O2 CO2 Needs IB

- Ventilation
  - Movement of gas into and out of lungs
  - Inhalation
  - Exhalation
    - Passive
- Chronic Obstructive Lung Disease COPD
  - Lungs lose their elastic recoil
  - Work of breathing goes up
  - Patients need to use accessory muscles
  - Causes fatigue
- Perfusion
  - The ability of the cardiovascular system to pump oxygenated blood to the tissues
- Diffusion
  - Movement of oxygen and CO2 between alveoli and RBCs in pulmonary circulation
- Assessment of client with abnormal O2 CO2 exchange
  - Chest wall function
    - Pregnancy
    - Position
    - Obesity
  - Musculoskeletal Abnormalities
    - Curvature of the spine
    - Lordosis, Kyphosis, Scoliosis
  - Nervous System
    - PNS - Myasthenia Gravis, Guillaine Barre, Polio
    - CNS = Trauma and Spinal Cord Injury
- Chronic Diseases
  - COPD
  - Pneumonia
  - Lung cancer
  - Asbestos exposure
  - Smoking history
    - Calculate pack year history
  - Substance abuse
  - Inadequate nutrition
- Cardiovascular Function
  - Failure of the Pump
  - Conduction disturbances
  - Valve malfunctions
  - MI Cardiomyopathy
- Other factors
  - Increased O2 demand
  - Pregnancy
  - Exercise
  - Increased metabolic rate e.g. hyperthyroidism
- Changes in Respiratory Function
• Hypoventilation
  ▪ Inadequate alveolar ventilation to meet body’s oxygen needs
  ▪ Cause – Atelectasis
• Hyperventilation
  ▪ Excess of ventilation required to eliminate CO2
  ▪ Causes: Anxiety, infections, drugs, acid-base imbalances, chest pain, SOB, PE, shock, fever
• Hypoxia
  ▪ Inadequate oxygen at the cellular level
  ▪ Causes
    • Anemia
    • Hypovolemia
    • Deficiency in delivery e.g. CO poisoning
    • Inability of tissues to extract O2
    • Decreased blood perfusion of alveoli
    • Poor tissue perfusion
    • Impaired ventilation
    • Decreased inspired air concentration

• Signs and Symptoms of Hypoxia
  • Restlessness, apprehension, inability to concentrate
  • ↓ LOC, dizziness
  • Fatigue
  • Pallor → →
  • Clubbing
  • Dyspnea
  • ↑ RR
  • Cyanosis

• Head to Toe Assessment
  • LOC – confused, apprehensive, disoriented, combativeness, coma
  • Eyes - pale conjunctiva, fear, blurred vision
  • Mouth
    ▪ Cyanosis
    ▪ Pursed lip breathing
  • Neck – neck vein distention
  • Nose – nasal flaring, sputum
  • Cyanosis
  • Nasal flaring
  • Chest – retraction, asymmetry, Use of accessory muscles
  • Skin – cyanosis, pallor, cool, clammy, diaphoretic
  • Finger tips – clubbing, cyanosis
  • Lung
    ▪ Lungs sounds – adventitious sounds, noisy respirations
    ▪ Pain with inspiration, cough, sputum, hemoptysis
    ▪ Dyspnea with exertion (early), with rest (late)
    ▪ Clubbing
    ▪ Accessory Muscles
- Vitals – orthopnea, ↑breathlessness, ↑ HR, hypotension (very late)
- Other
  - Fatigue
  - Decreased urinary output (late)
  - Tripod position
  - Unable to speak without pausing for breath

- **Other Diagnostics**
  - **Complete Blood Count CBC**
    - **Hemoglobin**
      - Reflects amount of Hgb available for combination with O2
      - 13.5-18 g/L Men
      - 12-16 g/L Women
    - **Hematocrit**
      - Ratio of RBC to plasma
      - 40-54% men
      - 38-47% women
    - **Arterial Blood Gases**
      - Sample of arterial blood
      - Invasive procedure – Normal Value
        - pH 3.5-4.5
        - PaO2 - 80-100 mmHg
      - PaCo2 – 35-45 mmHg
      - HCO3 22-26 mmHg
      - SaO2 >95%
      - PaO2 – ↓ with advancing age
        - Mild hypoxemia – 60-79 mmHg
        - Moderate – 40-59 mmHg
        - Severe – below 40
  - **Pulse Oximetry**
    - Well oxygenated blood absorbs light differently than deoxygenated blood
    - Oximeter calculates saturation
      - Normal >95%
      - 90 adequate
      - 88 Adequate if no cardiac problems
      - 75 inadequate
      - <75 Requires immediate intervention
    - Factors which skew reading
      - Motion artifact
      - Ambient light
      - Fingernail polish
      - Mechanical problems
      - Anemia
    - Determining overall O2 carrying capacity
      - Total amount of O2 carried in blood should be between 19-20 mL/dL
      - Each gram of Hgb carries 1.34 mL of oxygen
      - Multiply Hgb by 1.34
        - E.g. Mrs. Weston, Hgb 15, O2 sat 97%
1.34 x 15 = 19.5 mL/dL (normal)
 Mr Bachus, Hgb 11, O2 sat
 1.34 x 11 = 14.03 mL/dL (far below normal)

**Pulmonary Function Tests**
- Tidal Volume
- Residual Volume
- Functional Residual Capacity
- Vital Capacity
- Total Lung Capacity
- Peak Expiratory Flow Rates

**Incentive Spirometer**
- Encourages voluntary deep breathing
- Pt inhales slowly with even flow
- Device indicates volume of breath

**Diagnostic tests**
- X-ray
- Bronchoscopy
- Lung Scan
- Lung VQ Scans

**Other Tests**
- Throat culture
- Sputum culture
- Blood culture
- Acid Fast Bacillus
- PPD
- Thoracentesis

**Postural Drainage**

**Chest Percussion**

**Hyperbaric Oxygenation**
- Inhaled oxygen – higher than normal pressures
- Supersaturates Hgb
- Oxygen also passes directly through skin
- Used in
  - Wound healing
  - Carbon monoxide poisoning
  - Hypoxia
  - Gas Gangrene
  - Osteomyelitis

**Oxygen Delivery Equipment**
- Safety - FIRE
  - Toxicity
- Nasal Cannula (2 to 6 L/min)
- Face Mask  5 to 8 L/min  40-60% O2
- Non-rebreather mask, 10-15 L/min, 95-100% O2
- Venturi Mask