

OXYGEN THERAPY
Fundamental Skills and Concepts
Chapter 21

Mrs. Janet Frascella BSN RN

OXYGEN

- Essential to sustain life.
- Every cell in human body uses O₂ to metabolize nutrients and produce energy..
- No O₂ – cellular death.
- **Maslow's Hierarchy** – highest need O₂.
- Colorless gas.

Oxygen

- **Hemoglobin** – carries O₂ and CO₂ to and from the cells.
- Low Hbg – lower O₂ to cells and lower CO₂ leaving cells.

A&P Of Breathing

- **Inspiration** – breathing in.
- **Expiration** – breathing out.
- **Respiration** – exchange of O₂ and CO₂.
- **Ventilation** – movement of air in and out of lungs.

ASSESSING OXYGENTATION

- **Determine quality of oxygen**
 - Physical assessment data
 - Arterial blood gases (ABG's)
 - Pulse oximetry
 - NORMAL ATMOSPHERIC PRESSURE 21%.

OXYGENATION

- **Hypoxemia**
 - Insufficient O₂ within arterial blood.

- **Hypoxia**
 - Inadequate O₂ at cellular level.
 - Late signs
 - Bluish discoloration of skin and mucous membranes.
 - Oral mucosa, eyes, and lips.
 - Anxiety, confusion, restlessness, change in BP, increased pulse rate, increased respirations, drowsiness, headache, and disorientation.

Oxygenation

- **Physical Assessment**

- Monitor resp rate
- Observe breathing pattern and effort
- Check chest symmetry
- Auscultating lung sounds
- Also
 - Heart rate
 - BP
 - Level of consciousness
 - Color of skin, mucous membranes, lips and naibeds

Oxygenation

- **Inadequate Oxygenation**
 - Decrease energy
 - Restlessness
 - Rapid heart rate
 - Sitting up to breath
 - Nasal flaring
 - Use accessory muscles
 - Hypertension
 - Sleepiness
 - Confusion
 - Cyanosis of skin – lips and nailbeds

Arterial Blood Gases

- **Known as ABG's**
- Lab test to determine arterial blood to assess O₂, ventilation, and acid- base balance.
 - **PaO₂** – partial pressure O₂ dissolved in plasma.
 - **SaO₂** - % hemoglobin saturated with O₂.
 - **PaCO₂** – partial pressure of CO₂ in plasma.
 - **HCO₃** – pH blood and level of bicarbonate.

Arterial Blood Gases

- Used for sampling due to arteries having greater O₂ content than veins.
- Responsible for carrying O₂ to all cells.
- Ordered to assess acute resp distress and evaluate client on medical treatment.

Arterial Blood Gases

- pH 7.35 -7.45
- PaO₂ 80 - 100 mm Hg
- PaCO₂ 35 - 45 mm Hg
- SaO₂ 95% - 100%
- HCO₃ 22- 26 mEq

Pulse Oximetry

- Noninvasive, transcutaneous technique to periodically or continuously monitor O₂ saturation of blood.
- Composed of sensor and microprocessor.
- **SpO₂** – abbreviation.
- Normal 95- 100%.
- Below 70% - life threatening.



Pulse Oximetry

- **Factors That Interfere With Accurate Readings**
 - Movement of sensor – tremor, restlessness.
 - Poor circulation
 - Barrier to light – nail polish, thick toenails, acrylic nails.
 - Direct sunlight
 - Hemoglobin saturation with other substances such as CO₂ poisoning.

Promoting Oxygenation

- Positioning

- High Fowler's Position

- Upright seated
 - Allows abdominal organs to descent away from diaphragm.
 - Lungs able to fill with greater volume of air.

Orthopneic Position

Seated with arms supported on pillows or arm rests of chair and leans forward over bedside table.

Allows for maximum vertical and lateral chest expansion and provides comfort while resting or sleeping.

Breathing Techniques

- **Deep breathing**
 - Maximizing ventilation.
 - Air fills alveoli to greater capacity to improve exchange.
 - Use with patients who are shallow breathers, esp those in pain.
 - Technique
 - Take in as much air as possible.
 - Hold breath briefly.
 - Exhale slowly.

Breathing Techniques

- **Incentive Spirometry**

- Calibrated device which encourages patients to reach their goal – directed volume of inspired air and prevent atelectasis.

- Use

- Sit upright
 - Know the goals
 - Exhale slowly
 - Insert mouthpiece
 - Inhale slowly
 - Hold breath for 3 to 6 seconds
 - Remove mouthpiece and exhale normally
 - Can repeat 10 to 20 times per hour

Breathing Techniques

- **Pursed –Lip Breathing**

- Control ventilation when the conscious patient prolongs expiration phase of breathing.
- Help in eliminating more than usual amounts of CO₂.
- Used with patients with chronic lung diseases.
- Hypercarbia – excessive levels of CO₂ in blood.
- Used with patients with respiratory diseases.
 - Technique
 - Inhale slowly through nose.
 - Purse lips like to whistle.
 - Contract abdominal muscles.
 - Exhale through pursed lips for count of six or more.
 - Expiration should be two or three times longer than inspiration.

Breathing Techniques

- **Diaphragmatic Breathing**

- Uses diaphragm rather than upper chest muscles.
- Increase volume of air exchanged during inspiration and expiration.
 - Technique
 - Lie down with knees bent.
 - One hand on abdomen and other on chest.
 - Inhale slowly and deeply through nose while letting abdomen rise more than chest.
 - Purse lips.
 - Contract abdominal muscles and begin to exhale.
 - Press inward and upward with hand on abdomen while continuing to exhale.
 - Repeat for 1 full minute and rest for 2 minutes.

Breathing Techniques

- **Nasal Strips**

- Used to reduce airflow resistance by widening breathing passageways of nose.
- Used – for athletes, increase O₂ during exercise, and those who snore.

Oxygen Therapy

- An intervention for administering more O₂ than is present in the atmosphere to prevent or relieve hypoxia.
- Always check order before administering any O₂.

Oxygen Therapy

- **Safety Precautions**

- Itself O₂ will not burn.
- Aids in combustion.
- Greater concentration O₂, the greater the chance to start a fire.
- Difficult to extinguish.
- 10 ft should separate O₂ apparatus and open flame.

Oxygen Therapy

- **Caution Signs**

- Avoid static electricity
- No smoking
- Remove equipment needing electricity
- Remove matches and lighters
- Avoid flammable material - oils, greases and ether.

Oxygen Therapy

- **Various disease processes that require O₂ therapy**
 - Pneumonia
 - Bronchitis
 - COPD
 - Emphysema

Oxygen Sources

- **Wall Outlet**

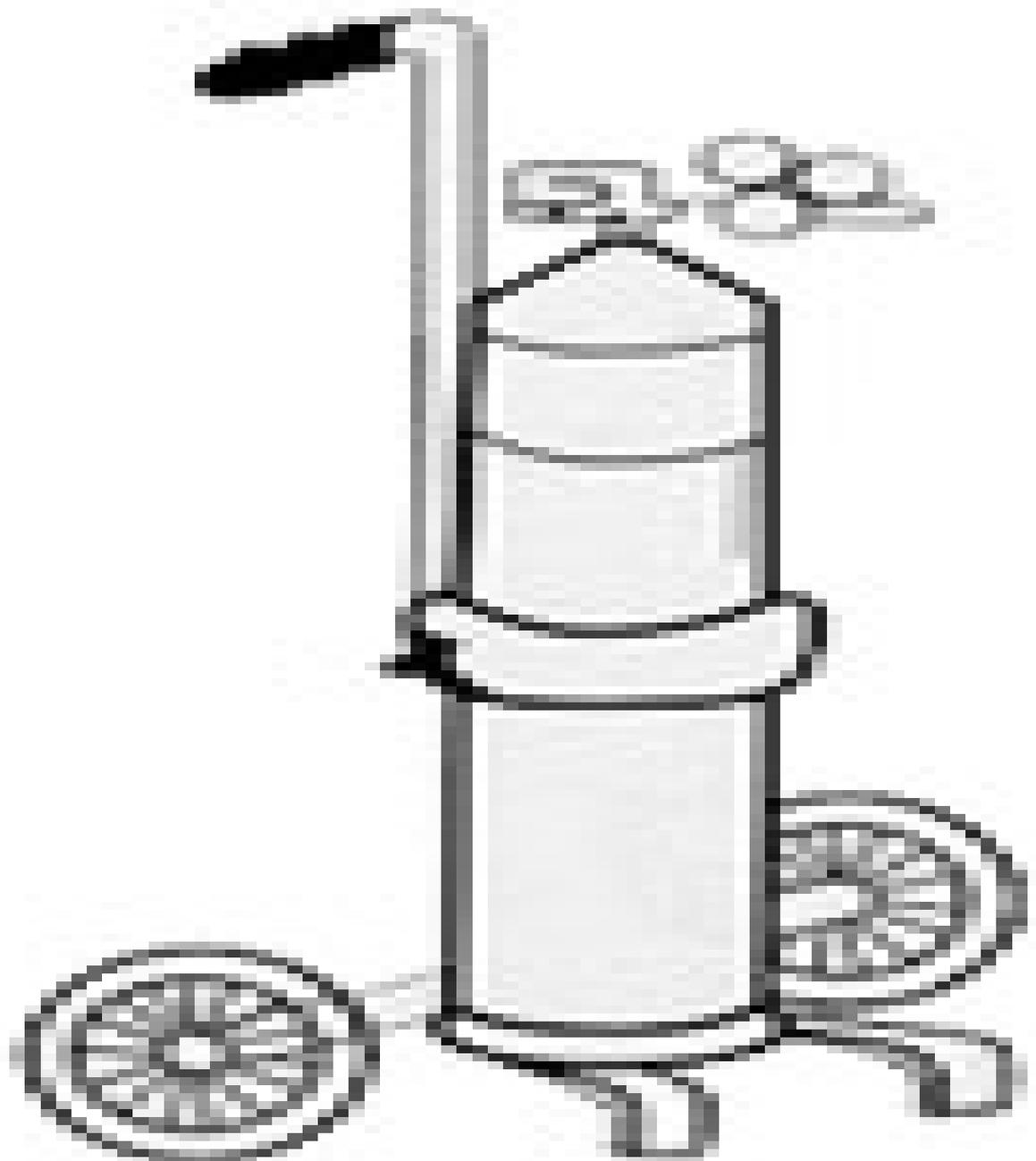
- Connect to a large central reservoir filled with O₂ on a routine basis.



Oxygen Sources

- **Portable Tanks**

- Used for transport.
- Resembles steel cylinders.
- Large tank – 2,000 lbs. of pressure per square inch.
- Delivered with protective cap to prevent cap to prevent accidental force against the tank outlet.
- O₂ tanks transported and stored while strapped to a wheeled carrier.
- Tank is “cracked” to clear the outlet of dust and debris.



Equipment For O2 Administration

- **Flowmeter**

- Gauge used to regulate amount of O2 delivered to patient and attached to the O2 source.
- Rate is regulated by a dial to get desired amount.



Equipment For O₂ Administration

- **Humidifier**

- Device that produces small water droplets.
- Used during O₂ administration because O₂ is drying to mucous membranes.
- Done mostly when O₂ is more than 4L/min over extended period.



Equipment For O₂ Administration

- **Nasal Cannula**

- Hollow tube ½ inch prongs placed in nostrils.
- Tube wrapped around ears and fitted under chin.
- Used for low concentration of O₂.
- Not used for patients with respiratory diseases.
- Chronic lung disease of more than 2 to 3 liters of O₂ can cause respiratory rate to slow or even stops.
- Used for patients with COPD or other resp disorders.



Equipment For O2 Administration

- Nasal Cannula – 2-6 L/min
 - **Advantage**
 - Easy to apply and comfortable.
 - Can eat and talk with it.
 - Less likely to feel suffocation.
 - Most inexpensive .
 - **Disadvantage**
 - Dries nasal mucosa.
 - May irritate cheeks and ears.
 - Can not give to patients who are hypoxic.

Equipment For O2 Administration

- **Oxygen Analyzers**

- **Measures concentration of O2 being received by patient.**
- **Gives the prescribed amount of O2.**
- Should be 21%.
- Placed by patient's nose.
- Adjusted until reads 21%.
- Used by resp dept or units.



Equipment For O2 Administration

- **Mask**

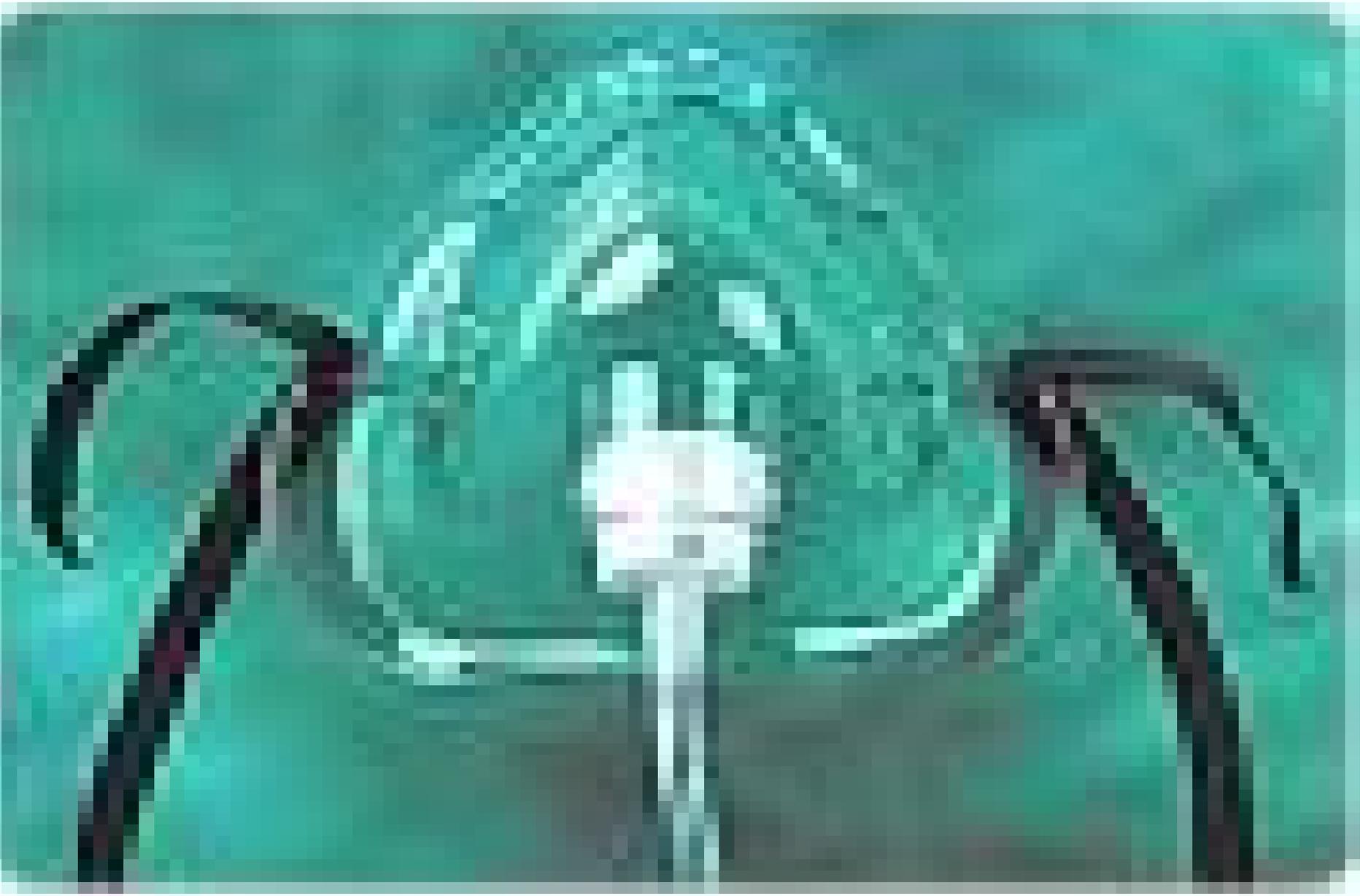
- Simple 5-8 L/min

- **Advantage**

- Higher concentration than cannula.
 - Effective for mouth breathers or nasal disorders.

- **Disadvantage**

- Requires humidification.
 - Interferes with eating and talking.
 - Anxiety with claustrophobic patient.
 - Risk for rebreathing CO₂ retained in mask.



Equipment for O₂ Administration

- **Partial Rebreather – 6-10L/min**

- **Advantages**

- Increase amount of O₂ with lower flows.
 - Mixture of atmospheric air, O₂ from its source, and O₂ within reservoir bag.

- **Disadvantages**

- Requires a minimum of 6L/min.
 - Risk for suffocation.
 - Must make such reservoir bag remains inflated at all times.



Equipment For O2 Administration

- **Non-breather 6-10L/ min**
 - **Advantages**
 - One-way valves that allow only O2 from its source, as well as O2 in reservoir bag to be inhaled.
 - No air from atmosphere inhaled.
 - All air exhaled is vented from mask.
 - Non enters reservoir bag.
 - Used with patients that require high concentrations of O2.
 - Used on patients who had heart attack, shock, internal bleeding.
 - High volumes of O2.
 - **Disadvantages**
 - Same as rebreather mask.
 - Risk for O2 toxicity.
 - Never use on COPD patient's



Equipment For O₂ Administration

- **Venturi 4-8L/min**

- **Advantages**

- Mixes precise amount O₂ and atmospheric air.
 - Permits specific amounts of room air to mix with O₂.
 - Exact amount of prescribed O₂.
 - Humidification can be added.

- **Disadvantages**

- Permits condensation to form in tubing which diminishes flow of O₂



Equipment For O2 Administration

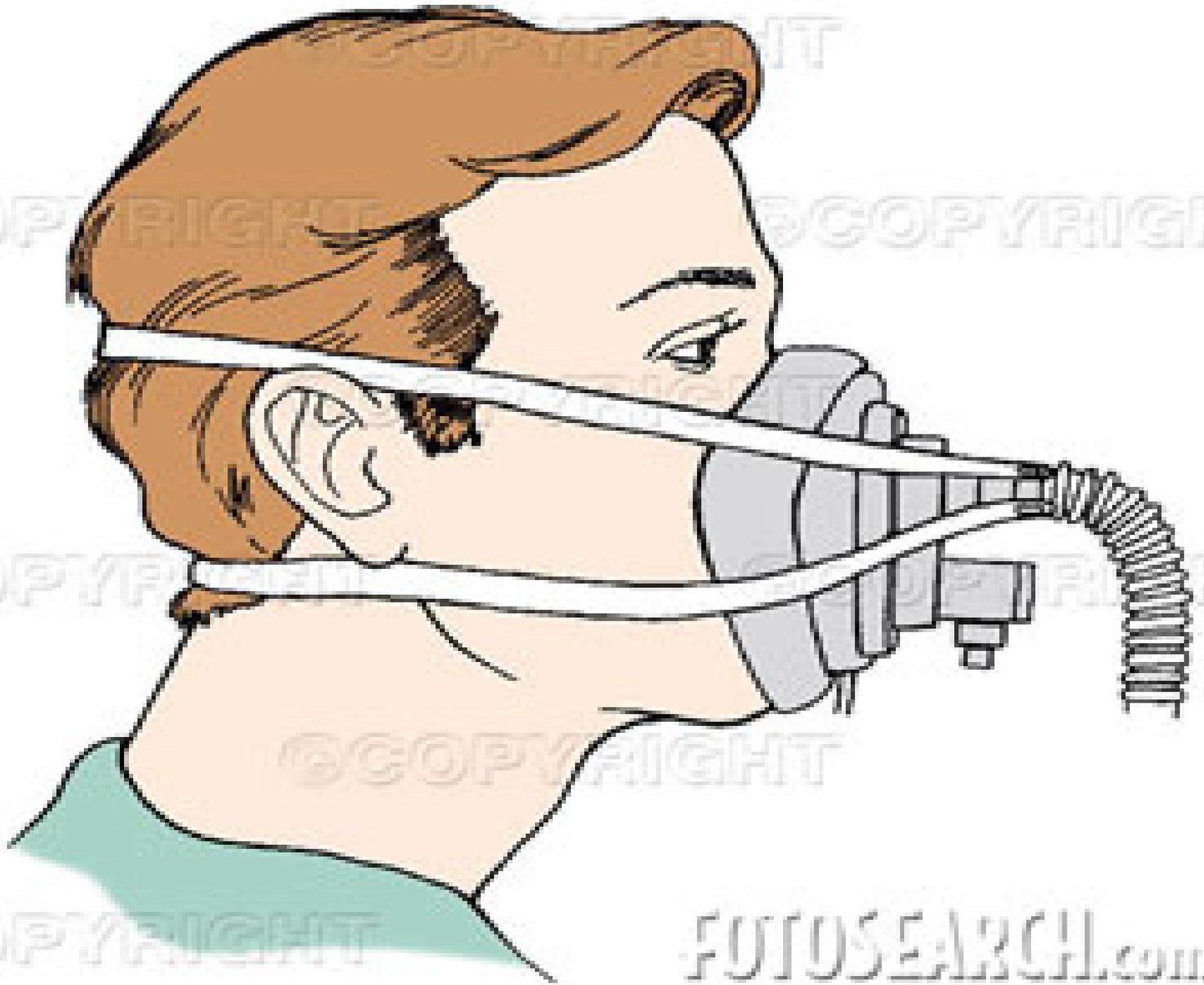
- **Face Tent 8-12L/min**

- **Advantages**

- Comfortable fit – O2 nose and mouth.
 - **Used in patients with facial trauma and burns.**
 - Facilitates humidification.

- **Disadvantages**

- Interferes with eating.
 - Amount of O2 actually received may be inconsistent with what is prescribed /because of environmental losses.



Equipment For O2 Administration

- **Artificial Airways**

- Opening must be created or a direct line to lungs.

- **Endotracheal** – into trachea. “Intubation”

- **Oral pharyngeal** - hold tongue forward.

- **Nasopharyngeal** – inserted through nose.

- **Tracheotomy** – into throat – surgically between the first and second cartilage ring.

- **TECHNIQUE**

- Attach T – tube to humidified O2 source.





Endotracheal Suctioning

- New trach painful.
- Apprehensive and frightened - airway obstructed.
- Needs support and confident nurse.
 - **Technique**
 - Hyperventilate through vent or ambu bag.
 - 3 to 5 breaths before each suction.
 - Never apply suction on inserting or leaving the tube to prevent tissue trauma and O2 loss.
 - Suction only when area of mucous and roll catheter when suctioning.
 - Wait 2 to 3 minutes between suction.
 - Encourage patient to cough.
 - After suction, may vent patient with ambu bag.

Endotracheal Suctioning

- Should a patient extubate himself during suctioning, the nurse should immediately insert the trach .