable spiral spinal injury

NURSING CARE

- Never cover a plaster cast until it's dry because the heat will build up and cause a burn
- Handle with an open palm to avoid denting
- Ensure edges of cast are smooth to avoid skin irritation or breakdown
- Check color, temperature, cap. refill and pulses
- monitor for S/Sx of compartment syndrome
- S cast on a lower extremity should be elevated for the first 24hrs after application
- When a sling is used, ensure the axillary area is well padded.

Reproductive Disorders

FIBROCYSTIC BREAST CONDITION

Non-cancerous changes in the breast that includes fibrotic connective tissue and cysts.
P: Hormone imbalance (High estrogen and Low Progesterone) results in hyperproliferation of fibrotic connective tissue.
R/F: Estrogen and anti-estrogen treatment, 35-50 y/o female.
S/S: Breast pain. Movable, tender, rubber-like cysts (commonly occur bilaterally in the upper-outer quadrants of the breasts).
Dx: Breast ultrasound, mammogram, biopsy.
Tx: Supportive measures (analgesics, supportive bra, ice/heat). Symptoms resolve after menopause (decrease estrogen).

POLYCYSTIC OVARIAN SYNDROME (PCOS)

P: Abnormalities with the metabolism of androgens and estrogen
S/Sx: Hirsutism, Infertility, Diabetes, Sleep Apnea, Obesity and menstrual dysfunction
Tx: Diet, Exercise, Weight loss, Oral contraceptives, anti-androgens, hypoglycemic agents

ENDOMETRIOSIS

P: The endometrium lining the uterus growth in places it should not which can cause cramping or infertility
S/Sx: Intense pelvic pain. Painful intercourse, diagnosis is confirmed by laparoscopy
Tx: Monitor for S/Sx of anemia during menses, educate about the importance of annual exams, help patient relieve painful cramp with ordered meds and heat compress

PELVIC INFLAMMATORY DISEASE

P: Infection of the reportative system usually caused by STDs
S/Sx: Pelvic pain, fever, discharge, cramping, painful menses
Tx: Antibiotics, education about using protection

MENSTRUAL DISORDERS

Menorrhagia: Prolonged or excessive menstrual bleeding. Can result in anemia
Dysmenorrhea: Painful menstruation.
Amenorrhea: Absence of menses. Causes include pregnancy, tumors, endocrine lesions, weight loss, Cushing's syndrome.
PMS: Varying symptoms (irritability, depression, breast tenderness, bloating, headache) that occur prior to menstruation.

PELVIC ORGAN PROLAPSE

Uterine Prolapse: Pelvic floor muscles and ligaments weaken, causing the uterus to protrude into vagina.
Cystocele: Protrusion of the bladder through the anterior vaginal wall, can cause UTI, stress incontinence.
Rectocele: Protrusion of the rectum through the posterior vaginal wall, which can cause constipation and hemorrhoids.
R/F: Pregnancy/childbirth, obesity, chronic constipation, decreased estrogen.
Tx: Kegel exercises, vaginal pessaries, intravaginal estrogen, surgical repair.

Reproductive Disorders

VARICOCELE

P: An enlargement of the veins in the scrotum caused by blood pooling in veins
S/Sx: A Dull, recurring pain in the scrotum, visibly large and twisted veins, a lump or swelling
N: Encourage pt to wear supportive underwear or jock strap.

STERILITY

P: Inability to reproduce as a result of various causes including low sperm count, chromosomal abnormalities or inadequate hormones
Tx: Hormone replacement, fertility drugs, surgery, artificial insemination, Psychosocial counselling to help pt. develop coping methods

ERECTILE DYSFUNCTION

P: Inability to keep an erection long enough for sexual intercourse
Tx: Vasodilator or hormone therapy, Smoking Cessation. PDE-5 inhibitors (sildenafil)

PRIAPISM

P: Uncontrolled, prolonged painful erection without sexual desire.
Complications: Circulation impairment and inability to void.
Tx: Urinary catherization, cavernous aspiration, vasoconstrictors, surgical intervention.

BENIGN PROSTATIC HYPERPLASIA (BPH)

P: Decreased androgenic hormones with aging causes enlargement of the prostate. This impairs urine outflow from the bladder, resulting in urinary retention, high risk of infection and reflux into the kidneys.
S/S: Urinary frequency, incontinence, urgency, hesitancy, retention. Post-void dribbling, reduced urinary stream force. Hematuria, nocturia. Frequent urinary tract infections.
Labs/Dx: DRE, High PSA (>4ng/mL), High WBCs w/ UTI, High creatinine and BUN w/ kidney involvement.
Tx: Meds: Finasteride, tamsulosin, tadalafil. Surgery: Transurethral resection of the prostate (TURP)

TESTES DISORDERS

Hydrocele: Fluid collection that forms around the testis, causing painless swelling in the testicle. Common in newborns or r/t scrotal injury, inflammation.
Spermatocele: Sperm-containing cyst on the epididymis, usually asymptomatic.
Testicular Torsion: Twisting of the spermatic cord, inhibiting blood flow of the testicle and causing severe pain and swelling. Immediate surgical repair required.

TRANSURETHRAL RESECTION OF THE PROSTATE (TURP)

Continuous Bladder Irrigation with 3-way catheter. The goal is to keep irrigation outflow light pink. Increase CBI rate of outflow is bright red or contains clots.
For catheter obstruction (S/S: bladder spasms, low outflow), turn off CBI and irrigate using large piston syringe. Expected: Patient will feel a continuous need to urinate.
Meds: Analgesics, antispasmodics, antibiotics (prophylactic), stool softeners (to prevent straining).
Nurse: Drink >2L of water per day. Avoid caffeine of alcohol. If urine is bloody, stop activity, rest, fluids.

Immune System

IMMUNITY

Active Natural Immunity: Body produces antibodies in response to exposure to a live pathogen.
Active Artificial Immunity: Body produces antibodies in response to a vaccine.
Passive Natural Immunity: Mom passes antibodies to her baby through the breast milk or the placenta.
Passive Artificial Immunity: Immunoglobulins are administered to an individual (not produced by the body, therefore no memory cells for antigen).

IMMUNE SYSTEM MALFUNCTION

Hypersensitivity: Exaggerated or inappropriate response upon exposure to an antigen (allergen), resulting in inflammation and destruction of healthy tissue.
Autoimmune Reactions: Body's normal defenses recognize self-antigens as foreign and target them. Caused by genetic, hormonal, and environmental factors.
Immunodeficiency: Absent or depressed immune response, due to viral infections, medications, or genetic disorders. Places the patient at higher risk for infection.

SYSTEMIC LUPUS ERYTHEMATOSUS (SLE)

Chronic, Progressive, systemic Inflammation disorder that can cause major organs and systems to fail. There is No cure for the disease. Discoid Lupus Erythematosus (DLE) affects only the skin.
P: Autoimmune disorder results in production of **Antinuclear Antibodies (ANA)**, leading to inflammation and damage to most major body systems (skin, lungs, kidneys, heart, etc.). Characterized by periods of exacerbations and remissions.
R/F: **Females**, ages 20-40, race (**African American**, Asian, Native Americans).
S/S: Butterfly rash on face, Fatigue, joint pain, fever, Raynaud's phenomenon, anemia, pericarditis, lymphadenopathy.
Labs/Dx: **Positive ANA titer**, decreased serum complement (C3, C4).
Low RBC, WBC, platelets. High BUN and Creatinine with kidney involvement.
Tx: NSAIDs, Immunosuppressants (prednisone, methotrexate), Hydroxychloroquine, topical steroid creams for rash.
Nurse: **Monitor Blood Urea Nitrogen and Creatinine frequently for signs of Renal Failure.** Avoid UV/Sun exposure and sick people. Rest frequently

POLYARTERITIS NODOSA

Collagen disease. Form of systemic vasculitis that causes inflammation of the arteries in visceral organs, brain, and skin. Affects middle age MEN.
S/S: Weakness, abdominal pain, bloody diarrhea, weight loss, Elevated ESR
Tx: Similar to SLE

PEMPHIGUS

Rare autoimmune disease. Treatment aimed to suppress the immune response and blister formation
S/S: Partial-thickness lesions bleed, weep and form crusts. Weakness, pain, dysphagia, **Nikolsky's Sign** (separation of the epidermis by rubbing the skin), foul smelling discharge from skin. Leukocytosis.
Tx: Corticosteroids, cytotoxic agents, antibiotics, soothing baths.

SCLERODERMA ≥SYSTEMIC SCLEROSIS≤

Chronic inflammation Connective Tissue Disease. Similar to SLE.
P: Autoimmune disorder results in damage and occlusion of blood vessels, and overproduction of collagen, which causes tissue inflammation, fibrosis, and sclerosis (hard).
-**Limited**: Skin thickening limited to distal extremities and face
-**Diffuse**: Skin thickening over most of the body and organ involvement.
R. Factors: Female (30-50 yo)
S/S: Pain, Arthralgia (joint pain), Raynaud's phenomenon, pitting edema in hands with **taut/shiny skin**, GI disfunction (reflux, dysphagia), arrhythmias and dyspnea (cardiac and pulmonary fibrosis), malignant hypertension (renal involvement).
Labs/Dx: Positive ANA tites, High ESR
Tx: No cure. Immunosuppressants, ACE Inhibitors
Nurse: Skin moisturization, frequent rest periods. Avoid stress, cold hands/feet (Raynaud's)

HUMAN IMMUNODEFICIENCY VIRUS

P: Retrovirus that causes Low Immunity and High Susceptibility to Infections. Virus targets CD4+ lymphocytes (helper T-cells), causing immunodeficiency, autoimmunity, and neurologic dysfunction.
R. Factors: Unprotected sex, multiple sexual partners, perinatal exposure, IV drug use, health care workers.
S/S: Flu-like symptoms, lymphadenopathy, thrush, weakness, night sweats, fever, weight loss, rash.
Labs: Low WBC, CD4+ count <500 cells/mm_3
Dx: Positive ELISA test, **confirmed with Western** Blood Test.
AIDS criteria: CD4+ <200 cells/mm_3
S/S: Kaposi's Sarcoma, TB, Pneumonia, wasting syndrome, candidiasis on the airways, and + infections.
Tx: Antiretroviral Therapy
Nurse: Practice safe sex. Encourage PrEP (pre-exposure prophylaxis) for uninfected partners. Monitor CD4+ counts. Prevent Infections (hand hygiene, bath with antimicrobial soap, avoid raw food, etc).

GOUT

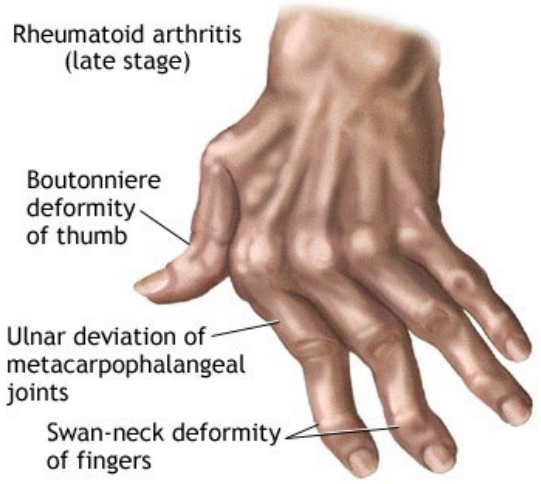
Gout or Gout Arthritis is the most common inflammatory arthritis. Systemic disease caused by disruption in purine metabolism, and uric acid crystal are deposited in joints and body tissues.
Primary Gout (<u>most common</u>): Uric acid production > excretion of it by the kidneys.
Secondary Gout: Excessive Uric Acid in the blood caused by another disease (Chronic Kidney Failure, Carcinomas, excessive diuretic use).
R. Factors: Obesity, Heredity, Cardiovascular Disease, Alcoholism, Diuretic use, Chemo, CKF
S/S: Severe Joint Pain, redness, swelling, and warmth of affected joint.
Labs: BUN and Creatinine Elevated, Urinary Uric Acid elevated.
Dx: Aspiration of synovial fluid for analysis or uric acid crystals in affected joints.
Tx:
-**Acute Gout:** Antigout Agents (Colchicine), NSAIDs, Corticosteroids (Prednisone).
-**Chronic Gout:** Allopurinol or Febuxostat. Uricosuric (Probenecid), Enzymes (Pegloticase).
Nurse: Low Purine Diet (no organ meats or shellfish). Avoid alcohol, starvation diets, aspirin, and diuretics. Increase fluid intake.

FIBROMYALGIA

Chronic Pain syndrome that manifests as Pain, Stiffness, and tenderness at trigger points in the body.
R. Factors: Female (30-50 yo), Hx of Rheumatologic conditions, Lyme disease, trauma, influenza
S/S: Chest Pain, dysrhythmias, dyspnea, fatigue, numbness/tingling of extremities, headaches, jaw pain, depression, abdominal pain, heartburn.
Tx: SNRIs and Anticonvulsants. Duloxetine (SNRI) and Pregabalin (anticonvulsant). NSAIDs, Tricyclic Antidepressants.
Nurse: Limit caffeine, alcohol. exercise regularly, complementary therapies.

RHEUMATOID ARTHRITIS (RA)

RA is a Chronic-Progressive-Inflammatory Disease that affects Tissues and Organs, but principally attacks the Joints, producing inflammatory synovitis. RA typically affects upper joints first.
P: Autoimmune disease where WBCs attack synovial tissue, causing it to become inflamed and thickened. Inflammation can extend to cartilage, bone, tendons, and ligaments, resulting in Joint deformity and bone erosion.
RA has periods of Exacerbation and Remission.



R. Factors: Female, Age 30-60 yo, Epstein-Barr virus, Environmental factors, stress and smoking. Genetic link HLA-DR4
S/S: Morning Stiffness, Pain, Pleuritic pain, Xerostomia, Anorexia, fatigue, Paresthesia, Subcutaneous nodules, fever, Lymph node enlargement.
- Joint Swelling and Deformity (these are late manifestations of RA). Joint swelling, warmth, and erythema are common. Finger, hands, wrists, knees, and foot joints are most affected. Finger joints affected are the proximal interphalangeal and metacarpophalangeal joints. **Ulnar deviation, swan neck, and boutonniere deformities in fingers.**
Labs: Anti-CCP antibodies Positive. Rheumatoid factor antibody (1:40-1:60). High ESR (ESR is associated with inflammation or infection). C-reactive protein (inflammation if elevated). Antinuclear Antibody (ANA) titer. High WBCs.
Dx: Arthrocentesis (synovial fluid aspiration by needle). X-ray
Tx: NSAIDs, COX-2 enzyme blockers, Corticosteroids (Prednisone). Disease Modifying anti-rheumatic drugs (DMARDs). Hydroxychloroquine, Sulfasalazine, Methotrexate, Etanercept, Infliximab.
Procedures: Plasmapheresis, Total Joint arthroplasty, Synovectomy
Nurse: Morning Stiffness (hot shower), Pain in hands (heated paraffin), Edema (cold therapy).

CANCER

CARCINOMA

P: Any cancer originating in the epithelium
S/Sx: A growing lump with a crusty surface, slow growing flat patch of redness
R: Overexposure to sun, repetitive irritation, genetic predisposition, lighter skin, older than 60 years

SARCOMA

P: Cancer originating in the connective tissues
S/Sx: Visible lump or mass in the soft tissue
R: Lymphedema. Von Willebrand disease. Genetic predisposition

MELANOMA

P: A cancer originating in melanocytes which are located in the basal layer of epithelium
S/Sx: New marks on skin, mole that changes shape or size, new pigments of the skin

LEUKEMIA

P: Cancer of blood-forming cells. Either acute or chronic
S/Sx: Prevent infection by avoiding invasive procedures such as catheterizations and injections. Prevent excessive bleeding due to possible low platelet count

GENERAL NURSING INTERVENTIONS

- Treat nausea, educate about carbohydrate ↓ for prevention (Antiemetic 30min prior to chemo)
- Maintain meticulous infection control for yourself, the patient and visitors. (Neutropenic precautions)
- Provide non pharmacological and pharm pain control

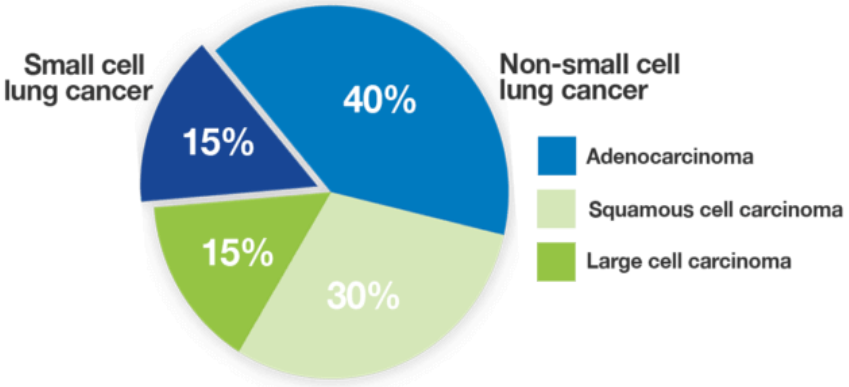
TREATMENTS

Surgery: Tumor is removed or destroyed
Radiation: Localized destruction of cancer cells. Can cause local irritation + fatigue
Chemotherapy: Kills + stops the reproduction of neoplastic cells.
-Skin, hair, nail, GI cells also impacted

WARNING SIGNS

- Change in bowel/bladder
- Any sore that doesn't heal
- Unusual bleeding/discharge
- Thickening or lumps
- Indigestion
- Obvious skin changes
- Nagging cough/hoarseness

LUNG CANCER



SMALL CELL LUNG CANCER (SCLC)

- Usually begin in the bronchi
- Spread more quickly than NSCLC
- Early metastasis to Lymph
- Poorest Prognosis
- Survival Rate of 12-18 months
- Staging not useful due to aggressive nature

NON-SMALL CELL LUNG CANCER (NSCLC)

Adenocarcinoma
- Associated with scarring (chronic fibrosis)
- Resection attemptable
- Most common in non-smoker

Squamous Cell
- Slow growing
- Resectable
- Often causes Bronchial Obstructions

Large Cell
- Associated with Tobacco abuse
- Highly metastatic
- High reoccurrence
- Surgery not attempted

STAGES

Occult-stage:
Cancer cells are found in sputum, but no tumor can be found in the lung by imaging tests or bronchoscopy, or the tumor is too small to be checked.

Stage 0
Cancer at this stage is also known as carcinoma in situ. The cancer is tiny in size and has not spread into deeper lung tissues or outside the lungs.

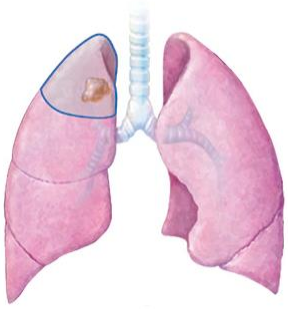
Stage I
Cancer may be present in the underlying lung tissues, but the lymph nodes remain unaffected.

Stage II
The cancer may have spread to nearby lymph nodes or into the chest wall.

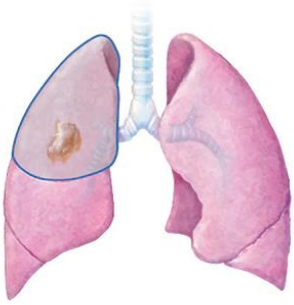
Stage III
The cancer is continuing to spread from the lungs to the lymph nodes or to nearby structures and organs, such as the heart, trachea and esophagus.

Stage IV
The most advanced form of the disease. In stage IV, the cancer has metastasized, or spread, beyond the lungs into other areas of the body.

Wedge Resection
Removal of "wedge" of lung tissue



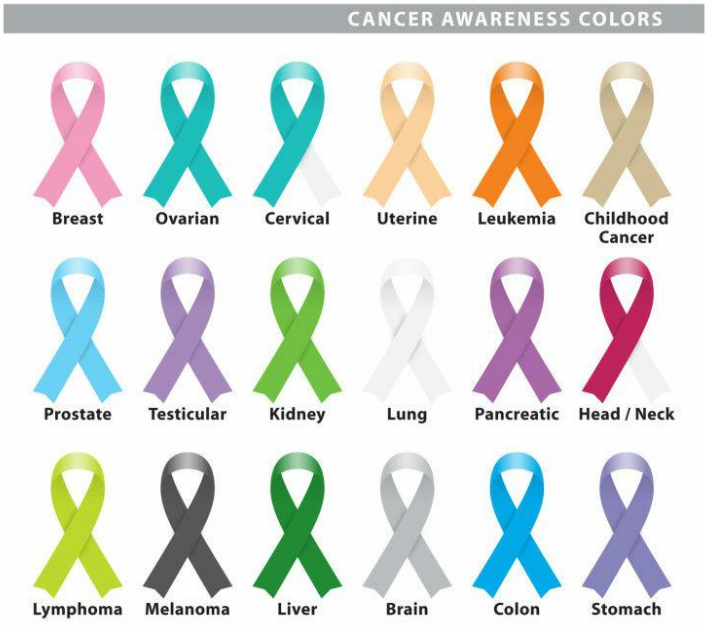
Segmentectomy - Segmental Resection
A portion of the lung is removed. Larger than a wedge, while leaving a portion of the lobe.



Lobectomy
Removal of a Single Lobe

Pneumonectomy
Removal of the entire lung.

Post Op Consideration – Place pt. on operative side to facilitate expansion of remaining lung.



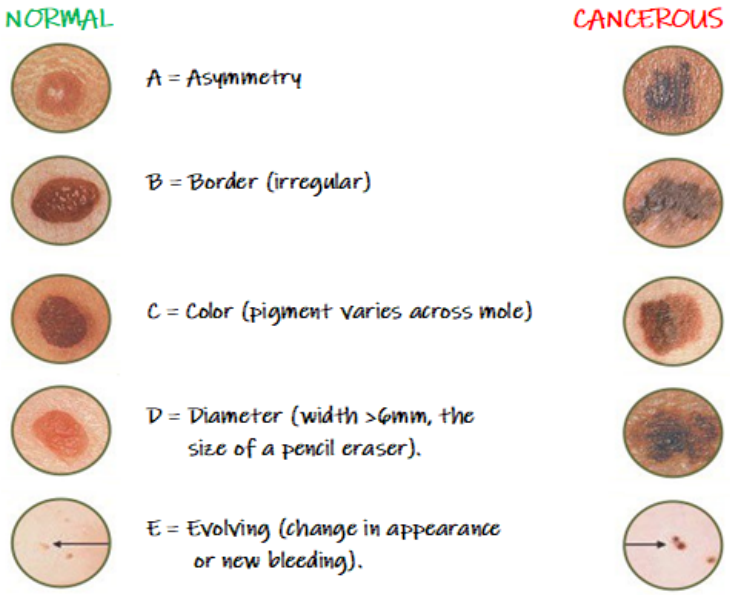
INTEGUMENTARY SYSTEM

Types of Skin Cancer:

- **Basal Cell Carcinoma:** Waxy nodule with pearly borders. Originates in the basal layers of the epidermis. Most common type of skin cancer.
- **Squamous Cell Carcinoma:** Oozing, crusting lesion. Originates in the upper layer of the epidermis.
- **Melanoma:** Irregular lesion, various color hues. Originates in the melanocytes (melanin-producing epidermis cells), highly metastatic. Most deadly form of skin cancer.

Ways to Prevent:

- Avoid midday sun, wear sunscreen and protective clothing, perform regular skin checks.



Treatment:
Excision, cryosurgery, topical chemotherapy (5-fluorouracil cream), Mohs surgery.

LYMPHOMA | MULTIPLE MYELOMA

Lymphoma: Solid tumor in the lymphoid tissue (lymph nodes and spleen), causing overgrowth of lymphocytes.

- **Hodgkin's:** Reed-Sternberg cells, local/regional
- **Non-Hodgkin's:** No Reed-Sternberg cells, disseminated spread.

Multiple Myeloma: Cancer that causes overgrowth of plasma cells in the bone marrow, resulting in excess of secretion of antibodies and cytokines. This prevents growth of RBCs, platelets, and WBCs.

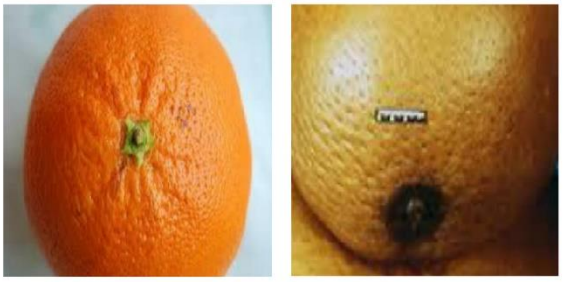
Treatment: Chemotherapy, radiation, targeted therapy, stem cell transplantation.

Nurse: There is a HIGH risk of anemia, thrombocytopenia, and neutropenia.

BREAST CANCER

Screening: Annual mammogram starting at age 40, monthly BSE.
RF: Genetics, early menarche, late menopause, long-term use of contraceptives, smoking
S/S: Firm, non-tender, immobile breast lump. Dimpling or peau d' orange appearance. Nipple discharge, ulceration, or retraction.
Tx: Hormone therapy (tamoxifen), chemo, radiation surgery (lumpectomy, mastectomy).
Mastectomy Care:
- Don't administer injections, obtain blood, or take Blood Pressure in affected arm(s).
- Wear sling when ambulating, wear loose clothing, perform arm/hand exercises to prevent edema.

Peau d' Orange

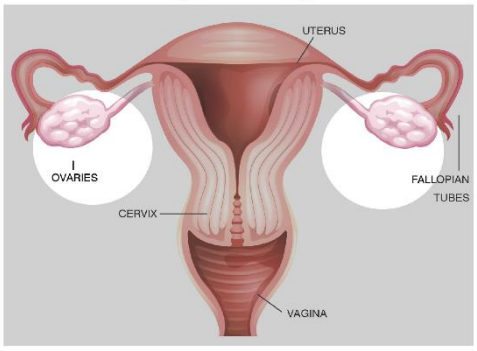


FEMALE REPRODUCTIVE SYSTEM

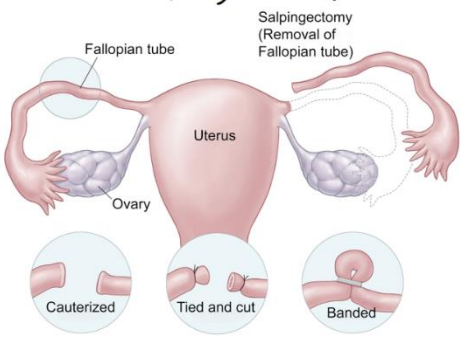
Endometrial Cancer: Cancer in the inner uterine lining, often due to prolonged exposure to estrogen without progesterone. Key symptom is postmenopausal bleeding.
Cervical Cancer: Cancer in the cervix, usually caused by the human papillomavirus (HPV). Key symptom is painless vaginal bleeding.
- **Prevention:** HPV vaccine (3 injections over 6 months)
- **Screening:** Pap smears (every 1-3 years, started 3 years after sexual intercourse or by age 21).

Ovarian Cancer: Epithelial tumor that grows on the surface of the ovaries and spreads rapidly. Symptoms are vague (GI disturbances), resulting in low survival rates due to late detection.
Tx: Chemo, internal/external radiation, ablation therapy, surgery (hysterectomy, salpingectomy, oophorectomy).

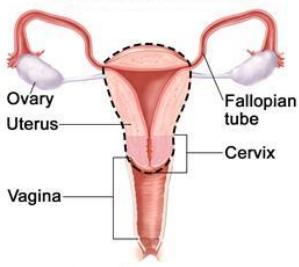
oophorectomy



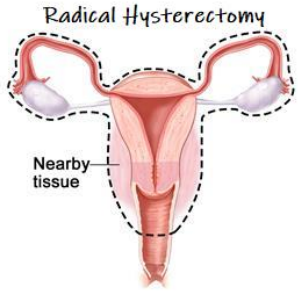
Salpingectomy



Total Hysterectomy

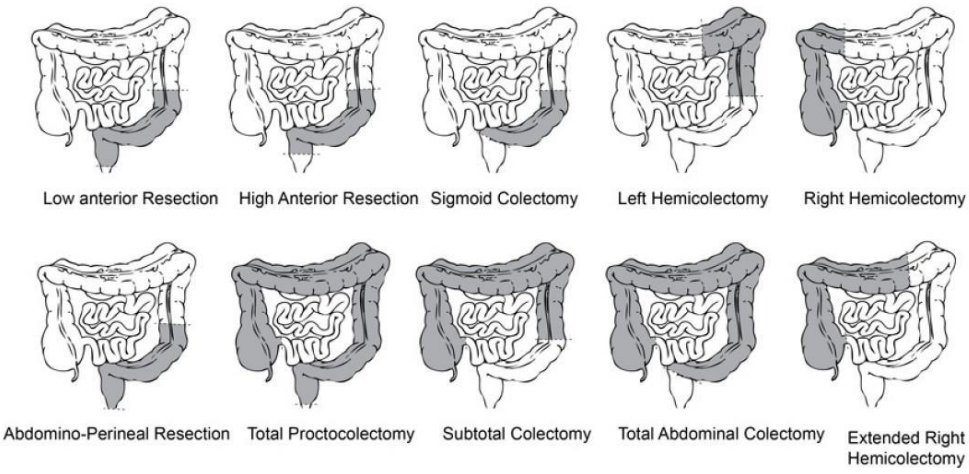


Radical Hysterectomy



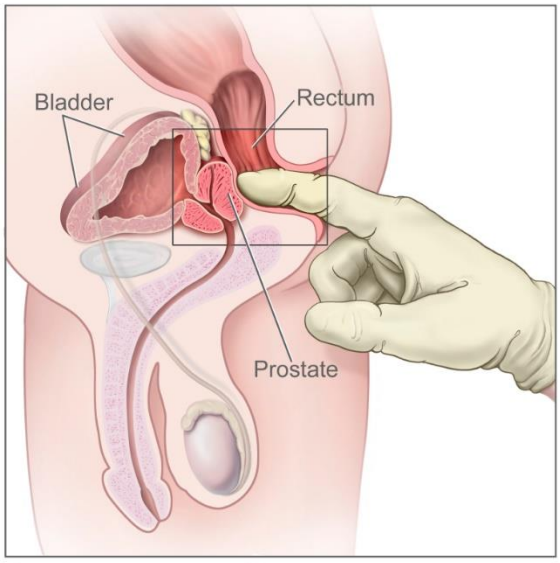
COLORECTAL CANCER

Screening: FOBT (Fecal occult blood test) annually, colonoscopy every 10 years (or sigmoidoscopy every 5 years) starting at 50.
RF: Older age, high-fat diet (especially red meat), genetics, smoking, obesity, alcohol, physical inactivity.
S/S: Rectal bleeding, change in bowel color, shape, consistency.
Labs/Dx: Colonoscopy with biopsy (definitive), positive FOBT, CT/MRI
Tx: Chemo, radiation, surgery (colon resection or colectomy with colostomy/ileostomy)



PROSTATE CANCER

Screening: Annual PSA test and digital rectal exam (DRE) starting at 50 (earlier if higher risk). Take PSA before DRE.
RF: Older age, high-fat, race (African American), genetics
S/S: Urinary retention, hesitancy, frequency. Frequent bladder infections, hematuria, nocturia.
Labs/Dx: Elevated PSA (>4ng/mL), transrectal ultrasound, biopsy.
Tx: Hormone therapy (leuprolide), chemo, radiation, prostatectomy, orchiectomy.



SIGNS & SYMPTOMS OF SHOCK

	RR	HR	BP	SKIN	TEMP	URINE	OTHER S&S
ANAPHYLACTIC Severe allergic reaction.	↑↓	↑	↓	Flushed Swollen Itchy	NO CHANGE	↓	Urticaria, Pruritus, Decreased LOC, Bronchoconstriction
CARDIOGENIC Failing pumping ability of the heart.	↑	↑	↓	Pale Cool Clammy	NO CHANGE	↓	Chest Discomfort, Syncope, JVD, Pulmonary Edema, Orthopnea
HYPOVOLEMIC Reduced circulating blood volume.	↑	↑	↓	Pale Cool Clammy	NO CHANGE	↓	Anxiety, Thirst, Syncope, Weakness, Confusion, Dizziness, Syncope, Weak Pulse
OBSTRUCTIVE Physical obstruction of great vessels or the heart.	↑	↑	↓	Extremities: Pale Cool	↓	↓	Muffled Heart Sounds, JVD, Decreased LOC, Signs of Poor Perfusion
NEUROGENIC Severe central nervous system damage.	↑	↓	↓	Warm Flushed Dry	↑ OR ↓	No Bladder Control	Paralysis Distal to Injury Site, Priaprism
SEPTIC Extreme immune system response to an infection.	↑	↑	↓	Flushed then Pale & Cool	≥38°C OR <36°C	↑	Bounding Pulse, Altered LOC

Anaphylactic Shock - Allergic Reaction

Immediate Type 1 - Anaphylaxis (Swelling, low BP, dilated Blood Vessels)

Delayed Type 2

EpiPen Yellow (adult-0.30mg) EpiPen Green (child-0.15mg) More than that - CARDIAC ARREST

Hypovolemic Shock (Pt lost 20% or 1/5 of body blood or fluid) **Low Preload**

When: Hemorrhage, Severe Dehydration, Diaphoresis, Diabetes Insipidus (No ADH, so excessive urine and thirst - Desmopressin), Vomiting, Diarrhea, Peritonitis, **Pancreatitis**- Demerol (Cullen's Sign) (Gray-Turners: black on the sides), Severe Burns

Tx: Vasoconstrictors- Improve **MAP**, by Increasing peripheral resistance, ↑venous return ↑ Myocardial contractility [i.e., Dopamine, NorEpi, Phenylephrine]

Neurogenic Shock (Hypotension - Bradycardia)

When: High Injury Spinal Cord, Spinal anesthesia, Disrupted Blood Circulation, Poikilothermic (Cold Body), WARM Extremities

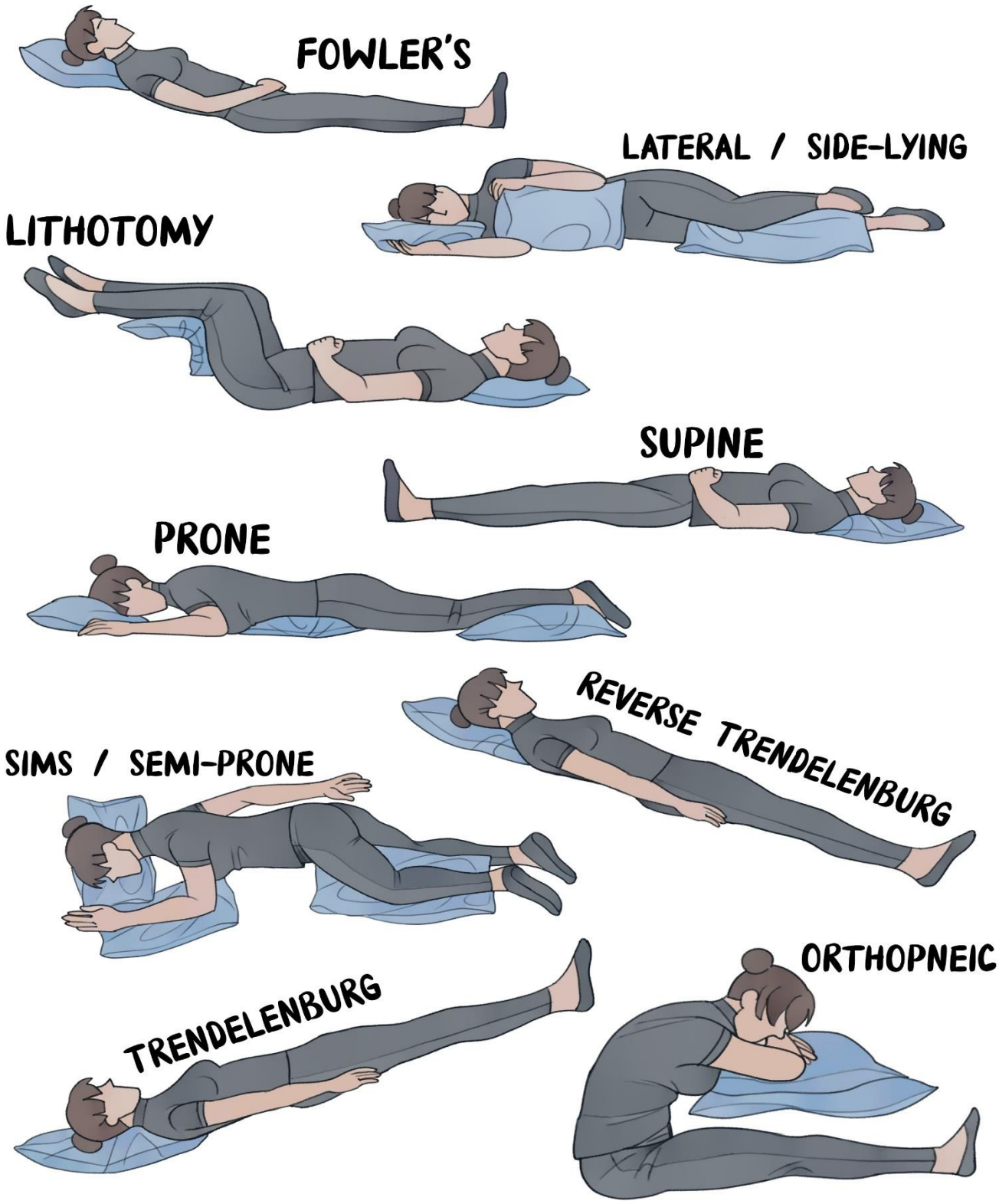
Tx: IV Fluids, Norepinephrine

C7 Up- Quadriplegia/Tetraplegia **C7 Down**-Paraplegia(legs)

Spinal Shock (Vasogenic Shock) - **Autonomic Dysreflexia** (Spinal Cord Injury T6 or Higher)

Bed Positions

BED POSITIONS



Bed Positions

BED POSITIONS

Fowlers: 45- 60 degrees; good for procedures (ex: suctioning, NG tube), provides better ventilation.
Semi-fowlers: 15-45 degrees (usually 30 degrees); prevents aspiration and helps with ventilation.
High fowlers: 60-90 degrees; good for severe dyspnea and during meals (to prevent aspiration).
Lateral / Side-Lying: Patient lies on their side with most of the weight on dependent hip and shoulder and the arms flexed in front of the body. Pillow under head and neck, upper arm, and legs and thighs. Good for prevention of pressure ulcers.
Lithotomy: Patient lying flat on its back with legs elevated to hip level or above. Good for gynecological procedures and childbirth.
Supine: patient is flat on back with head and shoulder elevated by a pillow.
Prone: patient is on stomach; helps to prevent hip flexion contractures after lower extremity amputation.
Trendelenburg: Whole bed is tilted with HOB lower than foot of bed; promotes venous return.
Reverse Trendelenburg: Whole bed is tilted with foot of bed lower than HOB; promotes gastric emptying (prevents reflux).
Modified Trendelenburg: Patient lies flat with legs elevated above his/her heart; good for hypovolemia.
Sims: Patient lies on their left side, with their left hip and lower extremity straight, and right hip and knee bent; used for enemas and rectal examinations.
Orthopneic: patient sits on side of bed with arms on overbed table; good for COPD (Promotes lung expansion)

BED POSITIONS BY PROCEDURES

Mastectomy
Position: Arm elevated on pillow. Turn only to unaffected side and back
Why? Promotes lymphatic fluid drainage from accumulating (decreases lymph edema).
Head Injury / Surgery
Position: Semi-Fowler's (HOB usually about 30-45 degrees); Head midline, no head flexion. Do not position client on side where there is a removed bone flap
Why? Reduces ICP by allowing venous drainage from head. Head flexion will increase ICP. Lying on side where there is a bone flap will increase ICP.
Immediate Post-Op /Post Procedure (in clients who aren't yet alert)
Position: Side-lying
Why? Allows secretions to drain from mouth and prevents aspiration.
COPD / Respiratory Distress
Position: High Fowler's / Elevate HOB 90 degrees / Tripod or orthopneic position
Why? Increases maximum lung expansion, allowing for more ventilation and oxygenation.
Enema Administration
Position: Left-lateral or Sim's position
Why? Allows solutions to flow by gravity into the natural direction of the colon.

BED POSITIONS BY PROCEDURES - CONT.

Leg Amputation
Position: Elevate affected limb on pillow x 24 hours only Prone as tolerated, 20-30 mins at a time, at least twice daily
Why? Reduces edema post-op, however, after 24 hours, DO NOT elevate stump because it can lead to contractures. Prone position will stretch out hip and leg muscles to prevent hip flexion contraction.

Thyroidectomy
Position: Head midline / Semi-Fowler's to Fowler's (30 to 45 degrees) / Support neck while turning/moving
Why? Reduces swelling and edema in the neck area.

Shock
Position: Modified Trendelenburg
Why? This will aid in perfusion of upper body and head without causing pulmonary edema.

Thoracentesis
Position: Seated upright at side of bed, with an overbed table in front of client.
Why? This will exposure required area for procedure.

Liver biopsy
Position: <u>During</u>: On the client's left side to exposure liver area (which is on the right).
<u>After</u>: On the client's right side.
Why? Left side <u>during the procedure</u> will expose the area for biopsy site.
Right side <u>after</u> procedure will use gravity to help stop bleeding

Paracentesis
Position: Seated upright in chair or semi-Fowler's in bed.
Why? To exposure area for puncture site, as this will assist in insertion of needle.

Nasogastric or Gastrostomy Tubes

Position: High Fowler's for NG <u>insertion</u>.
HOB at least 30 degrees (semi-Fowler's) for NG/GT <u>feeding, irrigation</u>.
Why? <u>For insertion</u>: It will aid in insertion by closing off the trachea and opening the esophagus.
<u>For NG/GT feed and irrigation</u>: To prevent aspiration of gastric contents.

Laminectomy
Position: Keep client straight. Logroll the client
Why? To avoid twisting of the spine, as this may cause complications.

CVA (Ischemic / Hemorrhagic)
Position: Ischemic – Usually flat
Hemorrhagic – HOB 30 degrees
Why? Ischemia – Head flat to perfuse blood to head.
Hemorrhagic – HOB 30 degrees to avoid ICP.

S/P Cardiac catherization
Position: Bedrest x 6 hours. Affected extremity straight. HOB no more than 30 degrees
Why? This position avoids pressure on the puncture site. Client can turn from side to side, but must avoid pressure on insertion site.

Maternal Patient with Dizziness
Position: Left lateral
Why? As the uterus enlarges, pressure on the inferior vena cava increases. This pressure compromises venous return and causes blood pressure to drop, which may lead to syncope and accompanying symptoms when the client is supine.
Turning the client on her left side relieves pressure on the vena cava, restoring normal venous return and blood pressure.

STEPS TO ABG ANALYSIS:

1- Look at the pH (7.35 - 7.45)

- If the pH is HIGH, this is ALKALOSIS
- If the pH is LOW, this is ACIDOSIS

2- Look at the PaCO2 (35 - 45) - PaCO2 – Respiratory

- If PaCO2 is HIGH, this is ACIDOSIS
- If PaCO2 is LOW, this is ALKALOSIS

3- Look at the HCO3 (22 - 26) - HCO3 – Metabolic

- If HCO3 is HIGH, this is ALKALOSIS
- If HCO3 is LOW, this is ACIDOSIS

PH:	7.35 - 7.45
$PACO_2$	35 - 45
HCO_3	22 - 26
PAO_2	80 - 100
O_2SAT	>95%

Interpret

Step 1: Analyze the pH. It will tell you ACIDOSIS or ALKALOSIS

Step 2: Analyze the PaCO2 and the HCO3

- Is PaCO2 below 35? It is Alkalotic. Above 45 it is Acidic
- Is HCO3 below 22? It is Acidic. Above 26 it is Alkalotic

Step 3: Match the PaCO2 or the HCO3 with the pH

For example, if the pH is acidotic, and the PaCO2, then the Acid-Base disturbance is being caused by the respiratory system. Therefore, we call it Respiratory Acidosis

Step 4: Does the PaCO2 or the HCO3 go the opposite direction of the pH?

If so, there is compensation by the systems. For example, if the pH is acidotic, and the PaCO2 is acidotic, and the HCO3 is alkalotic.

If they don't go the opposite direction, It is UNCOMPENSATED

Step 5: Is the pH in normal range? Fully Compensated / Partially Compensated / Uncompensated

If there is Compensation, and the pH is in normal range (7.35-7.45), then it is Fully Compensated

If there is Compensation, and the pH is out of range, then it is Partially Compensated

Step 6: Are the pO2 and the O2 saturation normal?

If they are below normal, there is evidence of Hypoxemia

Acid – Base Balance

PH:	7.35 - 7.45
$PACO_2$	35 - 45
HCO_3	22 - 26
PAO_2	80 - 100
O_2SAT	>95%

1- Practice Question

A 72 yr. old with pneumonia.

pH - 7.31 (Acidic)

PaCO2 – 60 (Acidic)

HCO3 - 34 (Alkalotic)

pO2 – 50 (LOW)

#1 – pH is below 35, so It is Acidosis
#2 – Who is doing the same as the pH (Acidic)? PaCO2
It is Respiratory
#3 – Does the HCO3 go in opposite direction as the pH? YES – Alkalotic
So, there is Compensation
#4 – Is the pH in normal range? NO
So, it is Partially Compensated
#5 – Is the pO2 in normal range? NO
The patient has Hypoxemia
The full Diagnosis is:
Partially Compensated Respiratory Acidosis with Hypoxemia

2- Practice Question

A 20 years old, acute renal failure
pH - 7.18 (Acidic)
PaCO2 – 44 (Normal)
HCO3 - 16 (Acidotic)
pO2 – 92 (Normal)

#1 – pH is below 35, so It is Acidosis
#2 – Who is doing the same as the pH (Acidic)? HCO3
It is Metabolic
#3 – Does the PaCO2 go in opposite direction as the pH? NO
So, there is NO Compensation
#4 – Is the pH in normal range? NO
So, it is Uncompensated
#5 – Is the pO2 in normal range? YES
The patient doesn't have Hypoxemia
The full Diagnosis is:
Uncompensated Metabolic Acidosis.

PRACTICE

1. pH: 7.11 CO2: 51 HCO3: 27

2. pH: 7.39 CO2: 54 HCO3: 38

3. pH: 7.14 CO2: 51 HCO3: 28

4. pH: 7.39 CO2: 53 HCO3: 27

5. pH: 7.45 CO2: 40 HCO3: 22

6. pH: 7.50 CO2: 44 HCO3: 31

7. pH: 7.35 CO2: 20 HCO3: 17

8. pH: 7.12 CO2: 44 HCO3: 14

9. pH: 7.28 CO2: 54 HCO3: 26

10. pH: 7.30 CO2: 35 HCO3: 17

11. pH: 7.19, CO2: 39, HCO3: 18

12. pH: 7.7, CO2: 52, HCO3: 35

13. pH: 7.42, CO2: 54, HCO3: 28

14. pH: 7.84, CO2: 49, HCO3: 30

15. pH: 7.75, CO2: 43, HCO3: 37

16. pH: 7.87, CO2: 26, HCO3: 24

17. pH: 7.37, CO2: 20, HCO3: 15

18. pH: 7.14, CO2: 31, HCO3: 20

19. pH: 7.58, CO2: 50, HCO3: 36

20. pH: 7.43, CO2: 32, HCO3: 12

ANSWER

1. pH: 7.11, CO2: 51, HCO3: 27 - Partially Compensated Respiratory Acidosis
2. pH: 7.39, CO2: 54, HCO3: 38 - Fully Compensated Respiratory Acidosis
3. pH: 7.14, CO2: 51, HCO3: 28 - Partially Compensated Respiratory Acidosis
4. pH: 7.39, CO2: 53, HCO3: 27 - Fully Compensated Respiratory Acidosis
5. pH: 7.45, CO2: 40, HCO3: 22 - Normal
6. pH: 7.5, CO2: 44, HCO3: 31 - Uncompensated Metabolic Alkalosis
7. pH: 7.35, CO2: 20, HCO3: 17 - Fully Compensated Metabolic Acidosis
8. pH: 7.12, CO2: 44, HCO3: 14 - Uncompensated Metabolic Acidosis
9. pH: 7.28, CO2: 54, HCO3: 26 - Uncompensated Respiratory Acidosis
10. pH: 7.3, CO2: 35, HCO3: 17 - Uncompensated Metabolic Acidosis
11. pH: 7.19, CO2: 39, HCO3: 18 - Uncompensated Metabolic Acidosis
12. pH: 7.7, CO2: 52, HCO3: 35 - Partially Compensated Metabolic Alkalosis
13. pH: 7.42, CO2: 54, HCO3: 28 - Fully Compensated Metabolic Alkalosis
14. pH: 7.84, CO2: 49, HCO3: 30 - Partially Compensated Metabolic Alkalosis
15. pH: 7.75, CO2: 43, HCO3: 37 - Uncompensated Metabolic Alkalosis
16. pH: 7.87, CO2: 26, HCO3: 24 - Uncompensated Respiratory Alkalosis
17. pH: 7.37, CO2: 20, HCO3: 15 - Fully Compensated Metabolic Acidosis
18. pH: 7.14, CO2: 31, HCO3: 20 - Partially Compensated Metabolic Acidosis
19. pH: 7.58, CO2: 50, HCO3: 36 - Partially Compensated Metabolic Alkalosis
20. pH: 7.43, CO2: 32, HCO3: 12 - Fully Compensated Respiratory Alkalosis

Lab Values

Electrolytes:
Sodium (Na^+): 135-145 mEq/L
Chloride (Cl^-): 98-106 mEq/L
Calcium (Ca^{2+}): 9-10.5 mg/dL
Potassium (K^+): 3.5-5.0 mEq/L
Phosphate (PO_4): 3-4.5 mg/dL
Magnesium (Mg^{2+}): 1.5-2.5 mEq/L

Arterial Blood Gases (ABGs)
pH: 7.35-7.45
$PaCO_2$: 35-45 mmHg
PaO_2: 80-100 mmHg
HCO_3: 22-26 mEq/L
SaO_2: 95-100%; <95% Indicates Hypoxemia

CBC
RBC: males 4.7-6.1 million/uL; females 4.2-5.4 million/uL
Hgb: males 14-18 g/dL; females 12-16 g/dL
Hct: males 42-52%; females 37-47% (hct 36-54 NCLEX)
WBC: 5,000-10,000 mm^3
Erythrocyte sedimentation rate (**ESR**): <20 mm/hour
Serum lactate (lactic acid): 0.5-1.0 mmol/L
Platelet: 150,000 – 400,000 mm^3

WBC Differential Count:
Neutrophils: 55-70%
Lymphocytes (T & B Cells): 20-40%
Monocytes: 2-8%
Eosinophils: 1-4%
Basophils: 0.5-1.5%

Blood Lipid Levels
Total **serum cholesterol**: desirable <200 mg/dL
LDL (low-density lipids): desirable <130 mg/dL; Bad Cholesterol
HDL (high-density lipids): males >45 mg/dL; females >55 mg/dL; Good Cholesterol
Triglycerides: desirable <150 mg/dL; males 40-160; females 35-135; over 65 years: 55-220 mg/dL

Anticoagulant Therapy Coagulation Times
Therapeutic **INR**: 2-3 sec (Normal Range: 0.8-1.1)
PT: 11-12.5 sec
Platelets: 150,000 - 400,000 mm^3

Liver Enzymes
ALT: 4-36 u/L
AST: 0-35 u/L
ALP: 30-120 u/L

Urinalysis
Specific gravity: 1.005-1.030
Protein: 0-0.8 mg/dL
Glucose: 50-300 mg/day
pH: 4.6-8

Liver Function Tests
Albumin: 3.5-5.0 g/dL
Ammonia: 10-80 mg/dL
Total **bilirubin**: 0.3-1.0 mg/dL
Indirect/unconjugated **bilirubin**: 0.2-0.8 mg/dL
Total **protein**: 6-8 g/dL;
Prealbumin: 19-38 mg/dL

Blood Glucose Levels
Glucose (fasting): 70-110 mg/dL
Glycosylated hemoglobin (**HbA1c**): 4-6%

Renal Function
Creatinine: 0.6 - 1.2 mg/dL
BUN: 10-20 mg/dL

Pancreas
Amylase: 30-120 units/L
Lipase: 0-160 units/L

I&O
Fluid intake: 2,000-3,000 mL/day
Daily urine output: 1,200-1,500 mL/day
Hourly urine output: ≥30 mL/hour; <30 mL for >2 consecutive hours = CONCERN!!
Polyuria (consistently high urine volume): >2,000-2,500 mL/day

BMI Ranges
Underweight: <18.5 Healthy: 18.5-24.9 Overweight: 25-29.9 Obese: ≥30