OXYGENATION

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Learning Objectives

- Discuss hypoxemia/hypoxia and poor perfusion
- Review methods to improve oxygenation
- Demonstrate the use of various oxygen therapy modalities (nasal cannula, non-rebreather mask, venturi mask)

What is perfusion?

- Passage of fluid through the circulatory system or lymphatic system to an organ or a tissue
  - usually referring to the delivery of blood to the tissue

What is poor perfusion?

- A decreased oxygen level in the blood
  - _____ can be used to assess oxygen level
    - SpO_2 – measure of how saturated hemoglobin are with oxygen (measured with pulse oximetry)
      - 95-100%

Signs/Symptoms of Poor Perfusion

Restlessness/confusion
Decreased blood pressure
Cool extremities
Pallor or cyanosis of extremities
Slow capillary refull

When oxygen delivery is inadequate to meet metabolic demands of the body = tissue ischemia and cell death

Hypoxia (low oxygen in your tissues) when your ***blood*** doesn't carry enough oxygen to the tissues to meet the body's needs

Interventions Prior to Oxygen Use

- Promotion of lung expansion
  - Position changes frequently – every 2 hours
  - Keep upright
  - Increase daily activities; ensure adequate hydration
  - Coughing exercises
  - Deep breathing (IS)
- Post Operative
  - IS
  - TCDB
  - Splinting incision

Albuterol (ProAir) MDI

- Bronchodilator
  - Rescue inhaler for acute difficulty breathing (asthma, COPD)
  - Beta 2 agonist (SABAs)Short-Acting Beta Agonist
    - Stimulates beta-2 adrenergic receptors, relaxing airway smooth muscle
    - Two puffs inhaled every 4 to 6 hours prn bronchospasm/difficulty breathing
    - May take 2 puffs 5-30 minutes before exercise
    - Common reactions
      - Nervousness, tachycardia, headache, throat irritation

Symbicort (budesonide/formeterol inhaled)

- Corticosteroid/Bronchodilator
  - Beta 2 agonist (LABA) Long-Acting Beta Agonist
  - MDI: 80mcg/4.5mcg; 160/4.5 mcg
    - Two puffs bid (2 times/day)
    - Treatment for prevention of asthma attacks and exercise-induced bronchospasm and COPD
    - Common Reactions
      - Tachycardia, nervousness, palpitations, oral candidiasis

Abnormal Respiratory Patterns

- Tachypnea – rapid rate
- Bradypnea – slow rate
- Apnea – cessation of breathing

- Vocabulary
  - Atelectasis
  - Pulmonary embolus
  - Deep Vein Thrombosis

Atelectasis – alveoli become deflated or cause partial collapse of lungs

Deep Vein Thrombosis (DVT) blood clot (thrombus) forms in one or more of the deep veins in the body, usually in the legs

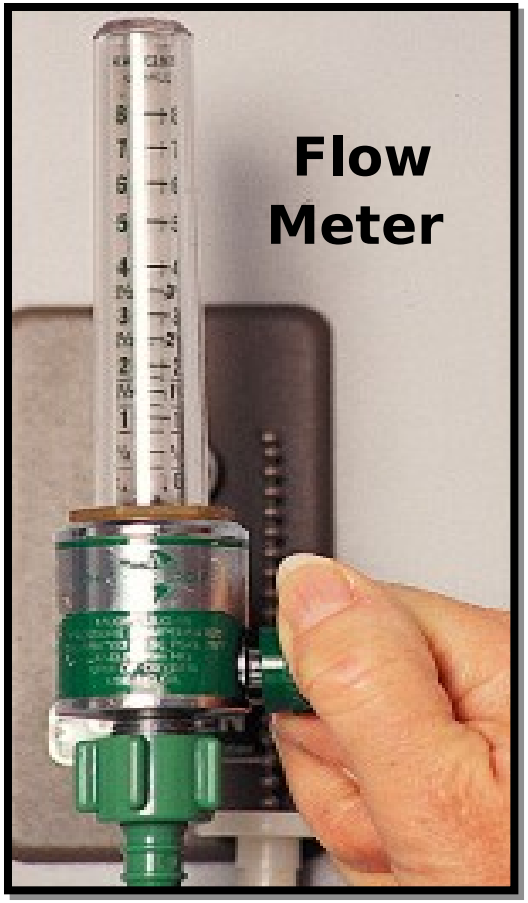
- Cramping, swelling, warmth – usually in the calf

Pulmonary Embolus – blockage in one of the pulmonary arteries in the lungs usually caused by blood clots that travel to lungs from deep veins in the legs

- Shortness of breath, chest pain, cough, pain the back

Assessing Patients on Oxygen Therapy

- Equipment
- Correct oxygen delivery device
- Flow rate is correct
- Respiratory assessment
  - *vital signs*
  - *oxygen saturation*
  - *Level of consciousness, any s/s of hypoxia*
  - *skin*


Flow
Meter


OXYGEN
MEDICAL AIR
Xmas
Tree

Fraction of Inspired Oxygen (FIO2)

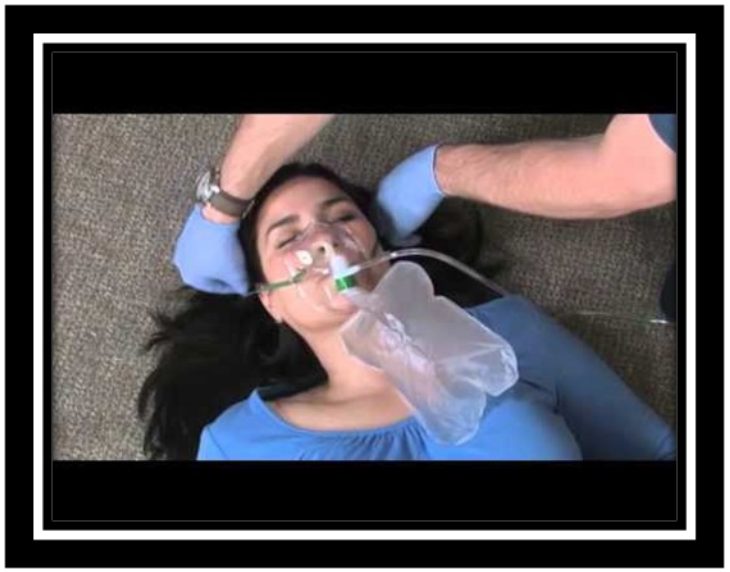
- FIO_2 is percent of oxygen a person is inhaling
- Room air FIO_2 is 21%
- With supplemental oxygen, FIO_2 can reach 100%

Methods of Oxygen Delivery
Nasal Cannula

- Oxygen delivery
  - up to 6L/min. **(usually no more than 4)**
  - FIO_2 24%-44%
- Advantages
  - safe & simple, easily tolerated
  - increased mobility

Disadvantages
  - dries membranes; skin breakdo

Non-Rebreather Mask



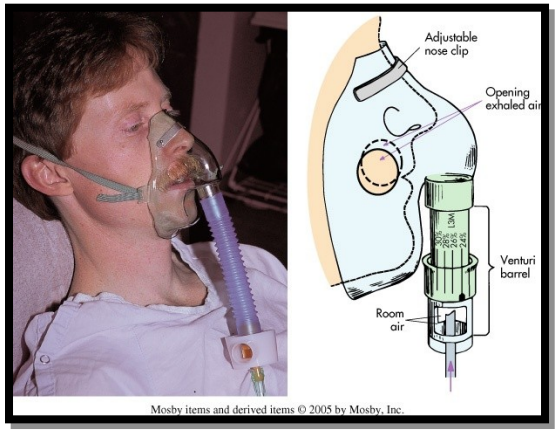
Face mask with reservoir Bag & one-way valves at inlet port & on exhalation ports on mask; one-way valve closes during exhalation

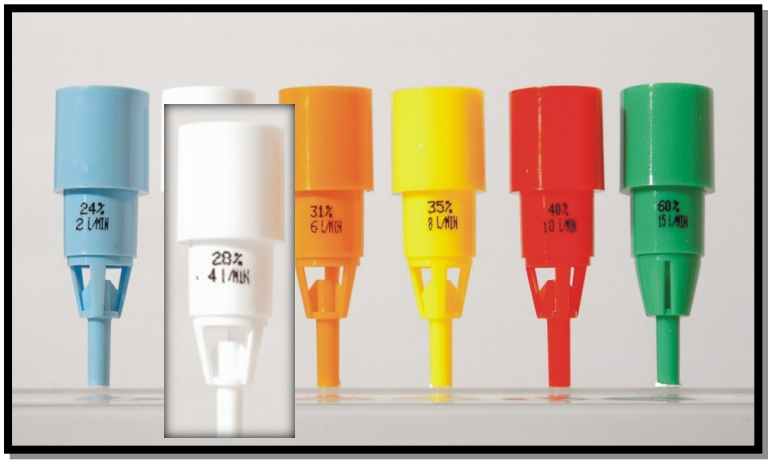
FIO2 of 60-100%

Set flow meter @ 10-15 L for 100%

Delivers higher concentrations of oxygen
Treat hypoxia, ↓workload of breathing

Venturi Mask





Advantages

- controls exact concentration of oxygen
- delivers FIO_2 of 24-60% flow rates from 4-12 L/min

Disadvantages

- Hot & confining
- Interferes with eating & talking

Commonly used in COPD patients

Face Tent

Advantages

- delivers 28-100% with flow rate of 8-12L/min

alternative for claustrophobia

Disadvantages

- Difficult to control concentration of oxygen

Continuous Positive Airway Pressure (CPAP)

- Used for sleep apnea
- Steady continuous stream of pressurized air
- Increases air pressure in throat so airway doesn’t collapse while breathing in

Bilevel Positive Airway Pressure (BIPAP)

- Two pressure settings
  - Prescribed pressure for inhalation
  - Lower pressure for exhalation
- Uses
  - Sleep apnea
  - Low oxygen levels
  - Heart failure
  - Cardiopulmonary disorders
  - Prescribed pressure for inhalation
  - Lower pressure for exhalation

Documentation

- Date & time oxygen initiated
- Method of delivery
- Flow rate in liters per minute
- Patient response to oxygen
- Condition of pt’s skin where device rests
- Respiratory assessment
- Patient/family teaching

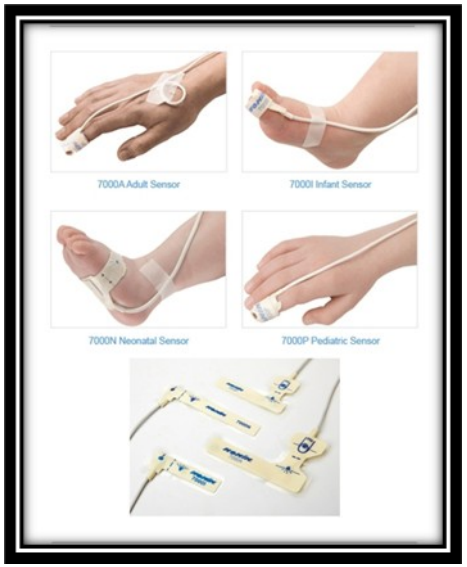
Humidification

Nebulizer

Bag-Valve Mask

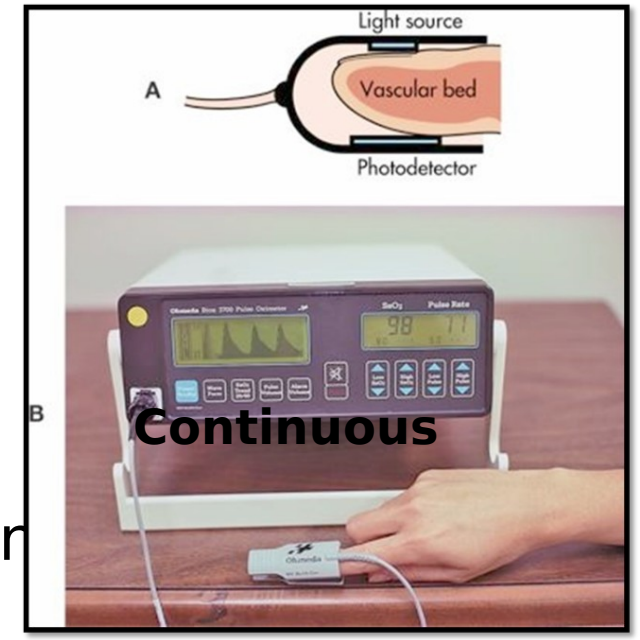
Pulse Oximetry

- A procedure used to measure the oxygen level in the blood.
- Non-invasive, painless
- Indicator of 0_2



Factors that Alter Accuracy Of Pulse Ox

- Physical
  - motion/incorrect placement
  - BP monitoring device
  - bright lights, polish, acrylics
- Physiological
  - poor arterial flow or edema
  - cold hands; poor capillary fillin
  - anemia



Incentive Spirometry (IS)

- **Purpose**
  - helps prevent post-op pulmonary complications (atelectasis)
  - provides voluntary deep breathing
  - gives visual feedback
- **Technique**
  - explain procedure
  - positioning
- **Frequency**
- Nursing considerations

Oxygen Safety

- Do not smoke
- Do not use aerosol sprays
- Do not use any petroleum products
- Should be administered to patient by physician order or in judgment of RN in emergency situations

Oxygen Toxicity

- Oxygen toxicity can develop when a person breathes 100% oxygen for ˃ 12 hours
- Results from effects on CNS and Pulmonary Systems
- Signs/Symptoms
  - Pallor, sweating, nausea & vomiting
  - Seizures, vertigo, muscle twitching
  - Hallucinations, visual changes, anxiety
  - Chest pain, dyspnea