

## Nursing 2

### Week 1

### Respiratory Disorders

#### *Atelectasis: Collapse of Alveoli*

1. Factors
  - a. Low tidal breathing
  - b. Supine position
  - c. Splinting of the chest
  - d. Fluid in pleural space (pleural effusion)
  - e. Hemothorax or pneumothorax
2. Clinical indicators
  - a. Increasing **dyspnea\*\***
  - b. cough
  - c. sputum production
  - d. **hypoxia\*\***, tachycardia, **tachypnea\*\***, pleural pain, central cyanosis
  - e. chronic may lead to infection
3. Assessment: Decreased breath sounds
  - a. X-ray may find it before clinical symptoms
  - b. Pulse Ox. less than 90 and lower than normal PaO<sub>2</sub> (partial pressure of O<sub>2</sub> in artery)
4. Prevention: Frequent turning, Early mobilization
  - a. managing secretions
  - b. deep breathing
  - c. incentive spirometry with directed cough
  - d. suctioning
  - e. nebulizer treatments
  - f. physical therapy (chest P.T.)
5. Treatment: Oxygen, P.T., PEEP Oxygen

\*\* Hallmarks of Atelectasis

**Quick Facts:**

- Thoracentesis: removal of fluid by needle aspiration*
- Respiration: process of gas exchange*
- Pulmonary ventilation: breathing*
- Lower airway begins at the trachea*
- Pharynx: SHARED PATHWAY - AIR and FOOD*
- Normal respiration: about 500ml of air (tidal volume)*
- Normal air contains 21% Oxygen*

Gas moves into the bloodstream by diffusion

1. PO<sub>2</sub> (partial pressure) in alveoli is about 100mm Hg
2. PO<sub>2</sub> in blood vessels is about 60mm Hg
3. PCO<sub>2</sub> in alveoli is about 40mm Hg

4. PCO<sub>2</sub> in blood capillaries is about 45mm Hg

Oxygenation

Quick facts: Men have about 5 million RBCs while Women have about 4.5 million

Hematocrit: Men 40-54%, Woman 37-50%

55% of CO<sub>2</sub> carried in RBCs as HCO<sub>3</sub><sup>-</sup> (Bicarb)

5% carried as carbonic acid

### Respiratory regulation:

1. Strongest effect on respiration is Chemo-sensors in the medulla oblongata that are highly responsive to levels of CO<sub>2</sub> (hydrogen ion concentrations).
2. Neuro-sensors in the carotid bodies are sensitive to decreases in O<sub>2</sub> concentrations. These are also found below the aortic arch. Long term smokers are on oxygen drive due to chronic high levels of CO<sub>2</sub>. This form of regulation is slower to respond and if these people are put on high concentrations of oxygen they may stop breathing.
3. Factors effecting respiratory function: Age, environment, lifestyle, health status, medications, stress.
  - a. Age - lungs reach full expansion in 2 weeks. Surfactant is needed for alveoli expansion
  - b. Elderly - less chest expansion, cough reflex and cilia decreased, decreased muscle strength, decreased immune response
  - c. Environment: Altitude, heat, cold, pollution
  - d. Lifestyle: Occupational hazards, sedentary lifestyle
  - e. Medications: Narcotics decrease rate and depth.
4. Alterations in respiratory function: movement, diffusion, or transport.
  - a. 3 major alterations: Hypoxia, Altered breathing pattern, and partial airway obstruction.
  - b. Clinical manifestations of hypoxia:
    - i. rapid pulse
    - ii. rapid, shallow respirations and dyspnea
    - iii. restlessness or light-headedness
    - iv. nasal flaring
    - v. substernal or intercostal retractions
    - vi. cyanosis (late sign)
      1. Blood contains 5g/dll or more of unoxygenated hemoglobin per 100ml of blood AND surface capillaries are dilated
  - c. Accumulation of CO<sub>2</sub> in blood (hypercarbia or hypercapnia), reduced oxygen in blood (hypoxemia)
    - i. Cerebral cortex can tolerate hypoxia for about 3-5 minutes

quick facts: *Clubbing: angle between the nail and the base of the nail exceeds 180 degrees*  
*Normal breathing - eupnea*

*Rapid breathing - tachypnea*

*Slow breathing - Bradypnea*

*Cheyne- stokes : rhythmic waxing - deep to shallow (from CHF, ICP, Drug overdose)*

*Biot's respirations (clusters): shallow breathing with periods of apnea (CNS disorder).*

Assessment of oxygenation status:

Inspection, palpation, percussion, auscultation

Nursing diagnosis's for respiratory problems:

- **Ineffective airway clearance** (secretions, obstructions)
- **Ineffective breathing pattern** (poor respirations)
- **Impaired gas exchange** (excess or deficit in oxygenation)
- **Activity intolerance** (poor physiological or psychological energy to endure)

### Oxygen Management

"An appropriate method of delivering supplemental O2 will provide the minimal amount necessary to reach these goals"

Oxygen delivery devices:

1. Low flow
  - a. Nasal canula 24-40% (up to 6 lpm), Simple face mask up to 50% (at least 5 lpm), Non rebreather up to 100% (10-15 lpm)
2. High flow
  - a. Venturi Mask 4-8 lpm, delivers precise percentage of oxygen.

Related nursing diagnoses

- **Anxiety**
- **Fatigue**
- **Powerlessness**
- **Insomnia**
- **Social Isolation**

### Nursing Care Plan

1. Teaching client to prepare for self care at home
2. Strategies
  - a. Encourage deep breathing
  - b. Coughing
  - c. Good positioning
  - d. Oxygen therapy
  - e. Breathing exercises

- i. Abdominal and pursed lip breathing (inhale 3 count, exhale 7 count)
- f. high fluid intake

#### Medications

1. Bronchodilators - sympathetic response
2. Anti-inflammatory drugs (glucocorticoids) - decrease edema and inflammation
  - a. Use bronchodilators first, then glucocorticoids
3. Leukotrienes modifiers (new class) - suppress leukotrienes that cause bronchoconstriction, mucus production and edema of respiratory tract
4. Expectorants - break up mucus
5. Digitalis Glycosides - improve strength of contractions and slow the heart rate
6. Beta adrenergic blockers - block sympathetic response which lowers the workload on the heart

*Incentive Spirometry (SMI)*. Sustained maximum inspiration device: improves pulmonary ventilation, loosens secretions, facilitates gas exchange, expand collapsed alveoli and can prevent atelectasis

Interventions: PVD - percussion, vibration and postural draining

#### End of Week 1

#### Normal Breath Sounds:

1. Vesicular - Soft intensity, low pitched “sighing sound” - heard at peripheral lung bases
2. Broncho-vesicular: moderate intensity “blowing” sound - heard between scapula, lateral to sternum between 1st and 2nd intercostals
3. Bronchial - High pitch, loud “harsh” sound, heard anteriorly over trachea

#### Child Airway: Problems and differences associated with age

1. Smaller nares, easy to occlude
  2. Oral cavity risk of obstruction
  3. Long floppy epiglottis can swell and occlude airway
  4. Thyroid, cricoid and tracheal cartilage easy to collapse
- Infant airway is about 4mm diameter, it lengthens for first 5 years with little change in diameter
  - Until 4 weeks old, infants are obligatory nose breathers.
  - Newborns do not have enough smooth muscle in their airways to trap invaders. Development is not complete until 1 year old.
  - Children under 6 use only the diaphragm to breath, their intercostals are not strong enough
  - The major concern is Foreign body aspiration
  - The right lung is the most common site of lower airway obstruction
  - **If a child cannot say “P” words like “Pluto”, or “peter pan”, than the foreign body has noticeably diminished expiratory efforts.**

#### CLINICAL THERAPY

- Careful History

- Physical exam
  - Decreased breath sounds
  - Strider
  - Respiratory distress
  - Radiograph (forced expiratory film)

#### NURSING ASSESSMENT

- ✓ Physiologic
  - Respiratory
    - Quality
      - Rate, depth, effort
      - Signs of distress
      - Chest expansion
      - Breath sounds
  - Pulse
  - Cough
  - Behavior changes
    - Restlessness, irritability, decreases LOC
  - Dehydration
    - Mucus membranes
- ✓ Psychosocial
  - Anxiety and fear created by event present in child AND in parent
    - These stresses increase the body's metabolic demand and therefore INCREASE THE OXYGEN DEMAND.

#### NURSING DIAGNOSISES

1. Ineffective Airway Clearance
2. Impaired spontaneous ventilations - muscle fatigue
3. Fear (parent OR child)
4. Risk for Injury

Discharge Planning - Teach safety in the home.

*Respiratory failure: PaO<sub>2</sub> less than 50mm Hg and PaCO<sub>2</sub> more than 50mm Hg (On room air)*

#### Thorax Inspection

- ✚ Chest configurations
  - Barrel Chest - ribs more widely spaced seen with EMPHYSEMIA
  - Funnel Chest - Depression in lower sternum- can be the result of RICKETS or KYPHASCOLIOSIS (abnormal spine curvature)
  - Pigeon Chest - increase in anteroposterior diameter - can result from RICKETS, MARFAN's, or KYPHASCOLIOSIS.

- Kyphoscoliosis: characterized by elevation of scapulas and S shape spine which limits lung expansion. can occur with osteoporosis and other skeletal disorders.
1. Eupnea : normal breathing pattern and rate in adults 12-18 breaths per minute.
  2. Thoracic Palpation - look for Tenderness, masses, lesions, pain and symmetry
  3. Respiratory excursion (expansion)
    - a. Assess for range and symmetry
      - i. Decreased range and excursion may signal chronic fibrotic disease, asymmetrical may be due to self splinting secondary to pleurisy, fracture, trauma, or unilateral bronchial obstruction.
  4. Tactile Fremitus : sound vibration felt with hands
    - a. Most palpable in upper thorax
    - b. Ask patient to repeat the phrase “ninety nine” while palpating up and down the thorax.
    - c. Vibrations detected with the palmer surfaces of the fingers and hand.
    - d. Patients with emphysema will not have fremitus
    - e. Patients with pneumonia will have increased fremitus over the effected lobe
  5. Percussion: used to identify areas that are solid, air filled, or fluid filled
    - a. Begin at posterior thorax with patient sitting up, head forward, hands crossed on lap.
    - b. Start at shoulder top, finger horizontal, identify 5cm width of area overlying lung apex.
    - c. Percuss down in 5-6mm intervals comparing left to right.
      - i. Middle finger is horizontal between ribs
      - ii. Anterior chest
        1. Shoulders arched back, arms held wide to side. Begin in the supraclavicular area and work down, one intercostal space at a time.
        2. Dullness between third and fifth intercostal is normal (heart)
        3. Dullness also over liver (5th intercostal space to the right of the right costal margin.
      - iii. Diaphragmatic Excursion
        1. Patient holds a deep breath, percuss to find diaphragm, then patient exhales and percuss downward to dullness to find margin, MARK IT.
        2. Measure distance between the two points to determine the range of motions.
          - a. Can be 8 - 10 cm in a health, tall man, normal 5-7cm.
          - b. Normal diaphragm is 2cm higher on the right side due to the heart.
  6. Breath Sounds - normal, adventitious and voice sounds
    - a. Listen for 2 full inspirations and exhalations at each location
    - b. Adventitious sounds:
      - i. Discrete - non continuous sounds
        1. Crackles
        2. Rhonchi (gurgles)
      - ii. Continuous - musical sounds

1. Wheezes
- iii. Voice sounds - vocal resonance "ninety nine"
  1. Bronchophony - more intense and clearer than normal
  2. Egophony - distorted sounds (Pt. says "e", you hear "a")

## NON Invasive Respiratory Therapies

- need is assessed by :

- a. Arterial blood gas
- b. Pulse Ox
- c. Clinical Exam.

Oxygen toxicity - too high concentration (over 50%) for too long (greater than 48 hours)

Overproduction of oxygen free radicals, which are the byproducts of cell metabolism

-Symptoms

- a. Substernal discomfort
  - b. Restlessness, fatigue, malaise, progressive respiratory difficulty, atelectasis
1. Incentive Spirometry (SMI) or Sustained Maximal Inspiration  
Prevents or reduces atelectasis (alveoli collapse)
  2. Postural Draining: uses the force of gravity to remove secretions 2 to 4 times per day.
    - a. Use Bronchodilators and mucolytic agents
    - b. Do a chest assessment
    - c. Drain lower lobes first, 10 to 15 minutes in each position
    - d. Breathe in slow through nose and out through pursed lips
    - e. Patient coughs to remove secretions
    - f. Document amount, color, viscosity and character of sputum.

## ACTIVITY AND EXERCISE

*Proprioception - an awareness of posture, movement and changes in equilibrium*

"An immobilized person is as vulnerable as an infant" Body image is related to immobility (risk)

1. Balance-When the line of gravity passes through the center of gravity (where the body's mass is centered)
2. Muscles are categorized by function
  - a. Extensors
  - b. Flexors
    - i. Stronger than extensors
    - ii. When a person is inactive for a long period, the joints are pulled into a flexed position. Eventually the muscle becomes permanently shortened and the joint becomes fixed in the flexed position
  - c. Internal and external rotators, etc.
3. The cerebral cortex initiates movement, the cerebellum coordinates it.

- a. When a person's cerebellum is injured, movements become clumsy, unsure and uncoordinated.
- b. Strenuous exercise may reduce immune function from the recovery phase

NUTRITION - IOM recommends 45-65% of calories come from complex carbohydrates  
 20-35% from healthy fats  
 10-35% from protein

Fitness activity - F.I.T. (frequency, intensity, time)

- ✚ Early ambulation after illness or surgery is essential to prevent complications.
- ✚ Bones demineralize without use
- ✚ Contracture of muscles is permanent unless there is surgical intervention.
- ✚ Collagen in joints become ankylosed (permanently immobile.) without movement.

## IMMOBILITY

1. Effect on the heart:
  - a. Diminished cardiac reserve
    - i. Rapid heart rate
  - b. Increased use of a Valsalva maneuver
    - i. Holding breath and straining against a closed glottis
    - ii. Interferes with return blood flow.
  - c. Orthostatic hypotension develops
  - d. Venous vasodilatation and stasis
  - e. Dependant Edema
  - f. Thrombus formation
2. Effects on Respiratory System
  - a. Decreased respiratory movement
    - i. Reduction in vital capacity.
  - b. Pooling of respiratory secretions
    - i. Loss of respiratory muscle tone
  - c. Atelectasis - collapse of alveoli
    - i. Pooling and bronchiole blocking
  - d. Hypostatic pneumonia - infection in secretions
    - i. Can severely decrease oxygen intake
    - ii. **Common cause of death.**
3. Effects on Metabolic system
  - a. Decreased metabolic rate: sum of all physical and chemical processes
    - i. BMR is the minimum energy expended for maintenance of these processes
  - b. Negative nitrogen balance
    - i. Imbalance between anabolism and catabolism
    - ii. Catabolism of muscle mass releases nitrogen

- c. Anorexia
  - i. Loss of appetite due to decrease in metabolic rate
- d. Negative calcium balance
- 4. Urinary System
  - a. Urinary stasis - due to lack of gravity
  - b. Renal Calculi (stones)
    - i. Urine becomes more alkaline and calcium salts precipitate out as crystals.
  - c. Urinary retention - incontinence
  - d. Urinary infection
    - i. Improper perianal care.
- 5. Gastrointestinal System
  - a. Constipation (give rectal rockets)
    - i. A bedpan does not facilitate elimination
- 6. Integumentary system
  - a. Reduced skin turgor - skin atrophy
    - i. Loss of elasticity
  - b. Skin breakdown
    - i. Bed sores (decubitus)
- 7. Psychoneurological System
  - a. Body has a decline in mood elevation substances such as endorphins
    - i. Negative effect on mood
  - b. Exaggerated emotional reactions
  - c. Altered perception of time
  - d. Decision making ability decreases.

## IMMOBILITY MANAGEMENT

Assess relative to the client's activity and exercise

- 1. Nursing History
  - a. Activity history
- 2. Physical exam
  - a. Focus on activity, exercise, body alignment, gain, appearance and movement of joints, muscle mass, strength, and activity tolerance.
    - i. Body alignment
      - 1. Shoulder and hips level
      - 2. Toes pointed forward
      - 3. Spine is straight
    - ii. Gait
      - 1. Chin level, gaze straight ahead, sternum lifted and shoulder down and back, relaxed and away from ears.
    - iii. Pace
      - 1. Normal 70 - 100 per minute

2. Elderly may slow to about 40
- iv. Measure to determine activity intolerance
  1. Heart rate, strength and rhythm
  2. Respiratory rate, strength and rhythm
  3. Blood pressure
  4. Measure before, during and immediately after, 3 minutes after

#### Related Nursing Diagnosis's

- Activity intolerance levels I-IV
- Risk for activity intolerance
- Impaired physical mobility
- Sedentary lifestyle
- Risk for disuse syndrome
- **When problem arise:**
- Ineffective airway clearance
- Risk for Infection, injury, disturbed sleep pattern, low self esteem.

### PAIN MANAGEMENT

1. Pain transduction begins when nociceptor nerve endings in the peripheral nervous system are stimulated.
2. Chemical mediators of inflammation, prostaglandins, leukotrienes, histamine, bradykinin and substance P
3. Nerve impulse travels along the spinal cord on sensory neurons type A and C fibers
  - a. A fibers are wrapped in myelin that speeds transmission
    - i. A $\alpha$  fibers - fastest: touch, pressure on muscle
    - ii. A $\beta$  fibers - slower : touch pressure on skin
    - iii. A  $\Delta$  fibers - slowest: tissue injury - sharp pain.
  - b. C fibers are unmyelinated and carry information slower.

Perception: conscious experience of pain (in brain)

Nociception: neurologic transmission of pain.

Nociceptors are neuronal receptors involved in the transmission of perceptions to and from the brain.

#### Pain characteristics:

Duration, location, etiology

#### Pain assessment

1. Location
2. Intensity
3. Timing (history)

- a. Pt's own perception
- b. When and what medications were last taken
- c. Other medications being taken
- d. Allergies to medications
4. Quality (sharp or dull)
5. Precipitating or relieving factors
  - a. Activities
  - b. Atmosphere
  - c. emotion
6. Personal meaning - patient's description
  - a. Effects of pain on ADLs
  - b. Coping resources
  - c. Affective responses (feelings related to pain)
  - d. Pain diary - 3 entries per day, at the same time of day
7. Pain behaviors (verbal and non verbal)
8. Pain scale

#### Nursing Goals

1. Assess
2. Identify goals in pain management
3. Patient teaching
4. Physical care
5. Administer pain relieving interventions
6. Assess effectiveness

#### Pain control:

\*\*\* More medication is needed to restore pain control than would have been required for continuous infusion.

Patient controlled analgesic (PCA) is used ONLY for children 5 years and older.

Chronic pain: > 6 months

Appropriate pain management: when a patient's pattern of pain is known, a plan of pain relief with analgesics, activities, and management can be made.

- Early mobilization
- Shortened hospital stays
- Reduced cost

#### Misconceptions:

- 1) People only experience severe pain with major surgery
- 2) Health care workers are the authority on pain
- 3) Administration of analgesics regularly will lead to addiction.

- 4) The amount of tissue damage is related to the amount of pain.
- 5) Visible physiological or behavioral signs accompany pain and can be used to verify its existence.

#### Acknowledgement

- 1) Accepting and acknowledging client's pain
  - a. Acknowledge the possibility of pain
  - b. Listen attentively
  - c. Convey that pain is different for people and you need to ask.
  - d. Attend to client's needs promptly
- 2) Assist support persons by teaching them
- 3) Reduce misconceptions about pain
  - a. A client may refuse a pain med for fear of addiction
- 4) Reduce fear and anxiety
  - a. Teaching a client the range of pain that is normal for certain conditions.
- 5) Preventing pain
  - a. Pre-emptive analgesia

#### Analgesics

##### Classes of analgesics:

1. Nonsteroid anti-inflammatory drugs (NASIDs)
  - a. Act at the peripheral level
2. Opioids
  - a. Act at CNS
  - b. Primarily metabolized by the liver and excreted by the kidney
  - c. Agonist (morphine and codeine) - drugs that activate both mu and kappa receptors
  - d. Mixed opioid agonist-antagonist - occupy one receptor and block the other
    - i. Stadol, Buprenex, pentazocine
  - e. Opioid antagonist - drugs that block both receptors
    - i. Narcan
3. Adjunctive analgesics
  - a. Drugs that mimic inhibitory neurotransmitters
4. NON Drug pain management
  - a. Relaxation, meditation, distraction, cold or heat, electric nerve stimulation (TENS), therapeutic touch, energy therapy, biofeedback
    - i. The theory of non drug pain management is based on the descending system that terminates on the inhibitory area of the dorsal horn.
      1. If this system is always active, it prevents the continuous transmission of painful stimuli
      2. The cognitive processes may stimulate endorphin production within this system

3. The effectiveness is illustrated by distractions such as visitors, tv, cold or heat, ect, that increases activity in the descending system.
4. There are inhibitory interneural fibers that provide interconnections between the descending and ascending sensory tract.
5. The gate control theory speculates that psychological factors have an effect on pain management.

GOAL - maintain a patient pain level that allows self care and ADLs

PO dose is about 3 times greater than IV dose.

Balanced Analgesia : more effective pain control is accomplished when more than one medication is used concurrently.

COMMON PAIN MANAGEMENT DRUGS

1. Morphine Sulphate (Astramorph PF, Duramorph RF, Roxanol, others)
  - a. Class: Therapeutic Narcotic Analgesic
  - b. Pharmacology: Opioid Agent
    - i. Narcotic analgesic of choice for most types of acute and severe pain.
    - ii. DRUG OF CHOICE for chest pain associated with an M.I.
    - iii. NO UPPER DOSAGE LIMIT
  - c. Mechanism: Occupies MU and KAPPA receptors in the brain and the dorsal horn of spinal cord.
  - d. Dominant effects:
    - i. Alters the perception and emotional response to pain
    - ii. Mimics actions of endogenous endorphins
  - e. Pharmacokinetics
    - i. Routes: P.O., IV, SubQ, IM, Rectal, Epidural, Intrathecal (sub arachnoid space of spinal cord).
    - ii. Absorption: P.O. - variable, 30%; SubQ and IM - may be erratic or delayed
    - iii. Distribution: Wide, crosses placenta, secreted in breast milk
    - iv. Primary metabolism: Hepatic - significant first pass
    - v. Primary secretion: Renal - 7-10% in bile, feces
    - vi. Onset: PO - 30-60 minutes, IV-rapid, Epidural - 15-30 minutes
    - vii. Duration: PO 4-7 hours, IV 4-5 hours, Epi. - 4 - 24 hours.
  - f. Adverse Effects
    - i. Depresses CNS - sedation, anxiety, disorientation
    - ii. Tolerance
    - iii. Hallucination possible in high dose
    - iv. Reduces sensitivity to CO<sub>2</sub> receptors in CNS (effects respiration)
    - v. Produces Nausea and vomiting
    - vi. Slows peristalsis

- vii. Urinary retention
  - viii. Orthostatic hypotension
  - ix. Pruritus - more common in IV route (itching)
  - x. Schedule 2 narcotic - physical and psychological dependence
  - g. Contraindications
    - i. Hypersensitivity to opioids
    - ii. Caution with elderly and undiagnosed abdominal pain
    - iii. Hepatic or renal impairment, CNS depression, head injury, intracranial pressure, COPD
    - iv. Mothers should not breastfeed until 4 - 6 hours after.
    - v. Never withdraw abruptly
  - h. Interaction
    - i. Increases sedation with : alcohol, muscle relaxants, MAOIs
      - 1. Narcan will reverse effects immediately
    - ii. St. John's Wart decreases effectiveness
  - i. Pregnancy - category C
2. Similar Meds with the same actions and adverse reactions:
    - a. Codeine - better for severe cough
    - b. Hydrocodone - usually combined with acetaminophen
    - c. Hydromorphone - primarily analgesic - less nausea, rapid onset
    - d. Levorphanol
    - e. Meperidine: CNS stimulant - 15-30 hour half life
      - i. Can cause seizures and is not reversed with Narcan
    - f. Methadone: long duration
    - g. Oxycodone: (Percocet, Percodan) - less nausea, vomit, and hallucinations
      - i. Short duration
    - h. Propoxyphene (Darvon) oral: mild to moderate pain, fewer side effects, but overdose is difficult to reverse with Narcan. Schedule IV
  3. Mixed agonist and antagonist opioids with less chance of dependence.
    - a. Buprenorphine - partial agonist at the MU receptor and antagonist at the KAPPA receptor. Relief of moderate to severe pain, parenteral route and sublingual.
    - b. Stadol (Butorphanol) agonist at KAPPA, weak antagonist at MU.
      - i. IV, IM : severe pain, Nasal spray - migraine and obstetrics
    - c. Nubain (Nalbuphine) agonist at KAPPA, weak antagonist at MU
    - d. Pentazocine (Talwin)
  4. Non Steroid Anti Inflammatory Drugs (NSAIDs) - meds of choice for mild to moderate pain
    - a. No opioids
    - b. For pain associated with inflammation
    - c. Acetaminophen, aspirin (COX 1 and 2)
    - d. Act at peripheral sites by inhibiting pain receptors.
    - e. Inhibit cyclooxygenase which inhibits production of prostaglandins
      - i. Prostaglandins are chemical substances that increase sensitivity of pain sensors.

- ii. COX2 mediates prostaglandins that result in pain, inflammation and fever (Celebrex)
  - f. Effects: GI, nausea, anorexia, dyspepsia (upset stomach), ulcers
  - g. Provide a synergistic effect when combined with opioids
  - h. Have a ceiling of effective dose and a narrow therapeutic range.
- 5. Miscellaneous analgesics that act on the central nervous system
  - a. Ultram - central acting non opioid
    - i. No GI reactions
    - ii. Binds to MU receptor
    - iii. Inhibits norepinephrine and serotonin reuptake in spinal neurons and therefore inhibits transmission of pain impulses
    - iv. Adverse: vertigo, dizziness, headache, nausea, vomiting, constipation, lethargy
    - v. Physical dependence is possible
    - vi. Caution: patients allergic to codeine, COPD, and on antidepressants
    - vii. Narcan has some effects
    - viii. Prior to administrations: assess allergies, LOC, vitals, prior admin, pain level, and history of substance abuse.
  - b. Drugs similar to Ultram
    - i. Clonidine
      - 1. Used for hot flashes, Tourette, ADHD and alcohol withdrawal
      - 2. Admin as epidural infusion (block), PO, and transdermal
    - ii. Ziconotide (made from a saltwater snail)
      - 1. Only intrathecal infusion
      - 2. Blocks N-channel calcium channels
      - 3. Side effects = potential for psychiatric symptoms.
  - c. Adjunct Analgesic - Enhance analgesics for specific indications,
    - i. ALL have other primary classifications.
      - 1. Antidepressants, antiseizure, tranquilizers
    - ii. Pain refractory to opioids such as intractable cancer pain, neuropathic pain caused by damage to the nerve itself, and pain caused by CNS swelling putting pressure on the nerves. (neuropathic pain: pins & needles, burning, elec. Shock)
    - iii. Examples:
      - 1. Anti seizure
        - a. Carbamazepine, clonazepam, Neurontin - reduce peripheral nerve pain
      - 2. Benzodiazepines
        - a. Valium, Ativan : reduce anxiety in terminal dyspnea
      - 3. Bisphosphonate
        - a. Etidronate, pamidronate : reduce cancer pain
      - 4. Corticosteroids
        - a. Prednisone, Decadron : reduce spinal edema

5. SRSIs
    - a. Celexa, Prozac, Luvox, Zoloft : reduce neuropathic pain by increasing conscious inhibitory neurotransmitters
  6. Tricyclic antidepressants
    - a. Elavil, amoxapine, Norpramin, Sinequan, and Tofranil: same as SRSI, reduces neuropathic pain.
6. Pharmacology with Opioid Antagonist
- a. For opioid overdose
    - i. Heroin crosses blood brain barrier and is metabolized into morphine.
  - b. Narcan
    - i. No pharmacologic actions outside of opioids
    - ii. Routes: IV, SubQ, IM, ET
    - iii. Metabolism - Hepatic
    - iv. Onset 1 - 2 minutes
  - c. Revex
    - i. Similar to Narcan but with a longer duration
  - d. Naltrexone (Vivitrol)
    - i. Used in rehabilitation of opioid and alcohol abuse
    - ii. Patients with severe hepatic impairment should not use this drug.

**Definition of pain: An unpleasant sensory and emotional experience associated with actual or potential tissue damage. Most common reason for seeking care.**

Pain in children: IN very young children it can be unclear as to how much pain they are really experiencing.

Indicators:

1. Physiological:
  - a. Tachycardia
  - b. Tachypnea
  - c. Hypertension
  - d. Pupil dilation
  - e. Pallor
  - f. Increased perspiration
  - g. Increased secretion of catecholamine and adrenocorticoids
2. Behavioral Indicators
  - a. Short attention span
  - b. Irritability
  - c. Facial grimacing
  - d. Posture (guarding, immobile)
  - e. Drawing up knees, flexing limbs, massaging effected area
  - f. Lethargy

- g. Sleep disturbances
  - h. May take shallow breaths and suppress cough to avoid pain.
  - i. Children may assume that the nurse knows they are in pain
    - i. May be afraid of a needle.
3. Assessment of children
- a. Less than six months old: NIPS scale (Grimace, cry, breathing, rigidity)
  - b. Six - twelve months: FLACC (face, legs, activity, cry consolability)
4. Drug therapy of children with opioids, NSAIDs, non-narcotic analgesics
- a. Respiratory depression may lead to arrest
  - b. Continuous pain medication is recommended for children even though physical dependence from opioids may happen.
  - c. Anxiety caused anticipation of a procedure
  - d. Topical for minor procedures like a shot
    - i. 2.5% lidocaine or Prilocaine applied 60 minutes before the shot
  - e. Sedation - depressed consciousness (light to deep)
    - i. Diazepam (valium)
    - ii. Hypnotics or barbiturates: thiopental, pentobarbital
    - iii. Ketamine
    - iv. Propofol
    - v. Fentanyl, alfentanil
  - f. Check vitals every 15 minutes. Monitor child continuously, deep sedation vitals q 5 min.
  - g. Non pharmacological pain control: sometimes sucrose solution 12-24% with a pacifier for infants.
  - h. Withdrawal symptoms
    - i. CNS - irritability, sleepless, tremors, hyperactive deep tendon reflexes, yawning, sneezing, delirium, visual and auditory hallucinations.
    - ii. GI - vomiting, diarrhea, uncoordinated suck and swallow
    - iii. Nervous system - Tachycardia, tachypnea, high BP, nasal stuffiness, sweating, fear.
5. Nursing diagnosis's for children in pain:
- a. Acute Pain related to injury and surgery
  - b. Anxiety related to anticipation of pain
  - c. Sleep pattern disturbed related to inadequate pain control

Some definitions:

- Hyperalgesia (hyperpathia) - heightened response to painful stimuli
- Allodynia - non-painful stimuli that produces pain
- Dysesthesia - unpleasant abnormal sensation that mimics or imitates the pathology of a central neuropathic pain disorder.

Pain Stimuli: Mechanical, Thermal and Chemical

Transmission has three segments

1. Peripheral nerve to spinal cord - modified in the dorsal horn
2. Spinal cord to brain stem
3. Transmission between the thalamus to the somatic sensory system

Pain Perception: PERCEPTION IS REALITY

- 1) Modulation - the descending system
  - a. Thalamus and brain stem send signals back down to the dorsal horn
  - b. Fibers release endogenous opioids, serotonin, and norepinephrine
- 2) Perception
  - a. Patient becomes conscious of pain
  - b. Sum of complex activities in CNS shaping the character and intensity of the pain
- 3) Persistent
  - a. Changes the nervous system in a way that intensifies, spreads, and prolongs pain risking development of incurable chronic pain syndrome
  - b. Establishes new nerve growth, further spreading and prolonging the noxious stimuli.
- 4) Factors effecting pain experience
  - a. Ethnic and cultural values

## IV Solutions (parental fluids)

Isotonic = 310 mEq/Liter, Hypotonic < 210 mEq/Liter, Hypertonic >375 mEq/Liter

- IV solutions - goals
  - Provide water, electrolytes and nutrition
  - Replace water, and correct electrolyte imbalances
  - Administer medications and blood products.

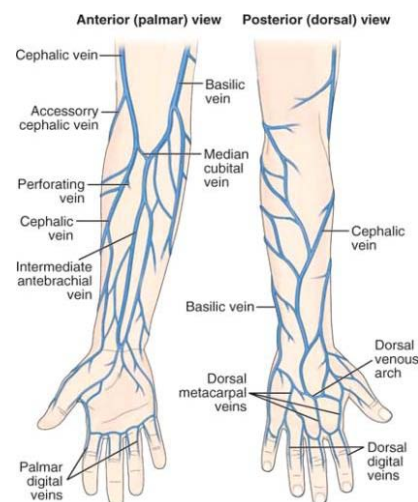
Calculation for drip rate:  $\frac{\text{gtt per ml of infusion set}}{60 (\text{min}[\text{in hour}])} \times \text{Total hourly volume} = \text{gtt per minute}$

ISOTONIC - 3 liters of isotonic solution replaces 1 liter of blood

1. 0.9% NaCl (Normal Saline) - the only product that can be given with blood products.
  - a. Supplies excess Na<sup>+</sup> and Cl<sup>-</sup>
  - b. When mixed with dextrose (5%) it becomes hypertonic
2. Lactated Ringers (LR)
  - a. Contains multiple electrolytes similar to plasma
  - b. Used for hypovolemia, burns, fluid loss and acute blood loss
  - c. DO NOT USE WITH RENAL FAILURE - can cause hyperkalemia
3. 5% dextrose in water (D5W)
  - a. 170 cal / liter
  - b. Contraindicated in head injury

HYPOTONIC

1. 0.45% NaCl (half normal saline, ½ NS)
  - a. Provides Na<sup>+</sup> and Cl<sup>-</sup> and free water



- b. Used to treat hypertonic dehydration

#### HYPERTONIC

1. 3% NaCl (hypertonic saline)
  - a. Used to increase ECF volume and decrease cellular swelling
  - b. Must be given slowly
  - c. Assists in removing intracellular fluid excess
2. 5% NaCl
  - a. Used to treat symptomatic hyponatremia (low sodium)

#### COLLOID SOLUTIONS

1. Dextran in NS or D5W
  - a. Volume/plasma expander for intravascular part of ECF
  - b. Remains in circulation for up to 24 hours
  - c. Treat hypovolemia in early shock
    - i. Increases pulse pressure, cardiac output and arterial BP
  - d. Not a substitute for blood and blood products.

#### Intravenous Lines (IVs)

1. Purpose
  - a. Provide water, electrolytes, nutrients to meet daily requirements
  - b. Replace water and electrolytes
  - c. To administer drugs and blood products.
  - d. Fluid in the body are a medium for metabolic reactions, transport for nutrients, waste and others. Lubricant, insulator, shock absorber, and one way to regulate temperature.
2. Systemic Complications
  - a. Fluid overload
    - i. Put patient in high fowler's position, call MD
  - b. Air Embolism
    - i. Put patient in left Trendelenburg
  - c. Infection
    - i. Replace IV line every 48 - 72 hours (for indwelling cath)
  - d. Infiltration and Extravasation (infiltration of meds)
  - e. Phlebitis (use a warm compress)
  - f. Thrombus (use a cold compress)
  - g. Hematoma
3. Blood Transfusions
  - a. Blood : 20g cath or larger
  - b. Platelets and Plasma: 22g Cath or larger.
  - c. Transfusion reaction signs and symptoms
    - i. Fever, chills, respiratory distress, low back pain, nausea, pain at IV site, anything unusual.
  - d. Transfusions Complications
    - i. Febrile nonhemolytic reaction

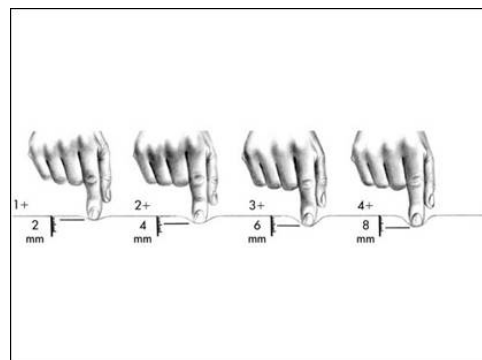
1. Antibodies to donor leukocytes that remain in blood
  2. Most common complication (90% of reactions)
  3. Chills, Fever within 2 hours
  4. NOT LIFE THREATENING
  5. Reduce donor leukocytes with a filter
- ii. Acute Hemolytic reaction.
1. MOST DANGEROUS
  2. Donor blood is incompatible with recipient
    - a. Fever chills, low back pain, nausea, chest tightening, dyspnea and anxiety
  3. Must be recognized promptly and transfusion stopped.
- iii. Allergic reactions
1. Sensitivity to a plasma protein in blood.
  2. Relieve with antihistamine
- iv. Circulatory overload
1. Too much blood infused too quickly
  2. Dyspnea, orthopnea, tachycardia, anxiety
- v. Bacterial contamination
1. Often results from organisms on donor's skin
  2. Symptoms not seen for several hours
  3. Treated aggressively with antibiotics.
- vi. Transfusion related acute lung injury
1. Only 1 in 5000 transfusions
  2. Most common transfusion related cause of death
  3. Mechanism unknown but may involve antibodies in donor plasma
  4. Interstitial and intraalveolar edema, as well as extensive WBCs in pulmonary capillaries.
  5. Onset is 2-6 hours
  6. Acute SOB, hypoxia, SaO<sub>2</sub> <90%, hypotension, fever, pulmonary edema
  7. Aggressive support therapy, O<sub>2</sub>, intubation, fluid support to prevent death.
  8. Less likely if blood is from someone who was never pregnant.
- vii. Delayed hemolytic reaction
1. Within 14 days
  2. A level of antibody develops to an extent that a reaction occurs
  3. Fever, anemia, increased bilirubin level, decreased or absent haptoglobin, and jaundice
  4. Generally not dangerous
- viii. Disease acquisition
1. Disease transmitted by blood
- ix. Complications of long term therapy
1. Greater risk for infections

2. Iron overload (PRBCs=250mg iron)
- e. Nursing Management
  - i. Stop transfusion - maintain line with NS through new tubing
  - ii. Thorough assessment
    1. Compare with baseline
    2. Respiratory focus
  - iii. Notify physician
  - iv. Notify blood bank
  - v. Send blood and tubing to blood bank
  - vi. For hemolytic transfusion reaction or bacterial infection:
    1. Obtain blood specimen from patient
    2. Collect urine sample
    3. Document reactions

## HYPERVOLEMIA (FVE) Fluid Volume Excess

Risk Factors: high sodium

1. Signs
  - a. Edema, distended neck veins, crackles in lungs, tachycardia, increased BP, increased pulse pressure and central venous pressure, increased weight, increased urine output and SOB.
2. Can occur when aldosterone is chronically stimulated
  - a. Cirrhosis, heart failure, nephrotic syndrome, increased capillary static pressure
3. Treatment: Stop IV fluids (some cases), restrict salt, diuretics
  - a. Thiazide diuretics
    - i. HydroDIURIL, Metolazone (mild)
  - b. Loop diuretics (block sodium reabsorption)
    - i. Lasix, torsemide (severe)
  - c. Potassium supplements help prevent hypokalemia
  - d. Low sodium diet (250mg/day) - normal is 6 to 25 grams
  - e. Serum osmolarity will be down (below 280)



Physical assessment to evaluate a patient's fluid, electrolytes and acid/base balance

Clinical measurements

Daily weight, Vital Signs, Fluid intake and Output

1. Interview
  - a. Current and past medical history
  - b. Medications and treatment
  - c. Intake and output (urine, vomiting, diarrhea)
    - i. Oral fluids
    - ii. Ice chips =  $\frac{1}{2}$  volume
    - iii. Foods that become liquid at room temperature

- iv. Tube feeding - water flush
- v. Parenteral fluids (IV)
- vi. Intravenous medications.
- d. Fluid electrolyte acid/base balance
  - i. Gain or loss of weight
  - ii. Excessive thirst, dry skin, dark or concentrated urine (output?)
  - iii. Difficulty concentrating, confusion, dizziness, feeling faint, cramping, twitching, spasms, excess fatigue?

#### FLUID and ELECTROLYTE BALANCE

60% of weight of an adult is fluid (water and electrolytes)

Obese have less water than thin people because fat cells contain little water.

1. 2/3 of body fluid is Intracellular (inside the cell)
2. 1/3 is extracellular (outside the cell) - transports electrolytes and other substances
  - a. Intravascular (in blood vessels)
    - i. Plasma - effective circulating volume
      1. 3L of 6L of blood is plasma
      2. Other 3L is erythrocytes, leukocytes and thrombocytes
  - b. Interstitial space - fluid that surrounds cells
    - i. About 11-12 liters in an adult
    - ii. Lymph
  - c. Transcellular
    - i. Cerebrospinal, pericardial, synovial, intraocular and pleural fluids (about 1Liter)
3. Fluid intake is about 2500ml per day
  - a. Oral 1300ml
  - b. Food 1000ml
  - c. Food metabolism 200ml
4. Fluid output about 2400-2600ml
  - a. Urine 1500ml
  - b. Skin 300-400ml
  - c. Respirations 300ml
  - d. Perspiration 100-200ml
  - e. Feces 200
5. Body fluid moves between two major compartments to maintain equilibrium
  - a. Osmosis - movement of WATER across membrane
  - b. Diffusion - movement of molecules across membrane (higher to lower concentration)
  - c. Filtration - pressure gradient
  - d. Active Transport
  - e. **Loss of fluids can disrupt equilibrium**
  - f. Sometimes fluid is unavailable for use by either ICF or ECF. Loss of ECF into space that does not contribute to equilibrium is called 3rd space.
    - i. Decreased urine output

- ii. Increased heart rate
  - iii. Decreased blood pressure
  - iv. Decreased central Venous pressure
  - v. Edema
  - vi. Imbalance in fluid intake and output
  - vii. Occurs in people who have: **hypocalcaemia, decreased iron intake, severe liver disease, alcoholism, hypothyroidism, malabsorption, immobility, burns and cancer.**
- g. ADH causes retention of fluid - serum osmolarity decreases (anti diuretic hormone)
- i. ADH is suppressed when serum osmolarity is low
- h. ANF is secreted by the heart muscle. It is a potent diuretic and causes nephrons to dump sodium and water.
- i. Electrolytes: active chemicals
- i. Cations (+), anions (-)
  - ii. Major cations: sodium, potassium, magnesium, and hydrogen ions
  - iii. Major anions: chloride, bicarbonate, phosphate, sulphate, and proteinate ions
  - iv. These chemicals are measured in milliequivalents per liter (mEq)
  - v. The ECF has low concentrations of potassium and phosphate and only tolerate small changes.
    - 1. Release of large stores of potassium (trauma) can be very dangerous
    - 2. Cell membrane pump exchange sodium and potassium (active transport)

**Tonicity:** ability of all solutes to cause an osmotic driving force.

**Osmotic Diuresis:** increased urine output by excretion of glucose, mannitol, or contrast agents in urine.

Normal urine output: 1ml/kg/hr or about 1 to 2 liters per day.

Osmolarity

1. Urine concentration
  - a. Serum 280-300 mOsm/kg
  - b. Urine 200-800 mOsm/kg
  - c. To estimate serum osmolarity:  $Na \times 2 = \frac{Glucose}{18} + \frac{Bun}{3}$
  - d. Urine specific gravity: 1.010 to 1.025
2. **BUN - normal 10 to 20 mg/dl** or 3.6 - 7.2 mmol/L. Increased BUN caused by :
  - a. GI bleeds
  - b. Dehydration
  - c. Increased protein intake
  - d. Fever
  - e. Sepsis
3. Creatinine - from muscle metabolism - indicator of renal function
  - a. Normal serum creatinine 0.7 to 1.4 mg/dl
4. Hematocrit - Normal 42 - 52% male, 35 - 47% female

5. Kidney: filters 180 liters of plasma a day (adult)

ELECTROLYTE IMBALANCES - must be corrected.

1. Sodium norm 135-145 mEq/L
  - a. Regulated by ADH, thirst, renin-angiotensin/aldosterone system
  - b. At risk: elderly, AIDS, those on a ventilator, people on SSRIs
  - c. Deficit: Hyponatremia
    - i. Usually from a water imbalance
    - ii. Poor skin turgor, dry mucosa, headache, orthostatic BP, nausea, vomiting, abdominal cramping.
    - iii. Less than 115 mEq/L = signs of high ICP
  - d. Excess: Hypernatremia
    - i. > 145 mEq/L
    - ii. Common cause : fluid deprivation in unconscious patient
    - iii. At risk: very old, very young, cognitively impaired
    - iv. Signs - primarily neurological
      1. Restless and weak (moderate)
      2. Disorientation and hallucinations (severe)
    - v. Dehydration is often overlooked as a primary reason for behavioral changes in the elderly.
    - vi. Primary characteristic: thirst
    - vii. Treatment: Hypotonic IV (0.3% sodium) Diuretics
    - viii. Review serum sodium levels
2. Potassium 3.5-5.0 mEq/L
  - a. Major intracellular electrolyte (98%)
  - b. Requires a functioning renal system (80% leaves via kidney)
    - i. Kidney regulates retention
  - c. Hypokalemia (below 3.5 mEq/L)
    - i. Diuretics can induce low potassium
      1. Also corticosteroids, sodium penicillin, carbenicillin, amphotericin B, GI loss
    - ii. Occurs frequently with diarrhea
    - iii. Caused by bulimia
    - iv. Clinical signs seen below 3.0 mEq/L
      1. Fatigue, nausea, vomiting, muscle weakness, leg cramps, decreased bowel motility, dysrhythmias.
    - v. Suppresses release of insulin - glucose intolerance
    - vi. Flat T-Wave or inverted T, elevated U is specific to hypokalemia
  - d. Hyperkalemia (above 5.0 mEq/L) - less common
    - i. Causes (three major)
      1. Decreased renal excretion

2. Rapid administration of potassium
  3. Movement of potassium from ICF to ECF
  4. Seen in untreated renal failure
  5. People with Addison's disease are at risk
  6. Medication caused: potassium chloride, heparin, ACE inhibitors, NSAID's, beta-blockers
  7. Potassium supplements AND impaired renal function is BAD!
  8. Acidosis: potassium moves out of the cell
    - a. Expect high potassium with trauma
  9. Cardiac effects significant when level is above 7 mEq/L
    - a. Peaked, narrow T waves
    - b. S-T segment depression
    - c. Shortened QT interval
    - d. PR interval lengthens
    - e. Finally, wide QRS and ventricular dysrhythmias
  10. Emergency interventions
    - a. IV calcium gluconate
3. Calcium Imbalances (normal 8.6 - 10.2 mg/dl)
- a. 99% is located in the skeletal system
  - b. Major role: transmitting nerve impulses and regulating muscle contractions
  - c. Hypocalcemia (< 8.6 mg/dl)
    - i. Common in renal failure
      1. Hyperphosphatemia causes a reciprocal drop in serum calcium
    - ii. Clinical manifestations
      1. Tetany - spontaneous discharge of sensory and motor fibers
      2. Trousseau's sign - inflate a BP cuff on the upper arm to 20mmHg over systolic . After 2-5 minutes, carpal spasms will occur as ischemia of the ulnar nerve develops
      3. Chronic hypo calcium - brittle hair, hyperactive bowel and abnormal clotting
      4. Osteoporosis
    - iii. Treatment
      1. Calcium gluconate, calcium chloride, calcium gluceptate
      2. Never use with 0.9% Sodium solution (NS)
        - a. Dilute in D5W and give as a slow bolus or infusion
        - b. IV with sodium will precipitate with calcium
      3. Vitamin D therapy to increase calcium absorption
        - a. Calcium intake 1000 to 1500 mg/day
        - b. Milk, leafy vegetables, canned salmon
      4. Severe: use seizure precautions
  - d. Hypercalcemia (> 10.2 mg/dl)
    - i. Severe hypercalcemia has a 50% mortality rate.

- ii. Common cause - hyperparathyroidism
  - 1. Excess PTH secretion causes calcium release
  - 2. Calcification of soft tissue occurs when the calcium phosphorus product exceeds 70 mg/dl
- iii. Hypercalcemia aggravates dig toxicity
- iv. Symptoms
  - 1. Anorexia, nausea, vomiting and constipation
- v. Hypercalcemia crisis: serum calcium = 17dl/L.
  - 1. Lethargy, confusion, coma, cardiac arrest
- vi. Cardiovascular symptoms: shortening Q-T interval and ST segment, and prolonged PR interval.
- vii. Treatment - underlying cause
  - 1. IV 0.9% sodium - temporarily dilutes serum calcium level
  - 2. IV phosphates
  - 3. Lasix
  - 4. Calcitonin - good with pt's with heart disease
  - 5. Increase pt's mobility and fluid intake.
- 4. Magnesium: 2nd most abundant intracellular cation. (1.5 - 2.5 mEq/L
  - a. Intracellular metabolism production of ATP, Protein and DNA synthesis
- 5. Chloride: major anion of ECF 95 - 108 mEq/L
  - a. Functions with sodium to regulate serum osmolarity and blood volume
    - i. When sodium is reabsorbed by the kidney, chloride usually follows
- 6. Phosphate PO<sub>4</sub> - major anion of intracellular fluid 2.5 - 4.5 mg/dl
  - a. Also found in the ECF, bone, skeletal muscle and nerve tissue
  - b. Children have a higher phosphate level than adults
  - c. Newborns have twice as much as adults
- 7. Bicarbonate HCO<sub>3</sub><sup>-</sup> : produced through metabolic process.
  - a. Regulates acid base balance
  - b. Regulated by the kidney

#### Factors that affect body fluids and electrolytes

1. Age - children have a higher percentage of body fluids
2. Gender - woman have lower percentage than men
3. Body size : less fat, higher percentage of water
4. Environment - more fluid loss in high temperatures
5. Medications
6. Lifestyle: anorexics die from electrolyte imbalance

## Electrolyte abnormal value symptoms

**Sodium** norm 135-145 mEq/L

HYPERNATREMIA. Sodium helps the kidneys to regulate the amount of water the body retains or excretes. Consequently, individuals with elevated serum sodium levels also suffer from a loss of fluids, or [dehydration](#). [Hypernatremia](#) can be caused by inadequate water intake, excessive fluid loss (i.e., [diabetes insipidus](#), kidney disease, severe burns, and prolonged vomiting or [diarrhea](#)), or sodium retention (caused by excessive sodium intake or aldosteronism). In addition, certain drugs, including loop [diuretics](#), [corticosteroids](#), and antihypertensive medications may cause elevated sodium levels.

Symptoms of hypernatremia include:

- thirst
- orthostatic hypotension
- dry mouth and mucous membranes
- dark, concentrated urine
- loss of elasticity in the skin
- irregular heartbeat (tachycardia)
- irritability
- fatigue
- lethargy
- heavy, labored breathing
- muscle twitching and/or seizures

HYPONATREMIA. Up to 1% of all hospitalized patients develop [hyponatremia](#), making it one of the most common electrolyte disorders. Diuretics, certain psychoactive drugs (i.e., fluoxetine, sertraline, and haloperidol), specific antipsychotics (lithium), vasopressin, chlorpropamide, the illicit drug "ecstasy", and other pharmaceuticals can cause decreased sodium levels, or hyponatremia. Low sodium levels may also be triggered by inadequate dietary intake of sodium, excessive perspiration, water intoxication, and impairment of adrenal gland or kidney function.

Symptoms of hyponatremia include:

- nausea, abdominal cramping, and/or vomiting
- headache
- edema (swelling)
- muscle weakness and/or tremor
- paralysis
- disorientation
- slowed breathing
- seizures
- [coma](#)

**Potassium** 3.5-5.0 mEq/L

HYPERKALEMIA. Hyperkalemia may be caused by ketoacidosis (diabetic coma), myocardial infarction ([heart attack](#)), severe burns, kidney failure, [fasting](#), [bulimia nervosa](#), gastrointestinal bleeding, adrenal insufficiency, or [Addison's disease](#). Diuretic drugs, cyclosporin, lithium, heparin, ACE inhibitors, [beta blockers](#), and trimethoprim can increase serum potassium levels, as can heavy [exercise](#). The condition may also be secondary to hypernatremia (low serum concentrations of sodium). Symptoms may include:

- weakness
- nausea and/or abdominal pain
- irregular heartbeat (arrhythmia)
- diarrhea
- muscle pain

HYPOKALEMIA. Severe dehydration, aldosteronism, [Cushing's syndrome](#), kidney disease, long-term diuretic therapy, certain [penicillins](#), laxative abuse, congestive [heart failure](#), and adrenal gland impairments can all cause depletion of potassium levels in the bloodstream. A substance known as glycyrrhetic acid, which is found in licorice and chewing tobacco, can also deplete potassium serum levels. Symptoms of [hypokalemia](#) include:

- weakness
- paralysis
- increased urination
- irregular heartbeat (arrhythmia)
- orthostatic hypotension
- muscle pain
- tetany

**Calcium** normal 8.6 - 10.2 mg/dl

HYPERCALCEMIA. Blood calcium levels may be elevated in cases of thyroid disorder, [multiple myeloma](#), metastatic [cancer](#), multiple bone fractures, milk-alkali syndrome, and Paget's disease. Excessive use of calcium-containing supplements and certain over-the-counter medications (i.e., [antacids](#)) may also cause [hypercalcemia](#). Symptoms include:

- fatigue
- constipation
- depression
- confusion
- muscle pain
- nausea and vomiting
- dehydration
- increased urination
- irregular heartbeat (arrhythmia)

HYPOCALCEMIA. Thyroid disorders, kidney failure, severe burns, [sepsis](#), [vitamin D deficiency](#), and medications such as heparin and glucocorticoids can deplete blood calcium levels. Lowered levels cause:

- muscle cramps and spasms
- tetany and/or convulsions
- mood changes (depression, irritability)
- dry skin
- brittle nails
- facial twitching

**Magnesium** 1.5 - 2.5 mEq/L

HYPERMAGNESEMIA. Excessive magnesium levels may occur with end-stage renal disease, Addison's disease, or an overdose of magnesium salts. Hypermagnesemia is characterized by:

- lethargy
- hypotension
- decreased heart and respiratory rate
- muscle weakness
- diminished tendon reflexes

HYPOMAGNESEMIA. Inadequate dietary intake of magnesium, often caused by chronic [alcoholism](#) or [malnutrition](#), is a common cause of hypomagnesemia. Other causes include malabsorption syndromes, [pancreatitis](#), aldosteronism, burns, [hyperparathyroidism](#), digestive system disorders, and diuretic use. Symptoms of low serum magnesium levels include:

- leg and foot cramps
- weight loss
- vomiting
- muscle spasms, twitching, and tremors
- seizures
- muscle weakness
- arrhythmia

**Chloride** 95 - 108 mEq/L

HYPERCHLOREMIA. Severe dehydration, kidney failure, hemodialysis, traumatic brain injury, and aldosteronism can also cause hyperchloremia. Drugs such as boric acid and ammonium chloride and the intravenous (IV) infusion of sodium chloride can also boost chloride levels, resulting in hyperchloremic [metabolic acidosis](#). Symptoms include:

- weakness
- headache
- nausea
- cardiac arrest

**HYPOCHLOREMIA.** Hypochloremia usually occurs as a result of sodium and potassium depletion (i.e., hyponatremia, hypokalemia). Severe depletion of serum chloride levels causes *metabolic alkalosis*. This alkalization of the bloodstream is characterized by:

- mental confusion
- slowed breathing
- paralysis
- muscle tension or spasm

**Phosphate** 2.5 - 4.5 mg/dl

**HYPERPHOSPHATEMIA.** Skeletal fractures or disease, kidney failure, [hypoparathyroidism](#), hemodialysis, [diabetic ketoacidosis](#), acromegaly, systemic infection, and intestinal obstruction can all cause phosphate retention and build-up in the blood. The disorder occurs concurrently with [hypocalcemia](#). Individuals with mild hyperphosphatemia are typically asymptomatic, but signs of severe hyperphosphatemia include:

- tingling in hands and fingers
- muscle spasms and cramps
- convulsions
- cardiac arrest

**HYPOPHOSPHATEMIA.** Serum phosphate levels of 2 mg/dL or below may be caused by hypomagnesemia and hypokalemia. Severe burns, alcoholism, diabetic ketoacidosis, kidney disease, hyperparathyroidism, [hypothyroidism](#), Cushing's syndrome, malnutrition, hemodialysis, vitamin D deficiency, and prolonged diuretic therapy can also diminish blood phosphate levels. There are typically few physical signs of mild phosphate depletion. Symptoms of severe hypophosphatemia include:

- muscle weakness
- weight loss
- bone deformities (osteomalacia)

## Lab Tests

1. Serum Electrolytes
  - a. Sodium, potassium, chloride, magnesium, bicarb ions
2. Complete blood count (CBC)
  - a. RBC
  - b. WBC
  - c. Platelets
3. Osmolality - solute concentration and urea (blood urea nitrogen or BUN)
  - a. Can be estimated by doubling serum sodium
4. Urine PG 4.0 - 8.0 normal
5. Urine Specific gravity 1.005 to 1.025
6. Urine sodium and chloride
7. Arterial blood gases (ABG)

- a. Ph, PaO<sub>2</sub>, PaCO<sub>2</sub>, bicarbonate, base excess (BE), SpO<sub>2</sub>

Normal values:

pH	7.35 - 7.45
PaO <sub>2</sub>	80 - 100 mmHg
PaCO <sub>2</sub>	35 - 45 mmHg
HCO <sub>3</sub>	22 - 26 mEq/L
Base Excess	-2 to +2 mEq/L
O <sub>2</sub> sat	95 - 98%

Related nursing diagnosis's

Deficient fluid volume, Excess fluid volume, Risk for imbalance fluid volume, Risk for Deficit, fluid volume, Impaired gas exchange.

Planning goals:

1. Maintain and restore fluid and electrolyte balance.
2. Teach the importance of fluids and fluid balance

Self Concept - mental image of self

Four dimensions:

1. Self knowledge - insights into one's abilities, nature and limitations
2. Self expectation - What one expects of themselves, can be realistic or unrealistic
3. Social Self - How a person is perceived by others
4. Social evaluation - appraisal of one's self in relationship to others, events and situations.

Components of self concept

1. Personal identity
  - a. Sense of individuality - continually evolving
  - b. Beliefs, values, personality, characteristics
2. Body image
  - a. Perceived size, appearance and function of body
  - b. Defelops partly from other's attitudes and responses
  - c. Body image closely resembles one's body ideal
  - d. A person with a body image disturbance, may hide or not lood or touch a body part that is significantly changed in structure by illness or trauma.
  - e. Role performance
    - i. Relates to what a person in a particular role does to the bahaviors expected in that role.
    - ii. Role development involves socialization into a particular role.
  - f. Self esteem
    - i. One's judgment of own self worth.
  - g. Self concept care:

- i. Create quiet environment
- ii. Sit level, eye contact
- iii. Demonstrate interest
- iv. Indicate acceptance
- v. Ask open ended questions

Illness and Trauma can effect self concept {i.e.: disfiguring injury}

Cleft Palate & lip - upper lip of infant is complete in 7 weeks, fusion of secondary plate 5 - 12 weeks. It tongue does not descend, lip cannot fuse. Folate fortification (1996) decreased incidences.

Can be seen on an ultrasound in 13-16 weeks.

Operative phases (3)

- Pre-operative phase - decision to operate until patient is on the OR table.
- Intra-operative phase - from the OR table to admission to PACU
- Post-operative phase - from PACU admission to follow up evaluation.

Perioperative domains: Safety, physiologic response, behavior response, and health care systems

Surgical classifications:

- Diagnostic
- Curative (excision of a tumor)
- Repairative (multiple wound repair)
- Cosmetic
- Palliative - to relieve pain or correct a problem.
- Urgency: emergent, urgent, required, elective, optional

Most procedures require written consent:

*Any invasive procedure, procedures requiring sedation, non surgical procedures, procedures involving radiation.*

Nutrients important for wound healing

1. Protein - collagen deposition and wound healing
2. Amino acids - provides necessary substrate for collagen synthesis & stimulates T cell response.
3. Carbs & Fats - primary energy source
4. Water - replace fluids lost
5. Vitamin C - capillary formation, antibody formation
6. Vitamin B complex - indirect: influence on the host's resistance.
7. Vitamin A - increases inflammatory response in wounds. Reduces anti-inflammatory effects of corticosteroids.

8. Vitamin K - blood clotting
9. Magnesium - co-factor for many enzymes involved in protein synthesis
10. Copper - co-factor in development of connective tissue.
11. Zinc - DNA synthesis, protein synthesis, essential to the immune function.

## PreOperative Phase

### Expected patient outcomes

1. Relief of anxiety
2. Decreased fear
3. Understanding of surgical intervention
4. No evidence of pre-operative complications.

### Pre-Operative Assessment

1. Current health status
2. Allergies and medications
3. Previous surgeries (surgical experience)
4. Mental status
5. Understanding of surgical procedure and anesthesia
6. Smoking, alcohol and recreational drugs
7. Coping skills and social resources
8. Cultural and spiritual resources.

### Pre-Operative screening tests:

1. CBC (hemoglobin, hematocrit, RBC, WBC, differential, PaO<sub>2</sub>)
  - a. RBC 4.5 million - 5.3 million
  - b. Hemoglobin - 13.8 - 18 g/dl
  - c. Hematocrit - 37 - 49% male, 36 - 46% female
  - d. WBC 4,500 - 11,000 /mm<sup>3</sup>
  - e. Differential
    - i. Neutrophils 55-70%
    - ii. Lymphocytes 20-40%
    - iii. Monocytes 2 -8%
    - iv. Eosinaphils 1 - 4%
    - v. Basophils 0-2%
2. Blood matching
3. Platelets 150,000 - 350,000 per mm<sup>3</sup>
4. Serum electrolytes (Na<sup>+</sup>, K<sup>+</sup>, Ca<sup>+</sup>, Mg<sup>+</sup>, Cl<sup>-</sup>, HCO<sub>3</sub><sup>-</sup>)
  - a. Sodium 134 - 145 mEq/L
  - b. Potassium 3.5 - 5.0 mEq/L
  - c. Calcium 4.5 - 5.5 mEq/L
5. Fasting blood glucose

6. BUN and creatinine
  - a. Produced by muscles, excreted by kidney
7. ALT, AST, LDH & bilirubin (liver functions)
8. Albumin and total protein
9. Urinalysis
  - a. 1200 - 1500 ml/day is normal (30ml/hr)
  - b. Ph 4.5 - 8.0
  - c. Specific gravity 1.010 - 1.025
10. Chest X Rays
11. ECG
12. Pregnancy test

Children undergoing surgery require teaching and understanding

Ask yourself:

- Does the child know the purpose of the procedure
- Has the child ever experienced this before?
- What does the child think will happen
- Is it painful
- How does the child handle challenging situations
- Will the family be there for support.
- Use a TREATMENT ROOM, NOT THE CHILD'S ROOM, the child's room should be a safe zone.

#### Pre-Operative Diagnosis

1. Deficient knowledge - related to a surgical procedure
2. Anxiety related to surgery
3. Disturbed sleep pattern related to pain, noise
4. Anticipatory grieving (family)
5. Ineffective coping

### INTRA OPERATING Phase

Team: Patient, Surgeon, Anesthetist, nurses and tech (scrub)

1. Patient fears can increase the amount of anesthetic needed.
  - a. Loss of control
  - b. The unknown
  - c. Pain
  - d. Death
  - e. Changes in body structure or function

- f. Disruption of lifestyle
- 2. Age - elderly are higher risk
  - a. Less body fat, more sensitive to temperature
  - b. Age related cardiovascular and respiratory function - increased duration of effects.
- 3. Culture - Jews and Muslims cannot use porcine based meds such as heparin
- 4. Roles
  - a. Circulating nurse (RN)
    - i. Works in collaboration with surgeon
    - ii. Planning and leadership role
    - iii. Manages OR -protects the patient (monitors OR)
    - iv. Verifies consent
    - v. Ensures cleanliness, temp, humidity, lighting, safe functioning equipment and availability of supplies.
    - vi. Secondary verification of surgical procedure and site.
    - vii. Patient identification
  - b. Scrub role (RN, LPN, or surgical tech)
    - i. Surgical hand scrub
    - ii. Setup surgical tables
    - iii. Prep sutures
    - iv. Instruments
    - v. Tool and supply count
  - c. Surgeon -( MD, DO, DDS, DMD or DRM)
  - d. Reg. Nurse 1st assistant
    - i. Handles tissue
    - ii. Provides exposure of operating field
    - iii. Suturing
    - iv. Maintaining homeostasis
  - e. Anesthesiologist (MD or CRNA)
    - i. Pre-op assessment
    - ii. Monitors vitals
    - iii. Administers anesthesia
- 5. Surgical environment
  - a. Known for stark and cool appearance
  - b. 3 zones
    - i. Unrestricted - street clothing allowed here
    - ii. Semi restricted - scrubs and caps
    - iii. Restricted - scrubs, shoe covers, caps, masks
      - 1. Surgical team: sterile clothing and protective devices
- 6. Surgical asepsis
  - a. Airborne: 15 air exchanges per hour
  - b. Temp 20 - 24 C, 68-73 F
  - c. Humidity 20-60%

- d. Bacteria reduced to 50 - 150 cru/cubic foot
  - i. Or infection rate 3-5%
- e. Laminar air flow surgical suite
  - i. 400-500 air exchanges per hour
  - ii. < 10 cfu/cubic foot
  - iii. Infection rate <1%
- 7. Health hazards associated with a surgical environment
  - a. Environment
    - i. Faulty equipment
    - ii. Infectious waste
    - iii. Sharps
    - iv. Lasers
  - b. Internal monitoring
    - i. Analysis of surface wipes
    - ii. Air samples

#### Anesthesia and Sedation

1 in 10,000 deaths associated with it.

Types of anesthesia : General, Regional, Moderate sedation, Monitored anesthesia care and local anesthesia

1. General Anesthesia
  - a. State of narcosis
  - b. Severe central nervous system depression
  - c. Not arousable
  - d. Must be ventilated
  - e. 4 Stages:
    - i. **Begining anesthesia - breaths in anesthetic mixture**
    - ii. **Excitement**
    - iii. **Surgical anethesia**
      1. **Unconscious**
      2. **Pupils contract**
      3. **Respirations are regular**
      4. **Can be maintained for hours, range from level 1 to 4**
    - iv. **Medullary depression**
      1. **If too much anesthesia is given**
      2. **Respirations shallow**
      3. **Pulse weak and thready**
      4. **Pupils dilate**

## SURGICAL COMPLICATIONS

Nausea, vomiting, anaphylaxis (medications are the most common cause), hypoxia, hypothermia and malignant hyperthermia

1. Hypothermia
  - a. Glucose metabolism is reduced and metabolic acidosis may develop, body temperature decreases.
  - b. Inhalation of cold gasses, fluids and open body cavities, and decreased muscle activity.
  - c. IV fluids can be warmed.
  - d. Keep dry material dry
  - e. Monitoring of core body temp, urinary output, ecg, bP, pulse, ABG, & serum electrolytes are needed
2. Malignant Hyperthermia
  - a. A rare inherited muscle disorder that is chemically induced by an anesthetic agent.
  - b. Occurs in 1 in 50,000-100,000 adults
  - c. Mortality can be 70%
  - d. Susceptible people:
    - i. People with strong bulky muscles
    - ii. History of muscle cramps or weakness
    - iii. Unexplained temperature elevation
  - e. Pathophysiology
    - i. Altered mechanism of calcium function in skeletal muscle cells
    - ii. Hypermetabolism, increase muscle contractility (rigid) causing hyperthermia.
    - iii. Heart rate rises to 150 and beyond (earliest sign)
    - iv. Temperature increase is a late sign (can go to 107)
3. Nursing process for patient during surgery
  - a. Assessment
    - i. Obtain data- medical history
    - ii. Physiologic status
    - iii. Anxiety level, verbal communication, coping mechanism, physical status, ethical concerns
  - b. Diagnosis
    - i. Anxiety related to surgical concerns
    - ii. Risk for latex allergy
    - iii. Risk for preoperative positioning injury
    - iv. Risk for injury related to anesthesia
    - v. Disturbed sensory perception
    - vi. Collaborative problems
      1. Nausea and vomiting

2. Anaphylaxis
  3. Hypoxia
  4. Unintentional hypothermia
  5. Malignant hyperthermia
  6. Infection
- c. Planning and Goals
    - i. Reduce anxiety
    - ii. Absence of complications
  - d. Interventions
    - i. Reduce anxiety through teaching
    - ii. Reduce latex exposure
    - iii. Prevent positional injuries
  - e. Evaluation
    - i. Low level of anxiety reached
    - ii. No latex allergy
    - iii. Free of positional injury
    - iv. Free of complications

Moderate sedation (conscious sedation)

IV administration of sedation for short term procedures

Monitored anesthetic care (done by an anesthesiologist)

Can be converted to general anesthesia if needed

## Post Operative Care

1. Post anesthesia                      PACU I,II, III
  - a. Information conveyed from OR nurse to PACU nurse
    - i. Name, gender, age, surgical procedure, anesthetic condition, estimated blood loss (EBL), fluid/blood replacement, vitals, complications encountered, pre-op medical diagnosis, considerations for immediate care, language barrier, location of family.
  - b. OBJECTIVE: provide care until patient is recovered
  - c. Frequent assessment
    - i. Airway (full pulmonary assessment), LOC, vitals, evidence of bleeding.
    - ii. 15 minute vitals
  - d. TOP PRIORITY administration of analgesics
  - e. Maintain ventilations
    - i. Hypopharyngeal obstructions – patient placed with head slightly down, no pillow: prevent tongue from obstructing airway.
  - f. Cardiovascular stability
    - i. Mental status, rhythm, skin, urine output (30ml/hr or more)
    - ii. Blood loss of 500ml – replacement indicated

- g. Shock – cool, moist skin, pallor, tachypnea, cyanosis, weak thready pulse, narrow pulse pressure
- h. Hemorrhages: classifications
  - i. Primary – time of surgery
  - ii. Intermediary – first few hours (increased BP dislodges clots)
  - iii. Secondary - occurs later (suture slips)
- i. Hypertension is common in postoperative period
  - i. Secondary to sympathetic nervous stimulation from pain, hypoxia, bladder distention
- j. Dysrhythmias
  - i. Electrolyte imbalances
  - ii. Stress
  - iii. Anesthesia
- k. Pain management – usually IV opioids – most pain occurs 12 to 24 hours after surgery.
- l. Nausea – usually treated prophylactically in the OR
  - i. Turn the patient to the side
  - ii. Meds : Phenergan, Compazine, Zofran, reglan
- m. Gerontological considerations
  - i. Go slow and gentle
  - ii. Keep patient warm – less body fat
  - iii. Change positions frequently to prevent ulcers
  - iv. Slower to recover
  - v. They have less physiologic reserve
  - vi. Post-op confusion and delirium occurs about 50% of the time in the older age group.
    - 1. Can be caused by pain, hypotension, hypoglycemia, fluid loss, fecal impaction, urinary retention
  - vii. Hypoxia can present as confusion.
  - viii. Mental changes may be an indicator of infection.
- 2. Determine readiness to discharge
  - a. Fully recovered from anesthesia
    - i. Stable BP
    - ii. Adequate respiratory function
    - iii. Aldrete score
  - b. Prepare discharge
    - i. Patient teaching
    - ii. Verbal and written instructions
    - iii. Teach self care

#### Nursing process for post operative patient

- 1. Assessment
  - a. Review chart

- b. Vital signs and systems associated with surgery
  - c. Respiratory status is important
  - d. Shallow respirations can be caused by pain
2. Diagnosis
- a. Risk for ineffective airway clearance
  - b. Acute pain related to surgical incision
  - c. Decreased cardiac output related to shock or hemorrhage
  - d. Impaired skin integrity related to surgical incision
  - e. Anxiety related to surgical procedure
3. Planning and goals
- a. Optimal respiratory function
  - b. Relief of pain
  - c. Activity tolerance
4. Nursing interventions
- a. Encourage incentive spirometry
  - b. Early ambulation
  - c. Relieve pain
    - i. Pain medication
    - ii. Guided imagery
    - iii. Head or cold
  - d. Promote cardiac output
    - i. Manage fluid replacement
  - e. Assess surgical incision if possible – dressing change as ordered
  - f. Manage gastrointestinal function
    - i. Nasogastric tube
    - ii. Hiccups (thorazine)
    - iii. Turn frequently and ambulate to reduce abdominal distention
  - g. Maintain a safe environment
  - h. Manage potential complications
    - i. TEDS or DVT
  - i. Teach self care
5. Evaluation – expected outcomes
- a. Maintain optimal respiratory function
  - b. Indicates that pain has decreased in intensity
  - c. Increased activity
  - d. Wound heals without infection

## Children and surgery

### What to tell them:

1. Infant – no explanation – parent

2. Toddler – explain procedure JUST before , explain that the child did NOTHING wrong, they are fixing something
3. Preschool – simple explanation – drawing
  - a. Allow the child to touch and play with some of the equipment
  - b. Insure them that their body will remain the same
4. School age – thorough explanation, drawings, books, stress reduction, deep breathing
5. Adolescent – clear explanation, orally and written. Explain fear of procedures such as staple removal.
  - a. Visit ICU before surgery

#### Parenteral Nutrition -

Highly concentrated so the volume necessary does not exceed fluid tolerance  
Usually the subclavian or superior vena cava are used.

#### Indicators:

severe burns, digestive disorders, bone marrow transplants

1. Inability to ingest oral foods or fluids within 7 days.
2. Enteral nutrition should be considered before parenteral
3. Impaired ability to ingest or absorb food orally
4. Patient unwilling or unable to ingest

#### Parenteral nutrition fluids:

1. IVFE (Intravenous fat emulsions) - provide 30% of nutritional needs
2. IVFE mixed with components called a total nutritional admixture or TNA
  - a. TNA is more cost effective than PN
3. Solutions are started slowly and advanced gradually with a filtered IV setup
4. To supplement oral intake a PPN is used (peripheral parenteral nutrition)
  - a. Solution is less hypertonic
  - b. Not nutritionally complete
  - c. Lipids administered also to buffer the PPN
  - d. Given for 5 to 7 days
5. Dextrose concentrations of more than 10% should not be given peripherally
6. CPNs (Central parenteral solutions)
  - a. 5 to 6 times the osmolarity of blood (2000 mOsm/L)
  - b. Given through the subclavian or other central line

#### Central Venous Access Devices (CVADs)

1. Non tunneled (percutaneous) central catheters
  - a. Short term (less than 6 weeks)
  - b. Usually subclavian vein
    - i. Allows freedom of movement
    - ii. Stable
    - iii. Compressible

- iv. Easy access
  - c. Highest infection rate of all types of CVADs
- 2. Peripherally inserted central catheters (PICC)
  - a. Used from several days to months
  - b. Basilic or cephalic vein is used
    - i. Threaded to the superior vena cava
    - ii. No BPs or Bloods from the PICC arm
    - iii. Use a 10ml syringe to flush
- 3. Tunneled central catheter
  - a. Long term (years)
  - b. Cuffed
    - i. Single or double lumen
  - c. Examples
    - i. Hickman
    - ii. Groshong
    - iii. Permacath
  - d. Inserted surgically
  - e. Threaded under the skin to the subclavian and advanced into the superior vena cava.
- 4. Implanted port
  - a. Long term IV therapy
  - b. Examples
    - i. Port a cath
    - ii. Mediport
    - iii. Hickman port
    - iv. Hickman catheter
    - v. Groshong catheter
  - c. End is placed in a chamber in a subcutaneous pocket on the anterior chest wall or on forearm

#### Insert Central Line

1. Pt supine or Trendelenburg to dilate neck veins
2. Pt may be asked to do a Valsalva maneuver
3. Pt turns head away from side of insertion
  - a. Decreases chance of infection
4. Sterile procedure
5. Accurate placement of catheter must be confirmed by X ray

#### Complications of CVADs

- Pneumothorax
- Infection, sepsis . can be systemic
- Thrombophlebitis - clot in the line

- Flushed wrong
- Catheter migration
- Occlusion of the line
- Pinch off syndrome
- Air embolism

Diagnosis for Parenteral nutrition:

- Imbalanced nutrition
- Risk for imbalanced fluid volume

Interventions

- Maintain optimal nutrition
- Weigh patient daily
- I/O count, calorie count
- Prevent infection

# MIDTERM

## Musculoskeletal function and Assessment

-Leading cause of disability in the United States is Arthritis

-ligament : bind bone to bone

-Tendon : bind muscle to bone

1. Physical activity, weight bearing acts to stimulate bone formation and remodeling.
2. Deficiency in Vitamin D results in bone mineralization deficit, deformity and fracture.
3. Excessive thyroid hormone production in adults (Grave's disease) results in increased bone reabsorption and decreased bone formation. Increased cortisol has the same effect.
4. Estrogen stimulates osteoblasts and inhibits osteoclasts
5. Testosterone directly causes skeletal growth in adolescents and muscle growth in adults which has a continued effect on the bones from increased weight bearing.
  - a. Testosterone converts to estrogen in the adipose tissue, providing bone preservation in older men.

Joints : three types

1. Synarthrosis : immovable
2. Amphiarthrosis: limited movement (vertebral and pubis symphysis)
3. Diarthrosis : moveable joints
  - a. Ball and Socket
  - b. Hinge
  - c. Saddle (base of the thumb)

- d. Pivot (radius/ulna)
- e. Gliding (carpal bones)

#### Muscle tone

Tone: state of readiness – some muscles are contracted in a ready-state

Flaccid: limp without tone

Spastic: greater than normal tone

Atonic : soft and flabby from lower neuron destruction (polio), and atrophies

Immobility: Patients can decrease the effects of immobility on the bones by doing isometric exercises.

#### Assessment





##### 1. Health history







- a. Evaluation of the effects of the disorder
- b. Effect on ADLs
- c. Common symptoms
  - i. Pain
    - 1. Dull, deep ache, muscle strain, compartment syndrome (steady increase in pain points to the progression of infection)
    - 2. Radiating pain from pressure on a nerve root
  - ii. Tenderness
  - iii. Abnormal sensations
    - 1. Paresthesias : burning, tingling, numbness
- d. Questions:
  - i. Experiencing abnormal sensations or numbness?
  - ii. Compare abnormal to normal
  - iii. When did the condition begin? Is it getting worse?
  - iv. How does the effected extremity look?
  - v. Can you move it?
  - vi. Color, capillary refill, edema?
- e. Past health, social and family history
  - i. Genetic, occupational, exercise, diet, other health problems

##### 2. Physical assessment

- a. Basic assessment to functional capabilities to sophisticated physical exams
- b. Primarily a functional evaluation, focusing on the patient's ability to perform activities of daily living.
- c. Posture
  - i. Abnormalities:
    - 1. Kyphosis – increased forward curvature of the thoracic spine
    - 2. Lordosis or swayback – exaggerated curvature of the lumbar spine
      - a. Sometimes seen during pregnancy
    - 3. Scoliosis – lateral curving deviation of the spine

- ii. Inspect the spine, trunk, curves for symmetry from posterior and lateral views.
  1. Height of the two shoulders
  2. Hip symmetry
  3. Height : older adults have a loss of height due to vertebral cartilage loss
- d. Bone integrity
- e. Joint function
  - i. Range of motion: limited by
    1. Contracture – shortening of surrounding joint structure or muscle
    2. Osteoarthritis
    3. Effusion : excessive fluid in the joint
      - a. Most common in the knee
    4. Deformity
  - ii. Palpation of joint with passive movement to provide integrity information
    1. Snap or crack : ligament slipping over a bony prominence
    2. Crepitus – from slightly roughened surface such as from arthritis
    3. Size exaggerated as a result of rheumatoid arthritis
- f. Muscle size and strength
- g. Skin
  - i. Edema, temp, color, cuts bruises, evidence of decreased circulation
- h. Neurovascular status

<i>Nerve</i>	<i>Test of Sensation</i>	<i>Test of Movement</i>
Peroneal nerve	Prick the skin midway between the great and second toe.	Ask the patient to dorsiflex the foot and extend the toes.
		
Tibial nerve	Prick the medial and lateral surface of the sole.	Ask the patient to plantar flex toes and foot.
		

Radial nerve	Prick the skin midway between the thumb and second finger.	Ask the patient to stretch out the thumb, then the wrist, and then the fingers at the metacarpal joints.
		
Ulnar nerve	Prick the distal fat pad of the small finger.	Ask the patient to abduct all fingers.
		
Median nerve	Prick the top or distal surface of the index finger.	Ask the patient to touch the thumb to the little finger. Also observe whether the patient can flex the wrist.
		

- i. X ray studies
  - i. Bone demineralization, texture, erosion
- j. Arthrograph
  - i. Contrast agent injected and a series of x rays taken while the joint is moved
- k. Bone Scan, Arthroscopy, Arthrocentesis (joint aspiration to obtain synovial fluid), MRI, CT

#### Management of Pain with Musculoskeletal Trauma

##### 1. Contusions, Strains, Sprains

###### a. Strain

- i. 1<sup>st</sup> Degree – mild stretching of muscle or tendon. Minor edema, tenderness, mild muscle spasms, no noticeable loss of function.
- ii. 2<sup>nd</sup> Degree – partial tearing, loss of load bearing strength with accompanying edema, muscle spasms, **ecchymosis**.
- iii. 3<sup>rd</sup> Degree – severe muscle or tendon stretching with rupturing and tearing of the involved tissue. **Significant pain**, muscle spasms, ecchymosis, edema, **loss of function**. MRI will reveal 3<sup>rd</sup> degree strain.

###### b. Sprain

- i. 1<sup>st</sup> Degree – stretching the ligamentous fibers, minimum damage, mild edema, local tenderness, pain upon movement
    - ii. 2<sup>nd</sup> Degree – partial tearing of ligament, increased edema, pain with motion, joint instability, **partial loss of normal function**
    - iii. 3<sup>rd</sup> Degree – ligament is completely torn or ruptured. May cause avulsion of the bone. Severe pain, tenderness, increased edema and **abnormal joint movement.**
  - c. Nursing Management
    - i. Resting and elevating affected part
    - ii. Applying cold and using compression bandage
    - iii. RICE (rest, ice, compress, elevate)
    - iv. Cold packs for 20 to 30 minutes for the first 24 to 48 hours
    - v. Check neurological status every 15 minutes for first 2 hours, then every 30 minutes until stable.
- 2. Joint dislocation
  - a. Dislocation: articular surfaces no longer in anatomic alignment
  - b. Subluxation: partial dislocation and does not cause as much deformity
  - c. Management:
    - i. Immobilization
    - ii. Analgesia, muscle relaxants
    - iii. After reduction is stable, ROM
- 3. Fracture
  - a. Open fracture grades:
    - i. Grade1 clean wound less than 1cm long
    - ii. Grade2 larger wound without extensive soft tissue damage
    - iii. Grade3 highly contaminated, has extensive soft tissue damage
  - b. Clinical manifestations
    - i. Pain
      - 1. Muscle spasms begin within 20 minutes
      - 2. Muscle spasm results in intense pain
    - ii. Loss of function
    - iii. Deformity
    - iv. Shortening
    - v. Crepitus
      - 1. Testing for crepitus can produce further injury and should be minimized
    - vi. Localized edema and ecchymosis
  - c. Nursing management
    - i. Education of proper methods to control edema and pain
    - ii. Teach exercises to maintain health of unaffected muscles.
    - iii. Teach the use of assistive devices
    - iv. Plans to modify the home to ensure safety
    - v. Teach self care, monitoring for complications
    - vi. How to prevent infection for open fractures
    - vii. In hospital nurse management of open fractures
      - 1. Wound irrigation and debridement
      - 2. Elevate extremity
      - 3. Monitor for signs of infection

- d. Complications
  - i. Shock (hypovolemic from hemorrhage)
  - ii. Fat embolism syndrome
    - 1. Fat emboli occurs more in young adults up to age 40
    - 2. Fat globules from the marrow occlude the small blood vessels that supply the lungs, brain, kidneys and other organs.
    - 3. Onset within 12 to 48 hours
    - 4. Presents with Hypoxia, tachycardia, tachypnea, pyrexia.
    - 5. Subtle personality changes, restlessness, irritability, or confusion in a patient who has a fracture are indications for immediate ABG study.
    - 6. Prevention includes immediate immobilization of fractures, and maintaining fluid and electrolyte balance.
    - 7. Prompt respiratory support, assessment and monitoring
- e. Compartment Syndrome
  - i. Of the 46 anatomical compartments in the body, 36 of them are located in extremities
  - ii. It is a LIFE THREATENING problem
  - iii. Occurs when perfusion pressure falls below tissue pressure within a closed compartment.
  - iv. A sudden and severe decrease in blood flow occurs
  - v. Pt. Complains of deep throbbing pain.
  - vi. Hallmark sign is pain that occurs or intensifies with passive ROM
  - vii. Lower leg is most frequent, but forearm is not uncommon.
  - viii. Frequent assessment of neurovascular function is essential
  - ix. Normal pressure is 8mm Hg, 30mm Hg causes compromised circulation
  - x. Managed by maintaining the extremity at the heart level, NOT ELEVATED ABOVE THE HEART (brunner 2090) and opening splint, cast or compartment.
- f. Other complications
  - i. Venous thromboemboli including DVT and PE
  - ii. Disseminated intravascular coagulation (DIC) : widespread hemorrhage and microthrombosis with ischemia. (early manifestation includes unexpected bleeding after surgery, bleeding from the mucus membranes)
- g. Delayed complications
  - i. Delayed union – bone does heal within the expected timeframe
  - ii. Malunion – bones do not unite in normal alignment
  - iii. Nursing management
    - 1. Pain management
    - 2. Monitor for complications
    - 3. Education
  - iv. Avascular necrosis of bone
    - 1. Bone loses blood supply and dies
    - 2. Pain develops pain and limited movement
  - v. Reaction to internal fixation
  - vi. Complex regional pain syndrome
    - 1. Painful sympathetic nervous problem.
    - 2. Usually upper extremity
    - 3. Burning pain, edema hyperesthesia, stiffness, discoloration

4. Usually chronic
  - vii. Volkmann's contracture: acute compartment syndrome from antecubital swelling or damage to the brachial artery (elbow fracture)
    1. Evaluation
    2. Observe distal part for swelling, color, cap refill, temp compare to other
    3. Assess radial pulse
    4. Assess for paresthesia (tingling, burning)
    5. Assess pt's ability to extend and flex fingers
    6. Direct measure of tissue pressure
    7. Report diminished nerve function
  - h. Wrist fractures:
    - i. Active motion of fingers and shoulders should begin promptly
      1. Hold the hand at heart level
      2. Move fingers from full extension to flexion, hold and release
      3. Use the hand in functional activities
      4. Actively exercise the shoulder and elbow, including complete ROM
4. Amputation
- a. Lower extremity amputation is usually due to complications of peripheral vascular disease
  - b. Amputation is to relieve symptoms, improve function and improve quality of life
  - c. Rehab
    - i. Involves patient, nurse, physician, social worker, physical therapist, occupational therapist, psychologist, prosthetist, and vocational rehabilitation worker
    - ii. Patients grieve loss, change in body image.
  - d. Nursing Process
    - i. Assessment – before surgery evaluate neurovascular function
      1. Nutritional status
      2. Assess for infections
      3. Concurrent health problems
      4. Assess the psychological status – grief response to permanent alterations in body image, function and mobility is likely.
    - ii. Diagnoses
      1. Acute pain related to amputation
      2. Disturbed sensory perception, phantom limb pain related to amputation
      3. Impaired skin integrity
      4. Disturbed body image
      5. Grieving or risk for grieving relating to loss of body part and disability
      6. Self care deficit
      7. Impaired physical mobility related to loss of extremity
    - iii. Planning and goals
      1. Relief of pain
      2. Absence of altered sensory perceptions
      3. Wound healing
      4. Acceptance of altered body image
      5. Absence of complications
    - iv. Interventions
      1. Relieving pain

- a. Medication administration
    - b. Changing pt's position
    - c. Light sandbags on residual limb to counteract muscle spasm
    - d. Distraction
  2. Keep patient active
  3. Promote wound healing
  4. Enhance body image
    - a. Encourage patient to look at, feel and care for residual limb
  5. Postoperative ROM exercises are started early to prevent contracture
  6. Monitor incision, dressing, and drainage.
  7. Patient teaching
- v. Evaluation
5. Most common childhood fractures are: clavicle, tibia, ulna, and femur, with distal forearm fractures the most common type.
  6. Stress fractures are more common in adolescents who limit their intake of calories and calcium to remain lean for sports such as distance running, or gymnastics.
  7. Risk of fractures in adolescent females who drink carbonated beverages is three times higher than those who do not. Possible cause is the high phosphorus content of carbonated beverages fosters bone loss and these replace milk, a major calcium source.

## Complex Dressings

Review:

Risk assessment tools

1. Braden Scale : 23 points possible : 18 points or lower is considered a risk for pressure ulcers
  - o Sensory Perception      1-4 from limited to no impairment
  - o Moisture                    1-4 from completely moist to rarely moist
  - o Activity                     1-4 from bedfast to walks frequently
  - o Mobility                    1-4 from immobile to no limitations
  - o Nutrition                    1-4 from very poor to excellent
  - o Friction                     1-3 from problem to no problem

Wound healing

1. Primary intention –tissue surfaces have been approximated (closed), no or minimal tissue loss
2. Secondary intention – tissue loss and edges are not approximated
3. Phase:
4. Inflammatory Phase – 3 to 6 days
  - i. Hemostasis and phagocytosis
5. Proliferative phase – 3 to 21 days
  - i. Fibroblasts migrate to the wound synthesize collagen. Develop into granulation tissue
6. Maturation phase – 21 days to 1 or 2 years
  - i. Fibroblasts continue to synthesize collagen. Collagen reorganize into a more orderly structure

Exudate

-serous exudate : mainly serum

-purulent exudate : pus: thicker exudate

- sanguineous exudate: large amounts of RBCs
- serosanguineous: clear and blood tinged drainage – common in surgical incisions
- purulent : pus and blood – infection

*Albumin is a good indicator of nutritional status: A level of 3.5 g/dl or lower indicates poor nutrition and may increase risk of poor healing and infection.*

Diagnosis:

Impaired skin integrity – altered epidermis or dermis. 1<sup>st</sup> and 2<sup>nd</sup> degree pressure ulcers

Impaired tissue integrity – damage to mucous membrane, corneal, integumentary or subcutaneous tissue. 3<sup>rd</sup> and 4<sup>th</sup> degree pressure ulcers.

Types of dressings

1. Transparent Dressings
  - a. Applied to ulcerated or burned skin
    - i. Act as temporary skin
    - ii. Nonporous, nonabsorbent, self adhesive
    - iii. Do not require changing
2. Hydrocolloid dressings
  - a. Applied over pressure ulcers
    - i. Last 3 to 7 days
    - ii. Do not need a cover dressing
    - iii. Water resistant
    - iv. Decrease pain
    - v. Absorb moderate drainage
    - vi. Limitations
      1. They are occlusive, obscure wound visibility
      2. Limited absorption ability
      3. Can facilitate anaerobic bacterial growth
      4. Difficult to remove
3. Impregnated nonadherent
  - a. Woven or nonwoven cotton or synthetic material impregnated with petrolatum, or other agents. Requires a secondary dressing to hold in place
4. Clear absorbent acrylic
  - a. 5 to 7 days
  - b. Absorbs exudates
5. Hydrogels
  - a. Glycerin or water based non adhesive jellylike sheets, granule, or gels
  - b. Oxygen permeable
  - c. Requires secondary dressing
6. Polyurethane foams
  - a. Nonadherent hydrocolloid dressings
7. Alginates (absorbers)
  - a. Nonadherent dressings of powders, beads or granules. Absorbs up to 20x its weight

### The 5 principles of wound care

1. Categorization: dressings by generic category
2. Selection: safest most effective, easy to use, and cost effective
3. Change: changes dressings based on patient, wound, and dressing assessment, not on standard routine
4. Evolution: as the wound progresses with healing, the type of dressing may be altered. It is not uncommon for chronic wounds to be covered for 48 to 72 hours, and acute wounds for 24.
5. Practice: practice with dressing material is required to learn performance parameters.

### Debridement:

1. Autolytic debridement is the body's own digestive enzymes to break down necrotic tissue. Wound is kept moist with an occlusive dressing
2. There are commercially available products that contain the same enzyme. (Accuzyme, collagenase, granulex, and zymase. This method is slower than surgical debridement, but more discriminating for tissue removal.

### Categories of dressings:

1. Occlusive dressings: sterile or nonsterile gauze squares or wrap. Kept airtight with a plastic film.
2. Wet dressing: used for acute weeping, inflammatory lesions but now commercial products are used.
3. Moisture retentive dressings (commercially produced)
4. Hydrogels: polymers with 90 to 95% water in sheets or gels
5. Hydrocolloids: water impermeable polyurethane outer covering separated from the wound by a hydrocolloid material. Water is absorbed into the dressing which softens and discolors it.
6. Foam dressing: microporous polyurethane with an absorptive hydrophilic surface. Require a second dressing to hold it in place.
7. Calcium Alginates: derived from seaweed and consist of absorbent calcium alginate fibers. Hemostatic and bioabsorbable. As the exudate is absorbed, the fibers turn into a viscous hydrogel.
8. **Initial dressing selection is critical: wounds heal faster when the type of dressing is not changed during treatment.**

### Advances in wound treatment

1. Cytokines are proteins that have mitogenic activity. (encourages cell division)
2. Bioengineered skin maintain wound moisture, provide structure and supply cytokines
3. Pentoxifylline (Trental) increases peripheral blood flow by decreasing blood viscosity. It also has fibrinolytic action and decreases leukocyte adhesion to the wall of blood vessels.
4. Mechanical debridement may increase possibility of infection because it may damage healthy tissue

### Blood Transfusions

#### Types:

1. Whole blood = not common except for extreme cases of acute hemorrhage
  - a. Replaces volume and all blood products
2. Packed red blood cells = used to increase O<sub>2</sub> capacity of blood
  - a. Anemia, surgery and disorders with slow bleeding
3. Autologous red blood cells = client donated blood used for elective surgery
4. Platelets = replaces platelets in clients with bleeding disorders or platelet deficiency.
  - a. Each unit increases blood platelet count by about 5,000
5. Fresh frozen plasma = expands blood volume and provides clotting factors. Does not need to be crossmatched.

6. Albumin and plasma protein fraction clotting factors and cryoprecipitate = used for clients with clotting factor problems.

Check the table on page 1474 of Kozier book for transfusion reactions

## Growth and Development, Infants, toddlers, Preschool, School age

*Children learn tasks at different ages, but the order in which they learn them is universal.*

- Growth – quantitative change in physical size, weight, BP, words in vocab.
- Development – qualitative increase in capability and function.
  - Cephalocaudal development : from the head down
  - Proximodistal development: from center of body out
    - Example – infants are able to control their trunks, then arms, then fingers, then fine skills

Piaget's Theory of cognitive development (intellectual development)

Assimilation and then accommodation.

Kohlberg's theory of moral development – children can be assisted in making decisions about their care

Three stages (age is only a guideline)

1. Preconventional (4 to 7) decisions based on desire to please and avoid punishment
2. Conventional (7 to 12) conscience or internal standards become important. Rules are important.
3. Post conventional (12 on) internalized ethical standards. Social responsibility, values.

Social learning theory

- a. Centers around social contacts.
- b. Positive behavior reinforced
- c. Imitate a model (behavior of others)
  - i. They are more likely to cooperate if they see others performing the task successfully.

Behaviorism

- a. Based similar to social learning theory but mainly reinforcement of positive acts.
- b. Similar also to Pavlov

Ecological Theory Nature vs Nurture

Behaviors shaped by environmental responses : nurture

Resiliency theory

- a. Explains why children who are brought up with similar backgrounds have different behavior outcomes
- b. Ability to function with healthy response even with significant stress

Influences on Development

1. Genetic Inheritance : 23 chromosomes from each parent = 46 chromosomes
2. Children are born with the potential for certain features
  - a. Their interaction and environment influences how and when traits are manifested
3. Nutrition, drug use, low maternal stores of iron influence growth
4. Teratogenesis = abnormal development of the fetus
5. Mutagenesis = permanent changes in fetus genetic material
6. Illness during pregnancy can be harmful

- a. Rubella – deafness, vision defects, heart defects and retardation
  - b. AIDS and Hepatitis contracted from the mother
  - c. Radiation, chemicals and other environmental hazards
- A. Infant (birth to 1 year)
- a. Weight Triples
  - b. Height lengthens by 1 foot
  - c. Teeth emerge at about 6 months
  - d. Engages in solitary play
- B. Toddler (1 to 3 years)
- a. Displays independence and negativism
  - b. By age 2 the birth weight has usually quadrupled (about 8 ounces per month)
  - c. At 33 months, all deciduous teeth are in
  - d. Parallel play
  - e. Receptive speech far exceeds expressive speech
    - i. Give short clear instructions
    - ii. Do not give choices if one exist
- C. Preschool (3 to 6)
- a. New initiative and independence
  - b. Growth mainly in long bones
  - c. Do not tell them about procedures long in advance
  - d. Use simple terminology
  - e. Allow them to cry
  - f. Comfort by rocking
  - g. Procedure in a treatment room, not their room (safe zone)
  - h. Dental habits begin
  - i. Associated Play : side by side with interaction
  - j. They have literal understanding of words
    - i. The term “put to sleep” reference to surgery may be interpreted the way an animal is put to sleep
    - ii. Use drawings to clarify intent
    - iii. Allow them to handle some medical equipment
  - k. Short teaching segments
- D. School Age Children (6 to 12 years)
- a. Meaningful activities are very important (industrial)
  - b. Long bones continue to grow, fat becomes muscle
  - c. Boys become larger than girls
  - d. Concrete operational thought begins at about age 7 (problem solving ability)
  - e. Sexual maturity begins
    - i. Need information and education
    - ii. Bad touch vs good touch
    - iii. List of trusted people (teachers, clergy, school counselors, family members, (OK, NOT Clergy)
- E. Adolescent (12 to 18 years)
- a. Physical changes ending at puberty begin near the end of the school age period
  - b. Growth spurt completes in 2 to 3 years
  - c. All body organs fully mature

- d. Beginning of Piaget's last stage of cognitive development, formal operational thought
  - i. Develop the ability to abstract
- e. Rebellion
- f. Introducing adolescents to other teens with similar health problems who manage them well is more successful than telling them what to do
- g. Ensure privacy

Review Critical Concept Review : London Page 923

## Nutrition : Infant, child and adolescent

Infants have the highest nutritional intake due to their fast metabolism. Infants double their weight in the first 5 months.

Benefits of breast milk

1. Excellent nutritional balance
2. Promotion of gastrointestinal function
3. Immune defense
4. Psychological benefits
5. Economic advantage.

Introduction of solid food supplement at about 4 to 6 months depending on development

1. Usually rice cereal
  - a. Provides iron
  - b. May appear to spit it out at first from normal tongue back and forth action. Not a dislike
2. By 8 months vegetables or fruits can be introduced (after baby is eating about ¼ cup of cereal)
3. Finger foods introduced after the second half of the first year.
4. No honey until after 1 year.
  - a. Infants cannot detoxify *clostridium botulinum* spores.
5. No peanuts, fish, and shellfish until 3 years old
6. Too much regular milk and not enough solid food leads to anemia from iron deficiency
  - a. 16 to 24 ounces of milk per day if not breast feeding after 6 months is recommended

Toddlers Nutrition

1. Toddlers often display physiologic anorexia
  - a. High metabolic demands slow to keep pace with moderate growth of toddlerhood
2. General guideline for intake is 1 tablespoon of food for every year old and 16 to 24 oz of milk daily
  - a. No more than 4 to 6 ounces of juice daily (decrease chances of being overweight)
  - b. NEVER use unpasteurized milk (may have pathogens)
3. Discontinue bottles in favor of cups

Preschool age 3 to 6

1. Children may have periods of "food jags" (eating same foods for several days)
  - a. Assess food intake over a 1 to 2 week period instead of every day
  - b. Don't provide food between meals or outside of snacktime, they should be encouraged to eat at the proper time.
  - c. Teeth brushing should be done on their own, but with help

School age children 6 to 11

1. Preadolescent growth spurt.
  - a. Girls 10 or 11 years old

- b. Boys a year later
  - c. Nutritional need increase dramatically with this spurt
2. 22 to 26 permanent teeth erupt by age 12

#### Dietary Deficiencies and excesses

1. Vitamin A
  - a. Defi. Night blindness, dry scaly skin
  - b. Exce. Headache, drowsiness, hepatomegaly
2. Vitamin C
  - a. Defi. Abnormal hair (coiled), dermatitis and lesions, purpura, bleeding gums, joint tenderness, hear failure
  - b. Exce. None –excreted in urine
3. Vitamin D
  - a. Defi. Rib abnormalities, bowed legs
  - b. Exce. Drowsiness
4. B vitamins
  - a. Defi. Weakness, decreased deep tendon reflexes, dermatitis
  - b. Exce. None- excreted in urine
5. Protein
  - a. Defi. Hepatomegaly, edema, scant – depigmented hair
  - b. Exce. Kidney failure
6. Carbohydrates
  - a. Defi. Emaciation, decreased energy, retarded growth and development
  - b. Exce. Overweight
7. Iron
  - a. Defi. Lethargy, slowed growth and development, pallor
  - b. Exce. Vomiting, diarrhea, abdominal pain, pallor, cyanosis, drowsiness, shock

#### Important Related Facts

1. NO MORE THAN 30% of calories consumed should come from fat.
2. Woman who are pregnant , may become pregnant, breastfeeding, and young children should avoid shellfish, shark, swordfish, king mackerel and tilefish.
3. Vitamin A deficiency is common in developing countries
  - a. Children become night blind, vision loss and high risk of infection
4. Cow's milk should not be fed during the first year. It depletes stored iron in the infant.
  - a. Formulas should be iron fortified
5. 5 to 10% of pediatric hospitalizations in children under 1 year old are due to inadequate nutrition

#### Poisoning

Poison Control center 800-222-1222

- common cause of death and injury in children between 1 and 4
- second leading cause of unintentional home injury deaths
- children are at risk because they characteristically explore, and place objects in their mouth.
- 75% are ingested

#### Lead Poisoning

1. Average serum lead level now is 0.6 ug/dl down from 15 ug/dl

2. Particularly harmful to kids under 7
3. Interferes with normal cell function
  - a. Nervous system
    - i. Decreased IQ scores
    - ii. Cognitive deficits
    - iii. Hearing impairment
  - b. Blood cells
  - c. Kidney
  - d. Metabolism of vitamin D
  - e. Growth delay
4. Children with levels above 70ug/dl are critically ill
  - a. Require chelation therapy
    - i. Administration of an agent that binds with lead, and increases the rate of excretion
    - ii. Calcium disodium ethylenediaminetetraacetate, dimercaprol, d-penicillamine, or succimer

#### Management of Poison

22,000 deaths in the US due to poisoning . . . 50% are suicides

#### Five General Principles to treating poisoning

1. Topical decontamination
2. Prevention of absorption
  - a. Administer absorbents (activated charcoal), bowel irrigation, induce vomiting
    - i. Activated charcoal is NOT effective against cyanide, mineral acids, caustic alkalis, organic solvents, iron, ethanol, methanol
3. Neutralization
  - a. Administer acids or bases
4. Increase rate of excretion
  - a. Diuretics, peritoneal or extracorporeal dialysis and iron trapping
5. Antidotes and symptomatic therapy

#### Chelating agents for heavy metal poisoning

1. Edetate calcium disodium (Calcium EDTA)
  - a. Chelating agent
  - b. Binds with heavy metals such as lead and forms a soluble complex that can be excreted by the kidneys.
  - c. Can also remove lead stored in fat, bone and other locations
  - d. Given IV or IM
  - e. Adverse effects
    - i. May produce renal damage
    - ii. Patient should be monitored for cardiac irregularities
    - iii. Febrile reaction
      1. Thirst, chills, severe myalgia, arthralgia, gi distress
    - iv. Histamine-like reaction
  - f. Contraindications
    - i. Severe kidney disease, anuria or oliguria.
    - ii. IV administration is contraindicated with lead encephalopathy

2. Dimercaprol (BAL in Oil)
  - a. Chelating agent
  - b. IM route
  - c. Neutralizes arsenic, gold and mercury
  - d. Adjunct to Calcium EDTA
  - e. Treat lead encephalopathy
  - f. Forms ring complexes preventing binding of metallic cations to body proteins
  - g. Contraindications
    - i. Patients with hepatic insufficiency, severe renal insufficiency, or poisoning due to cadmium, iron, selenium, or uranium
    - ii. Patients with peanut allergy (formulated in peanut oil)

### QUIZ 3 STARTS HERE

#### Musculoskeletal Care

Casts: rigid EXTERNAL fixation device. Generally immobilize the joint above and below the injury

Short Arm Cast : from below the elbow to the palmar crease, secured around the thumb

Long arm cast: Extends from the axillary fold to the proximal palmar crease

Short leg cast: from below the knee to the toes

Log Leg cast: From the junction of the upper and middle third of the thigh to the base of the toes

Walking Cast: short long leg cast reinforced for strength

Body cast: encircles the trunk

Shoulder spica cast: A body jacket that encloses the trunk, shoulder and elbow

Hip spica cast: Encloses the trunk and lower extremity

Before a cast the nurse:

- Completes an assessment
  - General health of patient
  - Presenting signs and symptoms
  - Emotional status
  - Understanding of the need for the device
  - Physical assessment of body part to be immobilized
    - Neurological assessment
    - Vascular assessment
    - Swelling, bruising and skin abrasion
  - Purpose and expectations of treatment
- Promote active participation
- Educate the patient
- Evaluate pain associated with musculoskeletal condition
- Pain can be relieved with
  - Elevation
  - Cold
  - Analgesic agents
- Unresolved pain must be reported

- Can be associated with compartmental syndrome
- Burning pain over bony prominences indicates ulceration
- **Pain decreases when ulceration occurs**
- Never ignore complaints of pain.
- CMST circulation, motor, sensation, temperature

Joints that are not immobilized should be exercised through its range of motion

Casts used to immobilize, correct deformity, support, stabilize, apply pressure

Materials: Plaster & Fiberglass

After Casting

- Complications
  - Compartment Syndrome
    - 30mm Hg pressure or higher (normal 8mm Hg)
    - Treatment
      - Elevate extremity
      - Notify Doctor
  - Fat embolism syndrome
    - Fat emboli in blood
    - Respiratory symptoms
    - Tachycardia, chest pain
    - Pyrexia
    - TX
      - Immobilize Fx
  - Infection
    - Odors, purulent drainage, stains on the cast
  - Volkmann's contracture (a type of compartmental syndrome)
    - Contracture of the fingers and wrists from impaired circulation
    - Abnormal sensation
    - Permanent damage will occur in a few hours
- Assess the 5 "P"s of decreased circulation
  - Pain
  - Pallor
  - Pulselessness
  - Paresthesia
  - Paralysis
- Disuse syndrome
  - Teach the patient to tense or contract muscles (isometric) without moving the part.
    - Push down the knee (leg cast)
    - Make a fist (arm cast)
    - Should be done hourly
    - Self care deficits occur when parts are immobilized
- Lower extremity casts should be elevated to heart level and iced for 1 to 2 days
- Injury of the peroneal nerve is a cause of footdrop

- Patients in a body cast
  - Nurse responsibility
    - Preparing and positioning
    - Assisting with skin care
    - Monitor for CAST SYNDROME
    - Patient education
    - Pain management
    - Turn the patient toward the uninjured side every 2 hours while drying
  - Cast syndrome
    - Psychological and physiological manifestations
      - Psychological – similar to claustrophobia
        - Acute anxiety
        - Autonomic responses (pulse, resp, diaphoresis, pupil dilation)
      - Physiologic
        - Symptoms associated with immobility
          - Gastrointestinal motility decreases
          - Intestinal gas accumulates
          - Abdominal distention
          - Nausea
          - Vomiting
          - Reduction of blood supply to the bowel from abdominal distention against the cast can result in gangrenous bowel.
          - The descending aorta may sustain pressure as it is compressed between the spine and the pressure of the distention.
    - Monitor bowel sounds every 4 to 8 hours, report nausea, and vomiting to the doctor.

## External fixation

### Nursing management

1. Prepare the patient psychologically
2. Serous drainage from the pins is normal (some)
3. Clean around the pins with chlorhexidine solution one or two times a day
4. Never adjust the clamps on the device
5. Ilizarov external fixator : used to correct angulation and rotational defects, to treat non-union and to lengthen limbs.

**Traction:** used to minimize spasms, reduce-align-immobilize fractures, reduce deformity, increase space between opposing surfaces

Short term until external fixation is applied

Skin Traction: 2 – 3.5 kg

Pelvic traction: 4.5 – 9kg

### Monitor for potential complications from Traction

- Skin breakdown: identify sensitive, fragile skin and monitor the status
  - Remove foam boots to inspect the skin

- Palpate area of traction tape
- Provide back care every 2 hours to prevent pressure ulcers
- Nerve Damage
  - Avoid pressure on the peroneal nerve
  - Question patient about sensations
  - Ask patient to move toes
  - Weakness of dorsiflexion of foot movement and inversion of the foot can indicate pressure on the peroneal nerve.
- Circulatory impairment
  - Check for signs of deep vein thrombosis (DVT)
    - Unilateral calf tenderness, warmth, redness and swelling

#### Skeletal traction

- -applied directly to the bone
- -treat fractures of the femur, tibia, and cervical spine
- 7 to 12 kg
- Longer traction time
- Pins (Steinman), Wires
- Nursing interventions
  - Checks traction devices
  - Evaluate patient's position : maintain alignment
  - Prevent skin breakdown
  - A trapeze can be used to help prevent ulcers on elbows or heels
  - Prevention of osteomyelitis is key
    - Inspect pin sites every 8 hours
  - Serous or sanguinous drainage should subside after 72 hours
  - After pins are mechanically stable, weekly pin site care is recommended
  - Patients can take a shower in 5 to 10 days and let pins exposed to water

#### Nursing management

1. Assess anxiety
  - a. Traction restricts mobility
  - b. Confusion, disorientation, and behavioral problems may develop in confined patients
2. Assist with self care.
  - a. Develop routines that improve self care and patient independence
  - b. Clean pins with chlorhexidine, or hydrogen peroxide, 3X per day
3. Monitor and manage potential complications
  - a. Atelectasis and pneumonia
  - b. Constipation and anorexia
    - i. Stool softeners, laxatives
  - c. Urinary status
    - i. Teach patient to consume adequate fluids and to void every 3 to 4 hours
  - d. Venous Thrombosis
    - i. Teach ankle and foot exercises every 1 to 2 hours

See page 2036 (Brunner) for common orthopedic surgical procedures

Crutch = up with the good, bad with the down

- Conditions contributing to joint degeneration:
  - Osteoarthritis, Rheumatoid arthritis, Trauma, Congenital deformity, some fractures may cause avascular necrosis.
- Joint replacements made from metal (cobalt-chromium, titanium) and high density polyethylene. Cemented with polymethylmethacrylate (PMMA)

Patients with orthosis or prosthesis

- Evaluations:
  - Patients will demonstrate improved physical mobility
  - Transfer safely
  - Ambulate with maximum independence
  - Demonstrates increased activity tolerance

Hip Fractures

Mortality rates 1 year post fracture 12-32%

Fractures of the neck of the femur can damage the vascular system. (Intracapsular)

AVN is common in these patients (Avascular necrosis)

Extracapsular intertrochanteric fractures heal quicker due to better blood supply.

Extensive soft tissue damage can occur.

- Clinical manifestations:
- Femoral neck fractures: Leg is shortened, adducted and externally rotated. Pain in hip or groin or side of knee.
- Extracapsular fracture: extremity is significantly shortened, externally rotated to a greater degree, muscles spasms and associated ecchymosis

Hip replacement Complications

Dislocation of Hip Prosthesis

Excessive wound drainage

Thromboembolism

Infection

Heal pressure Ulcer

NEWBORN

Neurological status assessment

1. Tonic neck reflex : fencer position
  - a. When the newborn is supine and the head is turned to one side, in the extremities on the same side straighten and the opposite flex.
2. Moro Reflex

- a. When a newborn is startled by a noise or lifted slightly above the crib and suddenly lowered, it responds by straightening arms and hands outward while knees flexed. Slowly the arms return to the chest in an embrace, the fingers spread forming a C. newborn to 6 months
3. Grasping reflex
  - a. Newborn will grasp and hold an object or finger that stimulates the palm
4. Rooting Reflex
  - a. When the side of the newborn's mouth or cheek is touched, the newborn turns toward that side and opens the lips to suck.
5. Sucking Reflex
  - a. When an object is placed in the newborn's mouth or anything touches the lips. Newborns also suck while they are sleeping (nonnutritive sucking)

Hip Dysplasia: 1 in 100 newborns has hip instability

Symptoms:

Limited abduction of the affected hip

Asymmetry of the gluteal and thigh fat folds

Telescoping or pistoning of the thigh

Arthroplasty : repair

Arthrodesis : fusion of bones

Patient immobilization with scoliosis

Health history:

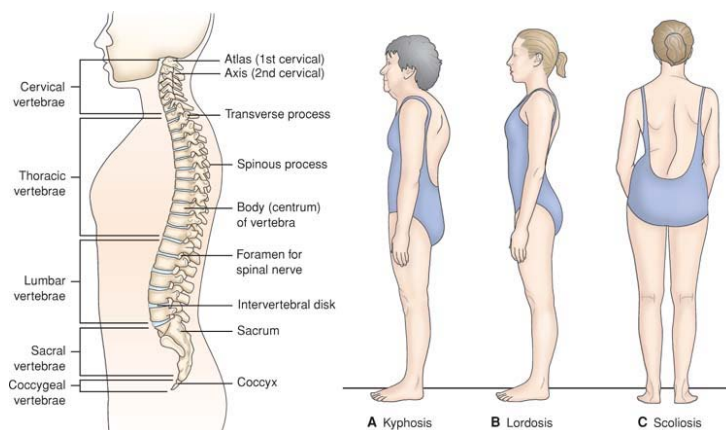
- a. Occupation – heavy lifting involved?
- b. Exercise patterns
- c. Dietary intake – calcium and vit D
- d. Current health history – diabetes, heart disease, pulmonary disease
- e. Infection
- f. Familial or genetic abnormalities
  - i. Achondroplasia, clubfoot, hip dysplasia, ehlers-danlos syndrome, Marfan syndrome, stickler syndrome, osteoporosis

Focus is on patient's ability to perform activities of daily living

Functional evaluation

Posture

1. Normal curvature : convex through thoracic portion, and concave through the lumbar portion
  - a. Newborn backs appear straight and flat : *lumbar and sacral curves do not develop until the newborn learns to sit.*
2. Common deformities
  - a. Kyphosis : increased forward curve of thoracic section (hunchback)



- i. Frequently seen in elderly patients
  - b. Lordosis: exaggerated curvature of the lumbar spine
    - i. Frequently seen in pregnant woman
  - c. Scoliosis: lateral curve or deviation of the spine
    - i. Congenital
    - ii. Idiopathic : mostly occurs in girls between 10 and 13
    - iii. Right thoracic and left lumbar most common
    - iv. Damage to the paraspinal muscles (polio)
    - v. Nursing diagnosis
      - 1. Risk for noncompliance – exercise program related to duration and intensity of exercise
      - 2. Impaired physical mobility – related to brace
      - 3. Risk for skin integrity – related to brace
      - 4. Health seeking behavior – related to unfamiliarity with disease process
      - 5. Disturbed body image – related to deformity and brace wear
- 3. Gait
  - a. Assessed by having the patient walk away for a short distance
- 4. Chest dimensions:
  - a. Elliptical
    - i. Oval, anteroposterior diameter is half its transverse diameter
  - b. Deformities:
    - i. Pigeon chest (may be caused by rickets)
    - ii. Funnel chest : depressed sternum
    - iii. Barrel chest: Anterior/transverse ratio is 1:1 – seen with kyphosis and emphysema
      - 1. Normal in infants: at about 6 years old it is 1:2 ratio (normal for adults)

#### Degenerative Disk Disease

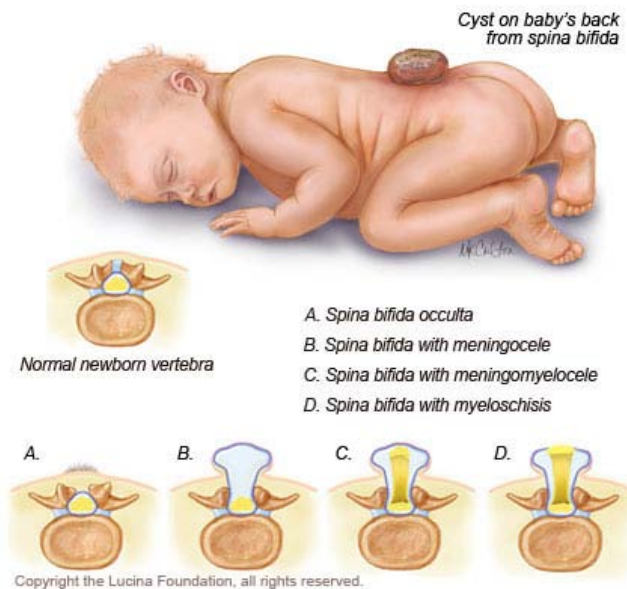
MRI – diagnostic tool of choice

Acute pain : pain lasting up to 3 months

Nursing process: patient undergoing a cervical discectomy: educate

1. Assessment
  - a. Onset, duration, location, diminished function, range of motion, exacerbation
2. Diagnosis
  - a. Acute pain related to surgical procedure
  - b. Impaired physical mobility related to postoperative surgical regimen
  - c. Deficient knowledge about the postoperative and home care management
3. Planning and goals
  - a. Relief of pain, improved mobility, increased self care
4. Nursing interventions
  - a. Relieving pain
    - i. Bed position (flat for 12 to 24 hours)
    - ii. Administration of medications
    - iii. Positioning for comfort

- iv. Reassuring that pain can be relieved
  - b. Improving mobility
    - i. Cervical collar is worn, instructed to turn the body instead of the neck
  - c. Monitoring and managing for potential complications
    - i. Evaluation for bleeding and hematoma formation
    - ii. Neurological checks
      - 1. Swallowing
      - 2. Upper and lower extremity weakness
      - 3. Sudden return of radicular pain
    - iii. Respiratory difficulty
  - d. Promote home and community based care
    - i. Teach self care
5. Evaluation
- a. Expected patient outcomes
    - i. Reports decreased pain
    - ii. Demonstrates improved mobility
    - iii. Demonstrates proper mechanics
    - iv. Has absence of complications



**Spina Bifida** Malformation of the spinal cord and spinal canal (myelodysplasia is a bone marrow disorder)

1. Spina Bifida is a defect in vertebrae through which the spinal cord can protrude
2. Most common in the lumbar and sacral area
3. Most common developmental disorder of the CNS (London 1697)
  - a. 1 in 2000 births in the US
4. Unknown cause
  - a. Environmental, genetic and maternal obesity have been implicated
5. Saclike protrusion on back indicates meningocele or myelomeningocele

- a. Incomplete closure of the vertebral column. The meninges and sometimes the spinal cord protrude.
- 6. Spina Bifida occulta: usually only detectable on x-ray
  - a. Sometimes just meninges
- 7. Spina Bifida meningocele
- 8. 18-40% of children with Spina Bifida have a latex allergy
- 9. Food Allergy: bananas, kiwi, milk
- 10. Nursing care:
  - a. Promote mobility and emotional support
  - b. Cover the sack with sterile saline dressing
  - c. Monitor for leaks
  - d. Place patient in a prone with hips slightly flexed and legs abducted (minimize tension on the sac)
    - i. Maintain position with towel rolls between the knees
  - e. Assess for motor deficits, bowel and bladder involvement
  - f. Assess vitals and for signs of infection
  - g. Comfort with tactile stimulation



#### Latex Allergy

- 1. 10% of health care workers, 50% of patients with spina bifida, 34% of children with 3 or more surgeries (London 1303)
  - a. IgE mediated response after repeated exposure to latex

#### Ancephalophacy

#### Pain control

- 1. Anti-inflammatory
  - a. NSAIDs
    - i. Given with food and/or milk
    - ii. Inhibitors
      - 1. Cox1
        - a. Decreases platelet clumping action
        - b. Causes renal irritation
        - c. Gastric erosion
      - 2. Cox2
        - a. Suppression of inflammation
        - b. Decrease pain
        - c. Temperature
  - b. Corticosteroids
    - i. Decrease immune response
    - ii. Monitor glucose
      - 1. Binds to glucocorticoid receptors
    - iii. Behavior change

## Urinary Catheterization

Straight catheter = single lumen with a small eye at the end.

Used to get a spot urine specimen, or temporary emptying of the bladder

Retention catheter = double lumen tube with a balloon for retention

Sized by the balloon size : ie. 10-ml and 30-ml (common)

Three way Foley = used for continuous irrigation

### Catheter Selection

Length of catheterization period determines the type of material

1. Plastic – short periods (1 week or less)
2. Rubber or silastic (2 to 3 weeks)
3. Silicone – long term (2 to 3 months)
4. PVC – 4 – 6 weeks (these soften at body temperature)

### Preventing Infection

1. Use aseptic technique during insertion
2. Use pre-assembled, sterile, closed urinary drainage system
3. Never disconnect the tubing, The drainage bag must never touch the floor.
4. Replace the bag and collecting tube if:
  - a. Contamination occurs
  - b. Urine flow becomes obstructed
  - c. Tubing junctions start to leak at the connections
5. A free flow of urine prevents infection
6. Empty the collection bag at least every 8 hours
7. Obtain a urine specimen at the first sign of infection
  - a. Use a sterile needle and syringe to obtain a specimen through the drainage port.
    - i. Can only be done on a catheter with a rubber self sealing port
  - b. On a foley, put a clamp on the catheter and allow it to fill with urine, wipe a spot and take the sample on the catheter below where the tube leading to the balloon is.

Patients with an indwelling catheter should drink 3000ml or more per day if permitted. This ensures a high urine output and reduces the risk of infection.

No special cleaning other than routine is necessary for an indwelling catheter (Kozier p1309)

Document the amount, color, and clarity of the urine.

Irrigations; usually done to wash out the bladder, apply a medication to the bladder, or maintain patency when removing pus or blood.

1. Closed method is preferred due to a lower risk of infection.
2. Strict precautions must be maintained to insure sterility of the drainage system

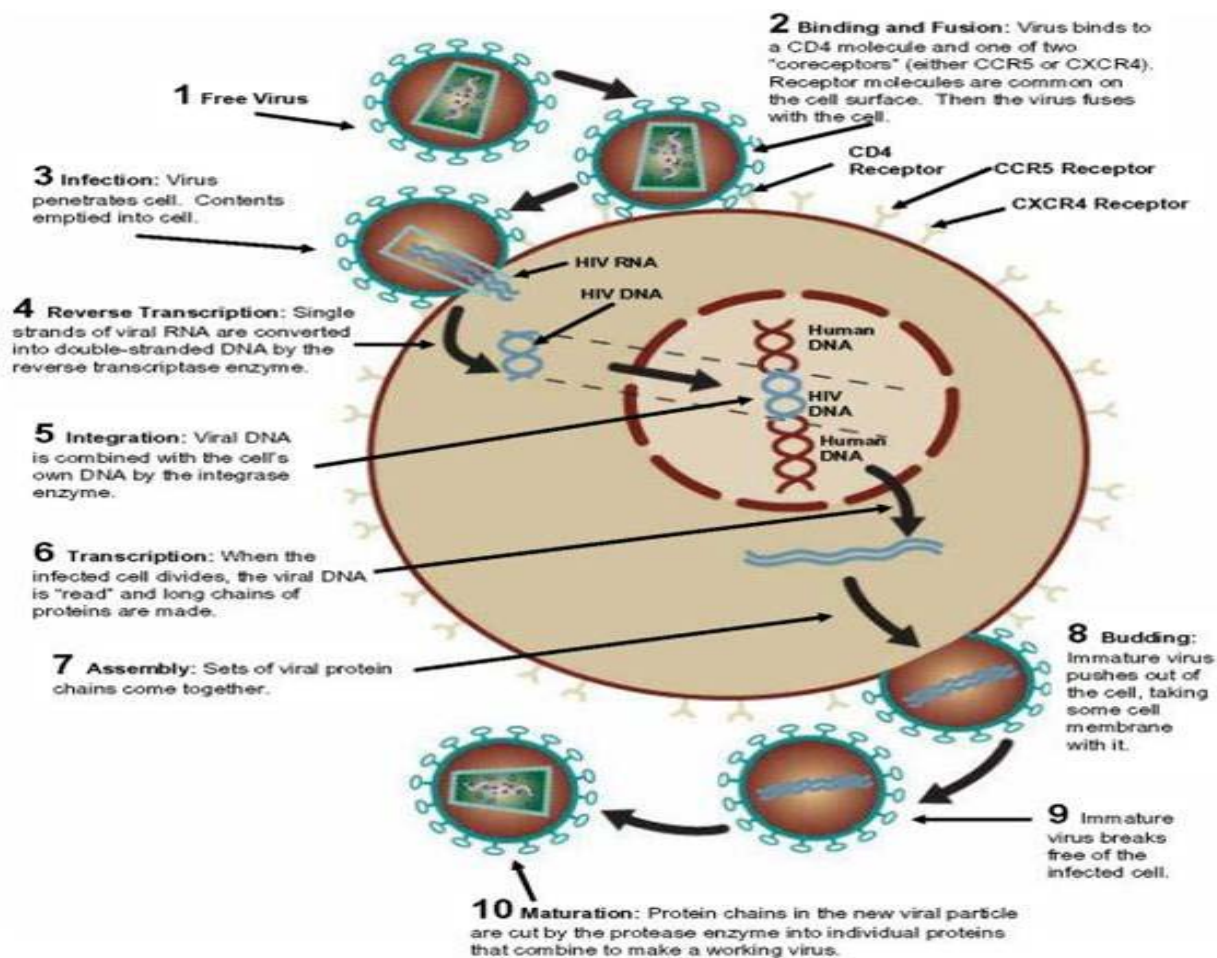
## Patient Immobilized with HIV

### Pharmacology

99% of global AIDS cases are caused by HIV-1 (509,000 HIV-AIDS patients in the US)

#### Stages of pathogenesis

1. Attachment of the virus to the CD4 receptor of the surface of T4 lymphocytes.
  - a. Structural proteins on the HIV surface fuse with the CD4 receptor
2. HIV penetrates the T4 and the virus uncoats
  - a. The single stranded RNA enters the host cell.
  - b. HIV converts its RNA strands to double stranded DNA using reverse transcriptase
    - i. Only a few viruses are able to do this
    - ii. Most organism make RNA from DNA
    - iii. This type of virus is called a *retrovirus* and drugs used to treat them are called antiretrovirals.
    - iv. This reverse process rate has a high error rate and therefore has a high mutation rate
3. The viral DNA enters the nucleus of the T4 where it becomes part of the chromosome
  - a. Performed by HIV **integrase** (enzyme)
  - b. The HIV is now called a **provirus**
  - c. It cannot be differentiated from healthy cells or removed.
  - d. Latent phase may last weeks to decades. Patients are asymptomatic and do not realize they are infected.
4. The latent provirus becomes active and produces large amounts of viral messenger RNA.
5. Individual components migrate to the cell membrane, are packaged and bud from the host cell.
  - a. The new virions are not yet infectious.
  - b. The viral enzyme protease breaks some larger proteins to smaller, functional ones.
  - c. After budding, the immune system recognizes that the cell is infected and kills the T4 cell
  - d. HIV infected patients produce as many as 10 billion virions per day, devastating the immune system



Symptoms of initial infection.

1. The immune system fights the virus killing about 1 billion virions per day.
2. Patients experience sore throat, fever, rash, malaise and weight loss that may last several weeks
3. Sometimes these symptoms are mistaken as a cold or flu and the patient does not know that HIV infection has occurred.

Therapeutic goals of pharmacotherapy for HIV:

1. Reduce HIV related morbidity and prolong survival
2. Improve quality of life
3. Restore and preserve immune function
4. Suppress viral load
5. Prevent transmission from mother to child

When patients are asymptomatic

- ✓ Antiretroviral therapy should be started with a history of AIDS defining illness or with a CD4 count below 350 cells/mm<sup>3</sup>
- ✓ Should be started in pregnant women with HIV associated nephropathy
- ✓ Should be started in patients coinfectd with Hep B when HBV treatment is indicated.
- ✓ May be considered in patients with CD4 levels above 350 when these patients have tuberculosis, Kaposi's sarcoma, non-Hodgkins lymphoma and other malignancies.

- ✓ Early therapy reduces the replicating virions, delays onset of symptoms and the progression of AIDS
  - Must be weighed against negative consequences.
    - Expense
    - Adverse effects and drug interactions
      - Nausea, diarrhea, rash, lipid abnormalities, hepatotoxicity, neuropathy, risk for cardio vascular events
    - Viral resistance

#### Tests:

1. Absolute CD4 lymphocyte count
  - a. Normal 500 to 1600 cells / mcl
  - b. HIV patients below 250 are said to have AIDS
2. HIV RNA level in plasma

#### Classes of HIV drugs

1. Nonnucleoside reverse transcription inhibitors:
  - a. Delavirdine (rescriptor)
  - b. Efavirenz (sustiva)
  - c. Etravirine (Intelence)
  - d. Nevirapine (Viramune)
  - e. Adverse effects of these drugs: Rash, fever, nausea, diarrhea, headache, stomatitis, paresthesia, hepatotoxicity, Stevens-Johnson syndrome, CNS toxicity
  - f. Mechanism: Binds to reverse transcriptase disrupting the shape of the enzymes's active site. This prevents DNA from being synthesized from HIV RNA
  - g. Nursing: monitor GI status, monitor for suicidal thought, use bedtime dosing, check liver functions.
2. Nucleoside and nucleotide reverse transcription inhibitors
  - a. Abacavir (Ziagen)
  - b. Didanosine (ddl, Videx)
  - c. Emtricitabine (emtriva)
  - d. Lamivudine (Epivir, 3TC)
  - e. Stavudine (Zerit, D4T)
  - f. Tenofovir (Viread)
  - g. Zidovudine (Retrovir, AZT)
    - i. First discovered in the 1960s, approved in 1987 for HIV
    - ii. Mechanism: resembles thymidine, a nucleoside building block of DNA. As HIV DNA is synthesized is mistakenly uses zidovudine instead of thymidine, therefore terminating the growth chan.
    - iii. Routes: IV and PO
    - iv. Primarily metabolized hepatically and excreted renal
    - v. Peak effect in 1 to 2 hours, half life is 1 hour
    - vi. Adverse effects: high doses are toxic to bone marrow: anemia and neutropenia are common. Nausea, fatigue, diarrhea, weakness, myalgia.
    - vii. Contraindications: used with caution in patients with anemia, breast feeding should be suspended.

- viii. Nursing Responsibility: health history, physical exam, monitor lab tests, observe for signs of myelosuppression such as anemia and neutropenia, monitor for adverse reactions.
3. Protease Inhibitors
    - a. Mechanism: inhibits HIV protease, prevents the final assembly of an infectious HIV virion
    - b. Atazanavir (Reyataz)
    - c. Darunavir (Prezista)
    - d. Fosamprenavir (Lexiva)
    - e. Indinavir (Crixivan)
    - f. Lopinavir/ritonavir (Kaletra) : reduces the effectiveness of birth control pills, exacerbates diabetes, patient must have good hepatic function.
    - g. Nelfinavir (Viracept)
    - h. Ritonavir (Norvir)
    - i. Saquinavir (Invirase)
    - j. Tipranavir (Aptivus)
  4. Miscellaneous Antiretrovirals
    - a. Fusion inhibitors
      - i. Enfuvirtide (Fuzeon)
        1. Interfere with the fusion of the viral and cellular membrane
        2. Given subQ twice a day : most will have an injection site reaction within the first week.
    - b. CCR5 inhibitors
      - i. Maraviro (Selzentry)
        1. Inhibits the CCR5 co-receptor on the cell membrane to prevent HIV cell entry
    - c. Integrase inhibitors
      - i. Raltegravir (Isentress)
        1. Inhibits integrase, a component required by HIV to insert its viral DNA into the human chromosome.
        2. Given PO

Nursing Diagnosis see page 941 in Adams book

*Risk for Infection* related to compromised immune system

*Decisional Conflict* (therapeutic regimen)

*Fear* related to HIV diagnosis

*Risk for Injury*, related to adverse effect of medication

*Deficient knowledge* (HIV), related to disease process

*Deficient knowledge*, related to purpose, precautions, and adverse effect of drugs.

Prophylaxis of HIV Infections

Vaccine development

Perinatal transmission: PACTG076 : reduced transmission from 22 down to 7 percent

Oral zidovudine given to the mother from 14 to 34 weeks

IV zidovudine during labor

PO zidovudine to the newborn for 6 weeks after delivery

HIV Tests: EIA (enzyme immunoassay) identifies antibodies specific to HIV, Western Blot Assay used to confirm it

OraSure test uses saliva to perform the EIA antibody

OraQuick Rapid HIV-1 antibody test takes 1 drop of blood and 20 minutes (96.6% accurate)

**Lipohypertrophy** : central visceral fat accumulation in the abdomen

Immune reconstitution inflammatory syndrome: rapid restoration of immune response to OI that causes either a deterioration of a treated infection, or a new presentation of a subclinical infection.

Pneumocystis pneumonia (PCP) : most common opportunistic infection in AIDS patients.

- Without prophylactic therapy, 80% of AIDS patients will acquire it.
- From onset of symptoms to actual documentation of disease may be weeks to months
- Initial symptoms: nonproductive cough, fever, chills, SOB, dyspnea, and occasional chest pain.
- Mild arterial Oxygen concentration decrease on room air
- If left untreated, will progress to respiratory failure
- A few patients will have dramatic onset and respiratory failure can occur in 2 to 3 days
- Diagnosed by identifying the organism in the lung tissue.
  - Sputum induction
  - Bronchial-alveolar lavage
  - Transbronchial biopsy

Gastrointestinal manifestations

- Loss of appetite, nausea, vomiting, oral and esophageal candidacies (almost all patients), chronic diarrhea (50-90%)

Cancer

- Karposi's sarcoma
  - Most common HIV malignancy
  - Involves endothelial layer of blood and lymphatic vessels.
  - Epidemic KS most often in male homosexuals
  - Related to low CD4 counts
  - Appear anywhere – brownish pink to deep purple
  - Flat, raised or round and surrounded by ecchymoses
- B cell lymphomas
  - Second most common
  - Most commonly in brain, bone marrow and gastrointestinal tract.

Neurological manifestations

- Peripheral neuropathy
  - Common : distal sensory polyneuropathy
- HIV encephalopathy : progressive decline in cognitive, behavioral, and motor functions
  - Headache, memory deficits, difficulty concentrating, confusion, apathy
  - Also called aids dementia
- Can be subtle and appear as fatigue, depression, or adverse effects of treatment
- Cryptococcus neoformans – fungal infection/cryptococcal meningitis
  - Fever, headache, malaise, stiff neck, nausea, vomiting, mental status changes, seizures
- Progressive multifocal leukoencephalopathy
- Treated with azoles, and or amphotericin B

Other signs

- Depression

- Integumentary: herpes, vesicles, seborrheic dermatitis, scaly rash, pruritic – pinkish red macules and papules, endocrine function, gynecologic –recurrent vaginal candidiasis.

#### Nursing Management: supportive care

- Assessment : identification of potential risk factors
  - History of risky sexual practices
  - IV/injection drug use
  - Physical status
  - Psychological status
  - Nutrition, Skin integrity, Respiratory, neurologic status, Neurologic, fluid and electrolytes, knowledge level

#### Nursing Diagnosis

- Impaired skin integrity related to coetaneous manifestations of HIV infection
- Diarrhea related to enteric pathogens or HIV infection
- Risk for infection related to immunodeficiency
- Activity intolerance related to weakness, fatigue, malnutrition, electrolyte balance impairment.
- Disturbed thought process related to impaired memory, confusion
- Ineffective airway clearance related to PCP, increased bronchial secretions
- Pain related to impaired perianal skin integrity
- Imbalanced nutrition, less than body requirements, related to decreased body intake
- Social isolation related to stigma of the disease
- Anticipatory grieving related to changes in lifestyle and roles and unfavorable outcome
- Deficient knowledge related to HIV infection
- Collaborative problems
  - Opportunistic infections
  - Impaired breathing or respiratory failure
  - Adverse reaction to medication

#### Nursing interventions

- Promote skin integrity
  - Frequent assessments
  - Reposition every two hours
  - Use pressure reduction devices
  - No adhesive tape
- Promoting usual bowel patterns
- Preventing infection
- Improving activity intolerance
  - Teaching conservation techniques
  - Relaxation measures
  - Collaboration with other members of the health team
- Maintain thought process
  - Assess mental and neurological status
  - Establish and maintain a daily routine
  - Use orientation techniques
  - Ensure patient safety
- Improving airway clearance
- Relieving pain and discomfort

- Improving nutritional status
  - Monitor I&O, weight
  - Control nausea with antiemetics
  - Treat oral discomfort
  - Provide oral hygiene
- Decreasing sense of isolation
  - Allow patients to express their feelings
- Monitor and manage potential complications
  - Opportunistic infection
  - Respiratory failure
  - Cachexia and wasting
  - Side effects of medications
- Promoting home and community based care
  - Teaching self care
  - Continuing care

Evaluation of expected outcomes.

Emotional and ethical concerns

Woman in the United states with AIDS

18% (London, 2003) 26% other sources (2007)

- During pregnancy, HIV test is done, but women can “opt out”.
- HIV positive pregnant women are given anti viral treatment (AVR) to reduce the transmission to child
  - Started after 12 weeks of gestation (Brunner, and other sources- 14 to the 38<sup>th</sup> week)
  - Cesarean delivery recommended if RNA viral load > 1000/ml
- Medication adherence is a major problem in the HIV infected adolescent
  - Adherence to Highly Active Antiretroviral therapy (HAART)
  - About 41% of adolescents reported consistent medication adherence
- Community support
  - Much care takes place in the community
  - Education
    - Gloves should be worn when changing diapers, treating cuts,
    - Guard against food borne illness

Most common drug to treat PCP

- Bactrim and Septra (TMP/SMX)
- Side effect: sensitivity to sunlight (most common), Stevens-Johnson syndrome, a very serious skin rash

### Child immobilized with ENT problems

Ear: Two major sensory functions and three structural areas (external, middle, and inner ear)

Nursing responsibility for otic medications

1. Assess for base line hearing, symptoms and current medical conditions

- a. Otitis Media (inflammation of the inner ear)
  - i. Most common ear infection (70% of infants during the first year, 93% by age 7)
    1. 70% in the London book- from a 2002 article in a pediatric magazine, 50-66% elsewhere in other sources – including the American Academy of Pediatrics.
  - ii. Breast feeding appears to be protective, pacifier increases incidents
  - iii. Related to Eustachian tube dysfunction
  - iv. Often upper respiratory infection precedes it.
  - v. Diagnosis based on otoscopic examination
2. Check for hypersensitivity to hydrocortisone, neomycin, polymyxin B, chloramphenicol and other medications
3. Assess for adverse effects (burning, swelling, redness, rash.)
4. When instilling, cleanse the ear thoroughly and remove the cerumen through gentle irrigation.
  - a. Otic drugs should be warmed to body temperature.



#### Nursing Diagnosis

Risk for imbalanced body temperature: hyperthermia related to infectious process

Fatigue related to sleep deprivation

Sensory/perceptual alteration auditory related to chronic ear infections and altered sensory reception

#### Tonsillitis and Adenoiditis

1. Clinical manifestations
  - a. Sore throat, fever, snoring, difficulty swallowing.
  - b. Enlarged adenoids may cause mouth-breathing, earache, draining ears, head colds, bronchitis, foul smelling breath, voice impairment and noisy respirations.
  - c. Enlarged adenoids usually fill the space behind the posterior nares
2. Assessment
  - a. Physical exam and history
  - b. Tonsillar culture to determine type of bacteria
  - c. If cytomegalovirus is present then HIV, hepatitis A, and rubella should be checked also
3. Management
  - a. Supportive measures – increased fluid intake, analgesics, salt water gargles and rest
  - b. Infections are treated with penicillin or other antibiotics
  - c. Surgical removal if needed (repeated episodes)
4. Postoperative care (surgical option)
  - a. Most comfortable position is prone with head turned to side
    - i. London book states patient on side then fowlers
  - b. Complication signs: fever, throat pain, ear pain, and bleeding.
  - c. Encourage fluids except citrus juices (pain)
  - d. Give acetaminophen elixir as ordered
  - e. Ice collar around the neck
  - f. Gargle with half teaspoon baking soda and salt in water
  - g. Rinse mouth with viscous lidocaine and then swallow the solution,

h. Complications: Bleeding, infection, pain

#### Nursing diagnosis

- Pain related to inflammation of the pharynx
- Risk for deficient fluid volume related to inadequate intake
- Risk for ineffective breathing pattern relate to obstruction by large tonsils
- Impaired swallowing related to inflammation and pain
- Health seeking behaviors related to home care following discharge

#### Quiz 3 ENDS HERE

#### Suctioning

Pressure:

Wall unit:

1. Wall unit
  - a. Adult 100 to 120 mm Hg
  - b. Child 94 to 110 mm Hg
  - c. Infant 50 to 95 mm Hg
2. Portable unit
  - a. Adult 10 to 15 mm Hg
  - b. Child 5 to 10 mm Hg
  - c. Infant 2 to 5 mm Hg

In endotracheal or tracheotomy suctioning, the catheter should not exceed half the diameter of the tube.

Patients immobilized with sensory defects.

Disturbed Sensory Perception, Visual

Unilateral neglect – lack of awareness and attention to one side of the body

Risk For Injury

Eye Assessment

Optic nerve : second cranial nerve (CN II)

Transmits images to the occipital lobe

Ocular history

1. What is the problem
2. Is visual acuity diminished
3. Pain, discomfort, itching
4. Both eyes effected?
5. Discharge? History of discharge?
6. Duration, recurrence of previous condition?
7. What makes it worse, what makes it better?
8. Systemic disease? Effect on ADLs
9. Other family members? Family history?

Genetic related eye problems: albinism, aniridia, color blindness, glaucoma, homocystinuria, leber heredity optic neuropathy, Marfan syndrome, retinitis pigmentosa.

Snellen chart. 20/20 line from 20 feet.

OD – right eye, OS – left eye (OS is Ocular sinister)

CF = count fingers ie. If pt can identify 3 fingers at three feet the score would be CF3

LP = only light perception

NLP = no light perception

Intraocular pressure (IOP)- 10 to 21 mm Hg

Amsler grid: test to identify macular degeneration

Optic Nerve is the second cranial nerve: transmit to the occipital lobe of the brain.

Ocular history:

1. What does the patient see as the problem
2. Is vision diminished
3. Is there blurred, double or distorted vision
4. Pain? Sharp, dull, worse or better with blinking
5. Both eyes?
6. History of discharge : color consistency, odor
7. Duration of problem
8. Onset : sudden, gradual, worsening?
9. Effect on ADLs
10. Systemic diseases>
11. Other family members with problems/

Ocular Trauma management

1. Splash injuries
  - a. Irrigate with normal saline before further evaluation occurs.
  - b. Parenteral broad spectrum antibiotics
2. Foreign bodies and corneal abrasions
  - a. Antibiotic ointment applied to the place where the foreign body was
  - b. Corneal abrasion
    - i. Often experience photophobia
    - ii. Avoid corticosteroids while epithelial heals
3. Penetrating injuries and contusions of the eyeball.
  - a. Most result in marked loss of vision with the following signs
    - i. Hemorrhagic chemosis (edema of the conjunctiva)
    - ii. Conjunctival laceration
    - iii. Shallow anterior chamber
    - iv. Vitreous hemorrhage
    - v. Hyphema (hemorrhage within the chamber)
      1. Caused by contusion forces that tear the vessels of the iris and damage anterior chamber angle.
4. Intraocular foreign bodies
  - a. Patient who complains of blurred vision and discomfort should be questioned carefully
    - i. Recent injury and exposure

- b. Diagnosed with a slit-lamp biomicroscopy and indirect ophthalmoscopy, CT or ultrasonography. MRI is contraindicated.
  - c. Special IOFB forceps and magnets are used
- 5. Ocular burns
  - a. Can cause an immediate rise in IOP
  - b. Immediate tap water irrigation
  - c. Irrigation continues until the conjunctival PH normalizes (7.3 to 7.6)

Ménière's disease: abnormal inner ear fluid balance.

Caused by a malabsorption in the endolymphatic sac, or a blockage in the endolymphatic duct.

1. Cochlear: fluctuating, progressive sensorineural hearing loss associated with tinnitus and aural pressure.
2. Vestibular: occurrence of episodic vertigo associated with aural pressure, but no cochlear symptoms.

Many can be controlled with a low sodium diet (1000 to 1500 mg/day or less) and medications.

The amount of sodium is one factor in regulating the body's water balance.

Rheumatic Diseases (arthritis – joint inflammation)

Pain, joint swelling, limited movement, stiffness, weakness, fatigue

100 types – primarily effect skeletal muscles, bones, cartilage, ligaments, tendons and joints in people of all ages.

Classifications:

1. **Monoarticular (single joint)** or **Polyarticular (multiple joints)**
2. Inflammatory or non inflammatory (degenerative)
  - a. All involve some degree of inflammation and degeneration
  - b. Inflammatory arthritis:
    - i. Inflammation caused by immune response.
    - ii. Manifests itself in the joint as **synovitis**
    - iii. Degeneration occurs as a secondary process, resulting from the effect of **pannus**
      1. Pannus : newly formed synovial tissue infiltrated with inflammatory cells
  - c. Degenerative arthritis:
    - i. Inflammation occurs as a secondary process
      1. Synovitis is milder and seen in advanced disease – reactive process

Assessment

1. Chronic disease: Health history and patient's perceptive
2. Physical and functional exam
3. X-ray, CT, MRI

Diagnose: Arthrocentesis

Local anesthetic, needle inserted into the joint (usually knee) – aspirate synovial fluid,

Will see inflammatory cells, immune complexes (rheumatoid factor)

After aspiration watch for leakage from needle insertion point.

Use ice and rest joint for 24 hours.

Osteo Arthritis, or the assumption of it may mask the presence of other diseases

Treatment is more difficult in older patients due to intensified medication effects

Blood tests indicative of Rheumatic diseases

Elevated Creatinine

ESR (sedimentary rate) – increase indicates inflammation

Hematocrit – decrease seen in chronic inflammation

RBC – decrease seen in RA, SLE

Uric acid level increased with gout

Medical management

1. Pharmacologic
    - a. Salicylates (NAIDs) & disease modifying antirheumatic drugs
    - b. Control inflammation
    - c. Antidepressants : Elavil = reestablish adequate sleep patterns
  2. Non Pharmacologic
    - a. Warm tub baths, warm moist compresses
    - b. Frequent with short intervals
    - c. Splints to acutely inflamed joints
    - d. Use of pads
  3. Exercise and activity
    - a. Individualized exercise program
    - b. Mild analgesic before exercise if needed
  4. Sleep
    - a. Since sleep time is frequently reduced, a solid routine is necessary
    - b. Sleep inducing medication may be needed
    - c. Teach sleep hygiene
- 
1. Nursing management of Rheumatic disorders
    - a. Diagnosis: acute and chronic pain
      - i. Interventions
        1. Comfort measures: heat, cold, massage, relaxation techniques
        2. Administer medications as ordered
        3. Teach pathophysiology of pain
    - b. Diagnosis: Fatigue related to increased disease activity, pain, inadequate sleep/rest
      - i. Provide instruction about fatigue
      - ii. Facilitate an appropriate rest schedule
      - iii. Encourage adequate nutrition
        1. Source of iron
    - c. Diagnosis: Impaired physical mobility
      - i. Encourage verbalization of limitations
      - ii. Assess therapy needs
      - iii. Identify environmental barriers
    - d. Diagnosis: Self care deficits
      - i. Develop a plan how to meet self care needs
      - ii. Explore, with the patient, different ways to complete difficult tasks
      - iii. Consult with community health care agencies

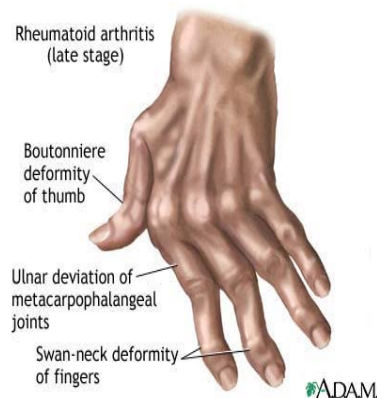
## Rheumatoid Arthritis

Autoimmune disease of unknown origin: affects 1% of the population worldwide

Female to male ratio between 2: 1 and 4:1

Progressive chronic, systemic, inflammatory autoimmune disease that primarily affects the synovial joints.

- Primarily occurs in the synovial tissue.
    - Phagocytosis produces enzymes within the joint
    - The enzyme breaks down collagen causing edema and ultimately pannus formation (flap of tissue).
  - Clinical manifestations
    - Joint pain, swelling, warmth, erythema, lack of function
    - Characteristically begins in the small joints of the hand and wrist
    - Onset is usually acute
  - Systemic disease
  - Assessment and diagnostic findings (Permanent damage can be avoided if diagnosed early)
    - Diagnosis:
      - Rheumatoid nodules, joint inflammation detected on palpation, and laboratory findings
      - Assess for extra-articular changes: weight loss, sensory changes, lymph node enlargement and fatigue
      - X-ray shows bony erosions and narrow joint spaces
      - Morning stiffness
      - Late: renal disease, pericarditis, subcutaneous nodules (25% of patients)
      - Sjögren's Syndrome
        - Triad of symptoms
          - Dry eyes KCS
          - Dry mouth (xerostomia)
          - Vaginal dryness
      - Felty's Syndrome
        - Hepato splenic megaly (enlarged)
      - Caplan presence of rheumatoid nodules in lung (Advanced RA)
- Medical management
  - Early : Aggressive early treatment
    - Education, balance of rest and exercise, referral to community agencies
    - Therapeutic NSAIDs
  - Moderate: occupational and physical therapy
  - Persistent: reconstructive surgery to relieve pain.
    - Arthroplasty (joint replacement)
    - Systemic corticosteroids
  - Advanced: immunosuppressive agents, (Rheumatrex, Cytoxan, Imuran, arava)
    - Nutrition therapy



- New medication modalities
- Nursing management
  - Monitor and manage potential complications
    - Medications can cause adverse affects
  - promote home and community based care
    - Teach self care
    - Teach about medications, importance of sleep cycles
    - Assess the home (home visits)
  - Closely monitor skin for impairment
  - Patient education is important

### Rheumatoid Factor

#### Tests to confirm rheumatoid arthritis

1. ESR elevated (when there is inflammation or infection)
  - a. Monitor with drug therapy to watch for effectiveness
2. Positive C- Reactive Protein
3. Rose Whaller test (positive)
4. Latex agglutination test (positive)
5. Positive antinuclear antibody (measures an unusual antibody that is related to autoimmune level)

### Systemic Lupus Erythematosus (SLE)

- Disturbed immune regulation, causes exaggerated production of autoantibodies.
- Can affect any body system : Musculoskeletal system with arthralgias and arthritis (synovitis ) is most common.
- Pericarditis is the most common cardiac manifestation

### Pharmacologic therapy

1. Salicylates : aspirin
  - a. No longer the drug of choice due to bleeding problems
  - b. Give with food and or proton inhibitor
2. Non-steroidal Anti-inflammatory Drugs (NSAIDs)
  - a. Drug of choice, give with food.
  - b. H2 blockers (zantac)
3. Corticosteroids (cortisone, prednisone)
  - a. Monitor glucose level
4. Immunosuppressive: can cause secondary infection from bone marrow suppression.
  - a. Monitor white blood cell count and leukocytes
  - b. Example : Methotrexate
    - i. Side effect : alopecia (hair loss)
  - c. Side effects : nausea, vomiting, increased LFTs, thiomalate
5. Disease modifying antirheumatic drugs (DMARDs)
  - a. Plaquenil – Hydrochlorquinelaol. 400 mg daily
    - i. Side effects: retinal damage
      1. Report blurred vision
      2. Eye exams

- b. Sulfasalazine – 1000mg twice per day
  - i. Contraindicated in patients with allergy to sulfa, aspirin
  - ii. Monitor with CBC
- c. Slows the progression of rheumatoid arthritis
- 6. Gold therapy
  - a. IM, gold sodium
- 7. BRMs (biologic response modifiers) – newest drugs
  - a. Two types of patients cannot be on BRMs
    - i. Patients with MS
    - ii. Patients with T.B.

#### Diagnosis and Assessment

Complete history, physical exam, and blood test.

Classic symptoms: fever, fatigue, weight loss, possibly arthritis, pleurisy, pericarditis

Inspect the skin for erythematous rashes.

Note areas of hyperpigmentation or depigmentation

Ask patient about skin changes

#### Medical management

Manage acute and chronic diseases

Prevent progressive loss of organ function

Nursing management : create a fundamental plan involving education, self care, community support, etc.

#### Osteoarthritis

1. Most common arthritis with joint pain and loss of function
2. Mostly seen in hips, knees, (weight bearing joints)
3. Trauma to joints or use of prednisone can pre-dispose them to osteoarthritis
4. History
  - a. Type of work
  - b. Previous involvement in sports
  - c. Family history of arthritis
5. Physical exam
  - a. Pain on passive range of motion
  - b. Inspection: joint enlargement (bone hypertrophy)
  - c. Atrophy of skeletal muscle from lack of use
6. Lab assessment
  - a. ESR
  - b. MRI
7. Nursing Diagnosis
  - a. Chronic pain
  - b. Immobility
8. Interventions
  - a. Weight control
    - i. Gradual weight loss
  - b. Promote rest
    - i. Localized (splint and braces)
    - ii. Systemic rest
      1. 8-10 hours of sleep and naps

- c. Heat application
- d. Pharmacologically
  - i. NSAIDS don't exceed 4 grams per day
- e. Alternative therapy
  - i. Hypnosis
  - ii. Magnetic therapy
- f. Surgery

#### Systemic Lupus Erythematosus

1. Chronic, progressive, inflammation of the connective tissue
2. Onset may be acute or slowly development over time.
3. Autoimmune process : abnormal antibodies attack the body
4. Mostly woman 18 to 40.
5. Physical Assessment
  - a. Classic butterfly rash (face)
  - b. Discoid lesions (coin size)
  - c. Renal:
    - i. Nephritis
  - d. Cardiovascular
    - i. Pericarditis
    - ii. Reynard's
  - e. Pulmonary
    - i. Pleural infusions
  - f. Nero
    - i. Central nervous system problems
  - g. Muskuloskelital
    - i. Bone death from lack of oxygen
  - h. Myocytis
    - i. Muscle atrophy from the invasion of immune complexes
  - i. Fever, fatigue, anorexia, vasculitis
6. Interventions
  - a. Patient education
  - b. Avoid the sun
  - c. Planned exercise and rest schedule
  - d. Maintenance of pharmacological treatment
  - e. Watch for signs and symptoms of infection and glucose levels.

#### Anaphylactic Reactions

- Acute systemic hypersensitivity reaction that occurs within seconds, or minutes after exposure to certain foreign substances.
- Antigen – antibody interaction

#### Asthma

## Assessment:

1. Family History
2. Signs seasonally?, emotionally, night or day,
3. Allergies
4. Elevated Immunoglobulin E
5. ABG –
  - a. Early on attack, CO<sub>2</sub> will be lower
  - b. Later the CO<sub>2</sub> will be high
  - c. O<sub>2</sub> will be low
6. Sputum culture : may contain eosinophils
7. Pulmonary function test (PFT)
  - a. Forced Vital Capacity (amount of air exhaled)
8. Blood gas analysis and pulse oximetry
9. Decreased FEV (Forced Expiratory volume)
10. Peak expiratory rate flow (PERF)
  - a. Fastest airflow rate at anytime during exhalation
11. Normal range for age, sex, size
  - a. 15% below normal value : diagnostic for asthma

## Pharmacologic Therapy

1. Corticosteroids – inhaled and systemic
  - a. Flovent and prednisone
  - b. Pulmicort 200mcg once per day
    - i. Takes a few days to take effect
  - c. Educate to monitor for any throat or oral lesions, Rinse mouth after use.
2. Inhaled Beta-agonists
  - a. Salmeterol 2 inhalations every two hours
  - b. Do not exhale into device
3. Combined medications
  - a. Advair twice per day:
4. Mast cell stabilizer
  - a. Cromolyn (Intal) start 3 to 4 weeks before expected allergy season
5. Leukotriene Modifiers – Singular (10mg PO) Given at night (when leukotriene peaks)
  - a. Keep taking daily, takes time for the drug to peak in action
  - b. Check for hepatic problems
6. Aminophylline and theophylline – seldom used anymore
  - a. Monitor drug levels
7. Beta Adrenergic Agonists e.g. albuterol, Alupent, and Serevent
  - a. Beta 2 (smooth muscle relaxation)
  - b. Broncho dilators
  - c. Common dosage (MDI) 1 to 2 inhalations every 4-6 hours prn
    - i. 90 mcg per inhaled dose
  - d. Monitor heart rate (teach this)
  - e. Chronic use increases dryness (increase fluid and water intake)
  - f. Use 5 minutes prior to using other inhaled drugs
8. Anticholinergic Agents e.g. Atrovent

- a. 2-4 inhalations 4 to 6 times daily (18mcg per inhalation)
- b. Also causes dryness (increase fluid intake)
- c. Shake it well, it separates on standing

#### Status Asthmaticus

- Asthma attack that does not break
- Wheezing, use of accessory muscles
  - Potent bronchodilators
  - Steroids
  - Intubation

#### Leadership

##### Classic Styles:

1. Autocratic : makes decisions for the group
  - a. Leader believes the people are incapable of independent decision making
  - b. Determines policies, gives orders and directs the group
  - c. Group may feel secure because procedures are well defined and predictable
  - d. Groups need for creativity; autonomy and self motivation are not met.
  - e. Members are often dissatisfied with this style
  - f. Most effective when urgent decisions are necessary
    - i. Effective when a project must be completed quickly
2. Democratic : leader encourages group discussion and decision making
  - a. Leader acts as a catalyst or facilitator
  - b. Group satisfaction and production are high as members contribute
  - c. Leader assumes that members are internally motivated
  - d. Demands that the leader has faith in the group members to accomplish the goal
  - e. Less efficient and more cumbersome than autocratic leadership
    - i. Allows for self motivation and creativity
  - f. **Can be extremely effective in the health care setting.**
3. Laissez-faire: nondirective, permissive
  - a. Leader recognizes the groups need for autonomy and self-regulation
  - b. Hands off approach
  - c. Group members may act independently and cross purposes due to lack of cooperation and coordination
  - d. Most effective for groups whose members have personal and professional maturity
4. Bureaucratic : does not trust self or others to make decisions, relies on rules and policies and procedures to direct the group's work efforts.
  - a. Group members are usually dissatisfied with the leader's inflexibility and impersonal relationship.

Situational Leader : adapt their leadership style to the readiness and willingness of the group to perform assigned tasks.

1. Flexes task and relationship behavior
2. Considers people's ability
3. Know the nature of the task

4. Is sensitive to the context in which the task takes place.

#### Contemporary Theories

1. Charismatic leader: rare – emotional relationship between the leader and the group members.
  - a. Evokes strong feelings of commitment to the leader and the leader's cause.
  - b. Group members overcome extreme hardship to achieve goals because of faith in the leader
2. Transactional leader
  - a. Has a relationship with followers based on an exchange from resource valued by the followers.
    - i. These incentives promote loyalty and performance.
    - ii. Ie: working a night shift to get a weekend off.
3. Transformational leader
  - a. Fosters creativity, risk taking, commitment and collaboration by empowering the group to share the organizations vision.
  - b. Inspires others with a clear, attractive, and attainable goal
  - c. Enlists the group to participate in obtaining that goal
4. Shared leadership
  - a. Recognizes that professional workforce is made up of many leaders
  - b. Examples: shared work teams, self directed work
  - c. Distributes decision making among an group of people.

#### Management Functions

1. Planning : ongoing process
  - a. Assessment, establishing goals, developing a plan, risk management
2. Organizing
  - a. Arranges the work into smaller units
  - b. Determines responsibilities, communicates expectations
3. Directing
  - a. Getting the work done
  - b. Instruction, guidance and ongoing decision making
4. Coordination
  - a. Ensuring the plan is being carried out and evaluate outcomes
  - b. i.e. appraises staff performance.

#### Enhancing Employee Performance

1. Empower staff by providing information, support, resources and opportunities to participate
  - a. The staff will develop a greater sense of commitment to the institution
2. Provide day to day coaching and serve as a mentor

#### Evaluating the groups work:

1. Effectiveness : measure of quality or quantity
2. Efficiency : measure of resources used
3. Productivity: performance measure of effectiveness and efficiency

#### Managing Conflict

1. Compromise, negotiation and collaboration.

2. Demonstrate respect for all parties
  3. Avoiding blame
  4. Allowing full discussion
  5. Use ground rules during meetings to promote fairness
  6. Encouraging active listening
  7. Exploring alternative solutions
1. Delegation
    - a. nursing areas that can be delegated to a UAP
      - i. Vital signs, measuring and recording intake and output, transfers and ambulation, postmortem care, bathing, feeding, gastrostomy feedings in established systems, attending to safety, weighing, simple dressing changes, suctioning of chronic tracheostomies, Basic Life Support (CPR)
    - b. Nursing areas that CANNOT be delegated
      - i. Assessment, interpreting data, nursing diagnosis, creating a nursing care plan, evaluation of care, care of invasive lines, administration of parenteral medications, insertion of nasogastric tubes, client education, triage, telephone advice.
    - c. Principles of delegation:
      - i. Must assess the patient before delegating
      - ii. Patient must be medically stable, or in a chronic condition but not fragile
      - iii. Task must be routine

#### Cultural Considerations

Culturally competent nursing care: effective, individualized care, with respect for dignity, personal rights, preferences, beliefs and practices of the patient.

#### Definitions:

Acculturation: members of one group adapt or take on behaviors of another group

Cultural Blindness: Inability of people to recognize their own values, beliefs and practices and those of others because of strong ethnocentric tendencies (thinking one's own culture is superior).

Cultural imposition: impose one's own cultural beliefs on another

Cultural Taboos: activities or behaviors that are avoided, forbidden, or prohibited by a particular culture

Translators should not be a member of the patient's family : violation of right to privacy.

#### Signals of ineffective communication:

- Efforts to change the subject
  - o Listener may not understand
- Absence of questions
  - o The listener may not be understanding the message
- Inappropriate laughter
  - o Self conscious giggle can signal poor comprehension
  - o May be an attempt to disguise embarrassment
- Nonverbal clues
  - o Blank expression

Conventional Medicine: National institute of health:-

Other names for conventional medicine : **allopathy, Western medicine, regular medicine, mainstream medicine, and biomedicine.**

Complementary or alternative interventions:

1. Alternative medical systems
  - a. Complete systems of theory and practice different than conventional medicine
  - b. Examples:
    - i. Eastern medicine: acupuncture, herbal medicine, oriental massage, Qi gong
    - ii. India's traditional medicine: Ayurveda (diet, exercise, meditation, herbal medicine, massage, exposure to sunlight, controlled breathing)
    - iii. Homeopathic medicine: herbal medicine, naturopathic medicine, soft tissue manipulation, electrical currents, ultrasound, light therapy
2. Mind-body interventions
  - a. Techniques to use the mind to affect symptoms and bodily functions.
    - i. Meditation, music, art therapy, prayer, mental healing
3. Biologically based therapy
  - a. Natural and biologically based interventions
    - i. Herbal therapies, special diets, shark cartilage, bee pollen, Atkins diet, orthomolecular therapy
4. Manipulative and body based methods
  - a. Interventions based on body movement
    - i. Manipulation of the spine (chiropractic)
    - ii.iropractic
    - iii. Osteopathic manipulation
    - iv. Massage therapy & reflexology
5. Energy therapies
  - a. Interventions focused on energy fields within the body, or externally (electromagnetic fields)
    - i. Qi gong, Reiki therapeutic touch, pulsed electromagnetic fields, alternating and direct electrical current.

Causes of Illness (viewpoints)

1. Biomedical or scientific
  - a. Prevails in most health care settings
  - b. All events have cause and effect
2. Naturalistic or Holistic
  - a. The forces of nature must be kept in natural balance or harmony
  - b. Yin/yang
    - i. Yin : female, negative force, cold
    - ii. Yang: male, positive force, hot
      1. Cold foods eaten when there is a hot illness
  - c. Four humors of the body : blood, phlegm, black bile, and yellow bile regulate body function
    - i. Described in terms of temperature and moisture.
  - d. Breaking the laws of nature create imbalances, chaos and disease.
3. Magico-Religious
  - a. Supernatural forces dominate the world.
    - i. Voodoo, witchcraft, faith healing, healing rituals.

Communication