- **Traction**- uses a pulling force to promote and maintain alignment of the injured area. Should include type of traction, amount of weight, and whether traction can be removed for nursing care

- **Contrast skeletal**
  - Screws inserted into the bone
  - Can use heavier weights and longer traction time to realign the bone
  - Provide frequent pin site care to prevent infection

- **Skin traction**- decrease muscle spasms and immobilize the extremity prior to surgery.
  - Pulling force applied by weights that are attached by rope to the client's skin with tape, straps, boots or cuffs
  - Bryant's and Bucks traction

- **Nursing interventions**
  - Assess neurovascular status of the affected body part every hour for 24 hour and every 4 hours after that
  - Maintain body alignment and realign if the client seems uncomfortable or reports pain
  - Avoid lifting or removing weights
  - Ensure that weights hang freely and are not resting on the floor
  - Use heat and massage as prescribed
  - Use therapeutic touch and relaxation techniques

- **Expected findings of patient-** know what is normal and abnormal for finding.
- **Expected findings of traction system-** what pin sites should look like, weights should not be touching the floor, should be hanging freely, ropes are free of knots, avoid lifting or removing weights
- **Ideal outcomes/goals**
  - Prevent
  - Prevent soft tissue injury
  - Realign of bone fragments
  - Decrease muscle spasms and pain
  - Correct or prevent further deformities

- **Neurovascular assessment**
  - **Components of assessment**

- **Pain-** assess on pain scale using 0 to 10, describe the pain, immobilize, ice and elevate
- **Sensation**- assess for numbness or tingling of the extremity, loss of sensation
- **Skin temperature**- should be warm, not cool to touch, cool skin can indicate decreased arterial pressure
- **Capillary refill**- press nail beds of affected extremity until blanching occurs. Blood return should be within 3 seconds
- **Pulses-** should be palpable, strong, equal to the unaffected extremity, edema can make it difficult to palpate. Doppler might be required
- **Movement-** should be able to move affected extremity in active motion

- **When to perform assessment**
  - Every hour for the first 24 hours and every 1-4 hours thereafter
- **Locations to palpate pulse**
  - Distal
- **Normal versus abnormal findings**
  - **Normal**
    - Palpable pulses
    - PERRLA
    - HR
    - RR
  - **Abnormal**
    - No pulse
    - Decreased or increased HR
    - Decreased or increased RR

- **Compartment syndrome**
  - Usually affects extremities and occur when pressure within 1 or more of the muscle compartments of the extremity compromise circulation, resulting in an ischemic edema cycle

- **Manifestations**
  - Assessed by using the five P's
  - Pain
  - Paralysis
  - Paresthesia
  - Pallor
  - pulselessness

- **Fat embolism**
  - can occur after injury, usually within 12 to 48 hours following long bone fractures or with total joint arthroplasty
  - Fat globules from the bone marrow are released into the vasculature and travel to the small blood vessels

- **Manifestations**
  - **Early:**
    - Dyspnea, increased RR, decreased O2 saturation
    - Headache
    - Decreased mental acuity related to low arterial oxygen level
    - Respiratory distress
    - Tachycardia
    - Confusion
    - Chest pain
  - **Late**
    - Cutaneous petechia, pinpoint sized subdermal hemorrhages that occur on the neck, chest, upper arms, and abdomen.

- **ABC- prioritization- goal is to maintain patent airway**

- Airway
- Breathing
- Circulation
-

- **Amputations**
  - Removal of a body part
  - Can be elective d/t complications of PVD, arteriosclerosis, osteomyelitis, or malignant tumor
  - Can be traumatic d/t an accident
  - Higher level of amputation the greater the amount of effort that will be required to use a prosthesis

- **Complications**
  - Cardiopulmonary complications r/t co-morbid conditions
  - DVT
  - Stump hematoma
  - Infection
  - Need for re-amputation (revision)
  - Phantom limb pain
  - Flexion contracture

- **Nursing interventions**
  - Prevent post complications (hypovolemia, pain, infection)
  - Assess surgical site for bleeding
  - Monitor tissue perfusion of end of residual limb
  - Monitor for manifestations of infection and non-healing of incision

    - Infection can lead to osteomyelitis

- **Preparing for prosthesis**
    - Residual limb must be shaped and shrunk in preparation for prosthetic training

- **Nursing interventions**
    - Wrap the stump using elastic bandages (figure 8 wrap), to prevent restriction of blood flow and decrease edema
    - Use a stump shrinker sock (easier for the client to apply)
    - Use an air splint (plastic inflatable device) inflated to protect and shape the residual limb and for easy access to inspect the wound

- **Increased ICP-**

    - Normal ICP is 10-15 mmHg

    - Persistent elevation of ICP will result in brain death if not treated

- **Causes**

    - **Manifestations**

        - severe headache
        - deteriorating LOC
        - restlessness, irritability
        - dilated pupils
        - slow to react
        - altered respirations
        - Cheyne stokes
        - Abnormal posturing
        - Deterioration in motor function

- **Pharmacologic treatment**
  - **Mannitol- osmotic diuretic**
  - **Barbiturates- may be placed in coma to decrease cellular metabolic demand**
  - **Phenytoin- prophylactically to prevent or treat seizures(first one used to suppress seizure that did not depress the entire CNS**
  - **Morphine- analgesic to control pain and restlessness**

  - **CPP-** closely linked to ICP

    - **What is it,-** cerebral perfusion pressure. MAP - ICP
    - **what is a normal value? Normal is 70 to 100**.
      - **Less than 50 results in permanent neurologic damage**

  - **Cushing's triad**

    - HTN, bradycardia, bradypnea, (opposite of shock)
    - Late manifestation of increased ICP

- **Methods for keeping ICP within normal limits**
  - Elevate head of bed to 30 degrees
  - Avoid extreme flexion, extension or rotation of head
  - Maintain neutral body position
  - Maintain patent airway
  - Maintain cervical spine stability
  - Provide calm environment

- Monitor fluid and electrolytes
- **Nursing interventions**
  - Monitor serum and electrolyte osmolality
  - Calm and reassure patient, clarify
  - Avoid opioid use with clients who are not mechanically ventilated due to CNS depressant effects
  - Perform neuro checks
- ***Must know normal ICP*=NORMAL ICP IS 10-15mmHg**

- **ABC prioritization**
  - Airway
  - Breathing
  - Circulation

- **Altered LOC LEVEL OF RESPONSIVENESS AND CONSCIOUSNESS IT THE MOST IMPORTANT INDICATOR OF THE PATIENTS CONDITION**
  - **Diagnostic tools**
    - Glasgow Coma Scale
    - Labs based on underlying cause
    - Diagnostic tests based on underlying cause
    - Management

        - ABC
        - Consider intubation
        - Treat underlying cause

    - **Manifestations**
        - Altered LOC

- **GCS**- helpful in determining changes in the LOC for clients who have head injurie, space-occupying lesions or cerebral infarctions and encephalitis
    - **Scoring**
        - Best score is 15
        - Less than 8 associated with severe head injury and coma
        - 9 to 12 moderate head injury
        - Greater than 13 associated with minor head trauma
        - E+V+M= Total GCS
- **Stroke-** cerebrovascular accidents or brain attacks, involve disruption in the cerebral blood flow secondary to ischemia, hemorrhage, brain attack or embolism
    - **Hemorrhagic-** occur secondary to a ruptured artery or aneurysm.
        - Prognosis is poor due to ischemia and increased ICP caused by expanding collection of blood.

- **Manifestations, signs/symptoms**
    - Cerebral aneurysm
    - Smoking/cocaine use

- Use of oral contraceptives
- Atrial fibrillation
- Hypercoagulability
- Hyperlipidemia
- Atherosclerosis
- Hypertension
- Obesity
- Diabetes mellitus
- Arteriovenous malformation
- Visual disturbances
- Dizziness
- Slurred speech
- Weak extremity

- **Right versus left hemisphere**

    - **Right**

        - Responsible for visual and spatial awareness and proprioception
        - Altered perception of deficits
        - Unilateral neglect syndrome (ignore left side of the body)
        - Loss of depth perception

- **Left –** responsible for language, mathematic skills, and analytic thinking
    - Expressive and receptive aphasia (inability to speak, and understand language)
    - Agnosia (unable to recognize familiar objects)
    - Alexia (reading difficulty)
    - Agraphia (writing difficulty)
    - Right extremity hemiplegia or hemiparesis
    - Poor impulse control and judgement
    - Left hemiplegia or hemiparesis
    - Visual changes such as hemianopsia

- **Thrombolytic therapy**

  - **Indications**

    - Used in instance of ischemic stroke
    - Given within 3 -4.5 hours of onset of symptoms
    - No tPA if patient is on anticoagulants (heparin, warfarin), head trauma within last few months, spinal surgery, cranial surgery
    - Under age 18

  - **Contraindications**

    - Stroke or head trauma in previous 3 months
    - Previous intracranial hemorrhage
    - Intracranial neoplasm, AV malformation, or aneurysm
    - Recent intracranial or intraspinal surgery
    - Arterial puncture at a non-compressible site in previous 7 days
    - Symptoms suggestive of subarachnoid hemorrhage
    - Persistent BP elevation (SBP> 185 or DBP >110)
    - Active internal bleeding
    - Age >80
    - Oral anticoagulant use regardless of INR
    - Severe stroke (NHSS score >25)

- **Methods of communication**
  - Talk at normal rate and like would any other patient
  - Do not have lengthy conversations, be brief

- **SCI**
  - Injury to the cervical spine= quadriplegia
  - Injury below T1=paraplegia
  - The level involved dictates the consequence of the spinal cord

INITIAL INTERVENTIONS: SIT PATIENT IN A SITTING POSITION TO DECREASE HTN

- **Autonomic dysreflexia interventions**
  - r/t spinal cord injury, secondary to SNS stimulation and inadequate compensatory response by the PNS
- **SNS>PNS**
- Only seen in patients with lesions above T6
- **Stimulation of SNS**
  - Causes extreme HTN
  - Sudden severe HA
  - Pallor below level of spinal cords lesion dermatome
  - Blurred vision
  - Diaphoresis
  - Restlessness
  - Nausea

        - Piloerection (goosebumps)
    - **Stimulation of PNS**
        - Bradycardia
        - Flushing above dermatome
        - Nasal stuffiness
    - **Risk factors**
        - Male clients age 16-30
        - High risk activities (extreme sports of high speed driving), participating in impact sports
        - Acts of violence (guns or knives)
        - Alcohol or drug use
        - Disease (metastatic cancer or arthritis of spine)
        - Falls (older adults)

- **Head injuries**:
    - **Open head injuries**- pose a high risk for infection: scalp injuries often result in profuse bleeding d/t poor vasoconstriction of the blood vessel of the scalp
    - **Epidural hematoma**- blood collection in the space between the skull and the dura. Patient may have brief LOC with return of lucid state.

- **Manifestations**
    - Patient may have brief LOC with return of lucid state- then as hematoma expands increased ICP will often suddenly reduce LOC

o

o **Subdural hematoma**- collection of blood between the dura and the brain

- **Acute**- symptoms develop over 24 to 48 hours
- **Subacute**- symptoms develop of 28 hours to 2 weeks
- **Requires immediate craniotomy and control of ICP**

- **Chronic-** develops over weeks to months
    - Causative injury may be minor and forgotten
    - Critical signs and symptoms may fluctuate
    - Treatment is evacuation of the clot

- **Manifestations**

o **Basal Skull Fracture**

- **Nursing interventions**
    - Test CSF leakage for glucose
    - CSF leakage from nose and ears can indicate basilar skull fracture (halo sign, yellow strain surrounded by blood on paper towel, fluid tests positive for glucose)

- **Craniotomy**- opening the skull surgically to gain access to intracranial structures. Performed to remove a tumor, or to relieve elevated ICP, evacuate a blood clot or control hemorrhage

    - **Post-op monitoring/identifying signs of complications**

        - Arterial or central venous line may be placed to monitor or manage blood pressure and central venous pressure
        - Intubation
        - Supplemental oxygen
        - Reduce cerebral edema
        - Relieve pain and prevent seizures
        - Monitor ICP

- **Meningitis-** inflammation of the meninges which are membranes that protect the brain and spinal cord

    - **Viral or aseptic** is the most common and usually resolves without treatment
    - **Fungal** common in clients who have AIDS
    - **Bacterial(septic)** contagious infection with high mortality rate

    - **Nursing interventions**

        - Isolate client as soon as meningitis is suspected
        - Droplet precautions
        - Implement fever reduction measures, cooling blanket
        - Report meningococcal infections to public health department

- Decrease environmental stimuli
- Provide quiet environment
- Maintain bedrest
- Minimize exposure to bright lights
- Avoid coughing, sneezing
- Initiate seizure precautions

- **Pharmacologic treatment options**
  - Ceftriaxone with vanco- antibiotic given until culture and sensitivity results are available. Bacterial infections
  - Phenytoin- anticonvulsant if ICP increases or client experiences seizure
  - Acetaminophen/ibuprofen- analgesic for headache or fever.
  - Ciprofloxacin, rifampin, or ceftriaxone- prophylactic antibiotic given to individuals who are in close contact with client

- **Prophylactic treatment of individuals exposed to Meningitis**
  - Decreasing cerebral edema
  - Lowering the volume of CSF
  - Decreasing cerebral blood volume while maintaining cerebral perfusion
  - Osmotic diuretics
  - Restricting fluid
  - Draining CSF
  - sedation