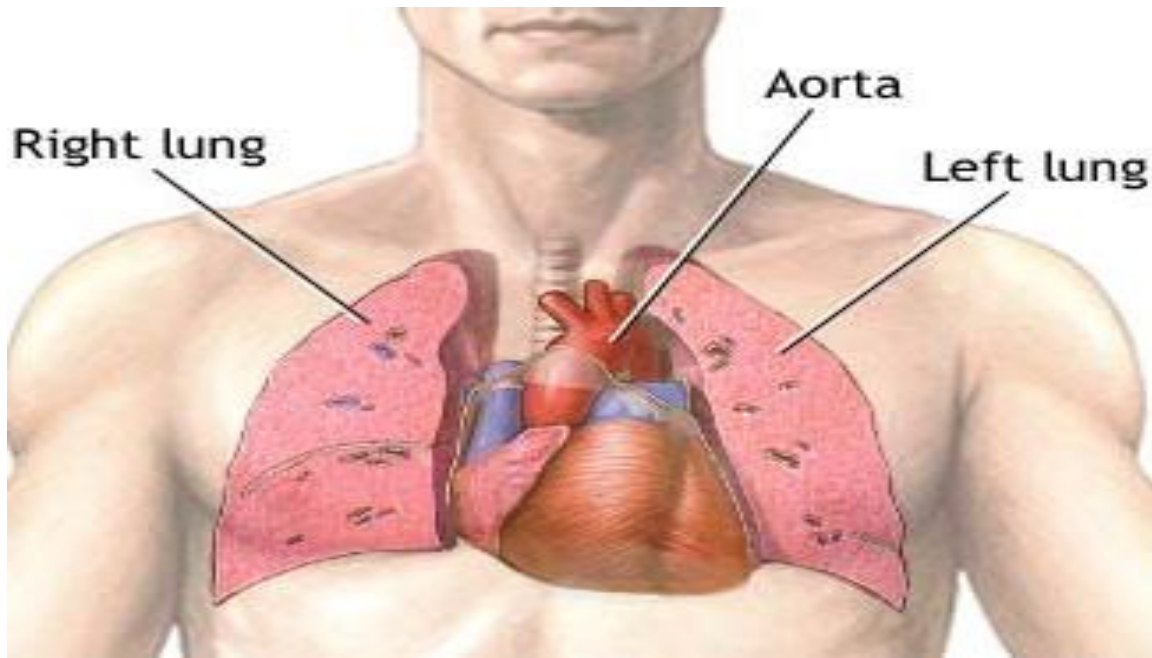
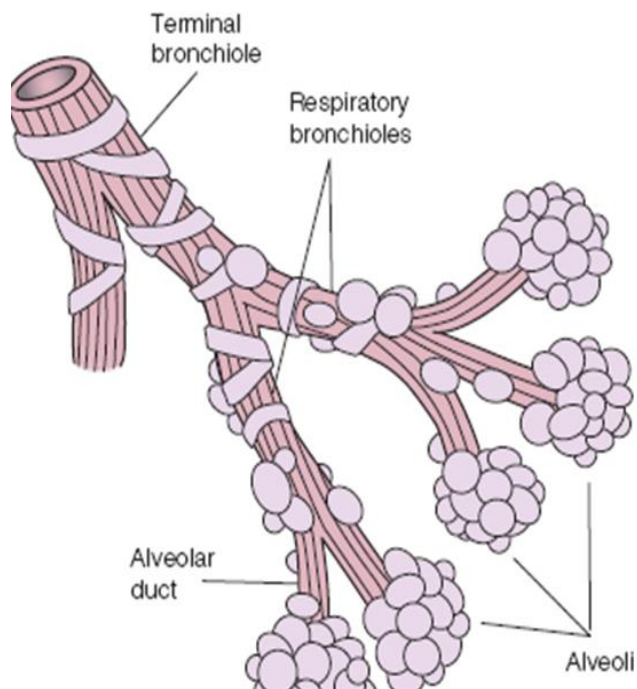
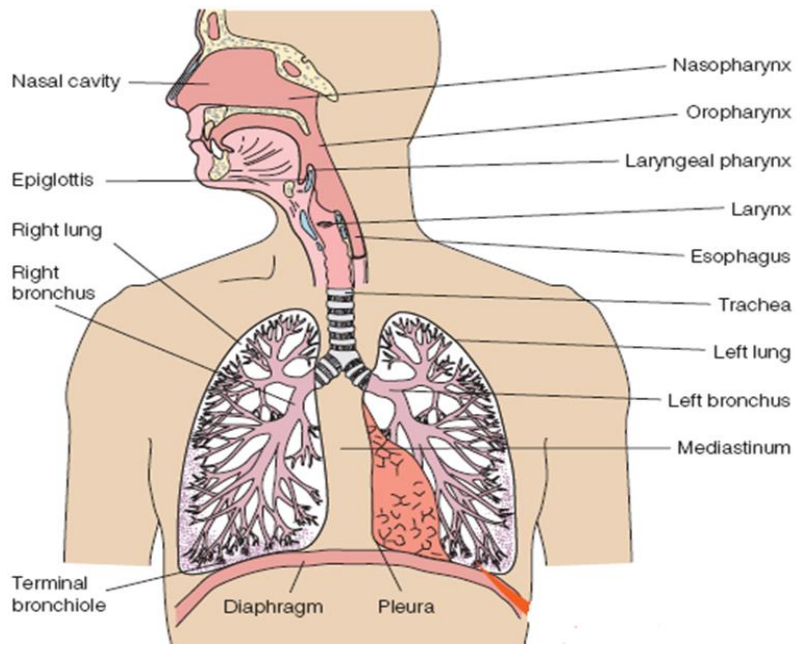


**MRS.MALAR  
LECTURER  
ICON**

## **Oxygenation**



**Respiratory System**



## Process of Breathing

- Inspiration  
Air flows into lungs
- Expiration  
Air flows out of lungs

## Normal Oxygenation Process

## **Inspiration**

- Diaphragm and intercostal muscles contract
- Thoracic cavity size increases
- Volume of lungs increases
- Intrapulmonary pressure decreases
- Air rushes into the lungs to equalize pressure

## **Expiration**

- Diaphragm and intercostal muscles relax
- Lung volume decreases
- Intrapulmonary pressure rises
- Air is expelled

## **Gas Exchange**

Occurs after the alveoli are ventilated

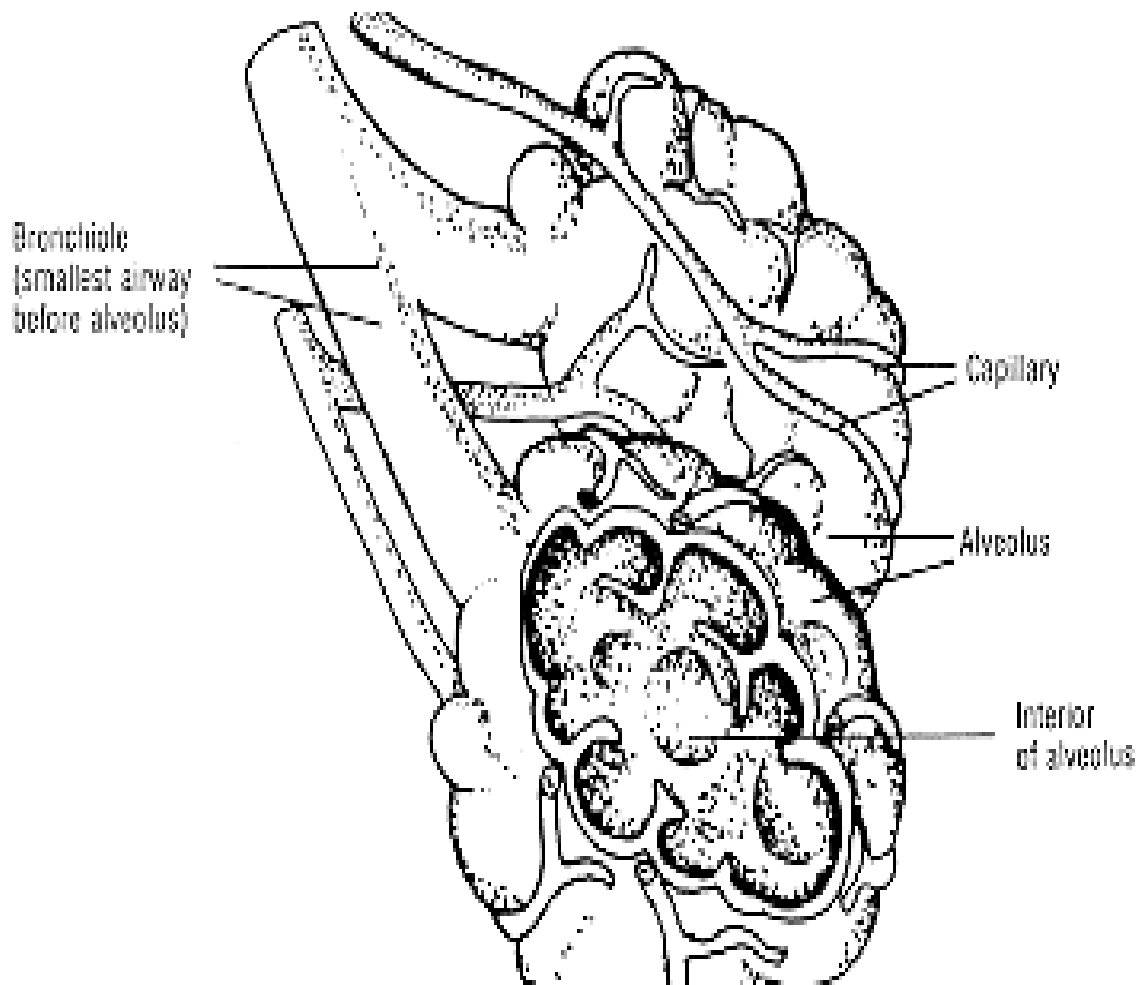
Pressure differences (**gradient**) on each side of the respiratory membranes affect diffusion

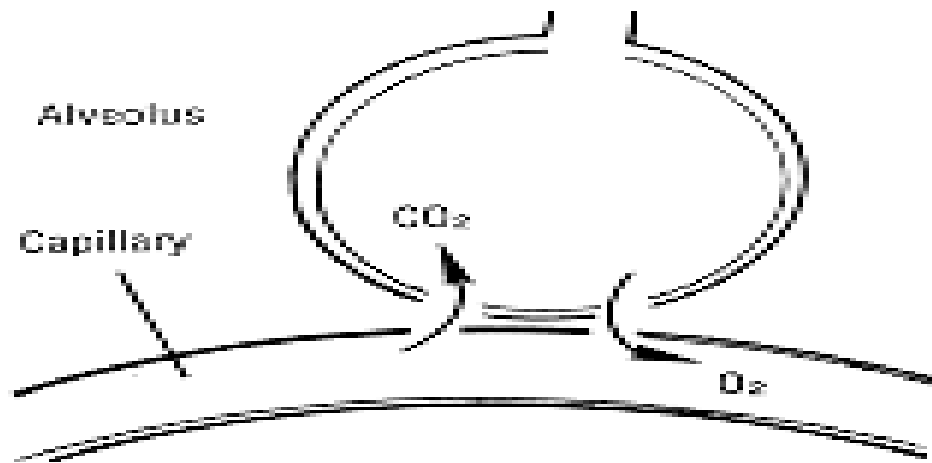
- Alveoli:
  - ❖ PO<sub>2</sub> 100mmHg
  - ❖ PCO<sub>2</sub> 40mmHg

- Venous blood:
  - ❖ PO<sub>2</sub> 60mmHg
  - ❖ PCO<sub>2</sub> 45mmHg
  - O<sub>2</sub> diffusion from alveoli → pulmonary blood vessels
  - CO<sub>2</sub> diffusion from pulmonary blood vessels → alveoli

## Adequate O<sub>2</sub> Balance

Maintenance of adequate O<sub>2</sub> balance *Gas Exchange*





## Oxygen Transport

- Transported from the lungs to the tissues
- 97% of  $\text{O}_2$  combines with RBC Hgb □ox  
hemoglobin carried to tissues
- Remaining  $\text{O}_2$  is dissolved and transported in plasma and cells ( $\text{PO}_2$ )

## Carbon Dioxide Transport

- Must be transported from tissues □ lungs
- Continually produced in the process of cell metabolism
- 65% – carried inside RBCs as bicarbonate ( $\text{HCO}_3^-$ )
- 30% – combines with Hgb □ car hemoglobin
- 5% – transported in plasma as carbonic acid ( $\text{H}_2\text{CO}_3$ )

## Common Manifestations of Impaired Respiratory Function

- ❖ Hypoxia
- ❖ Altered breathing patterns
- ❖ Obstructed or partially obstructed airway

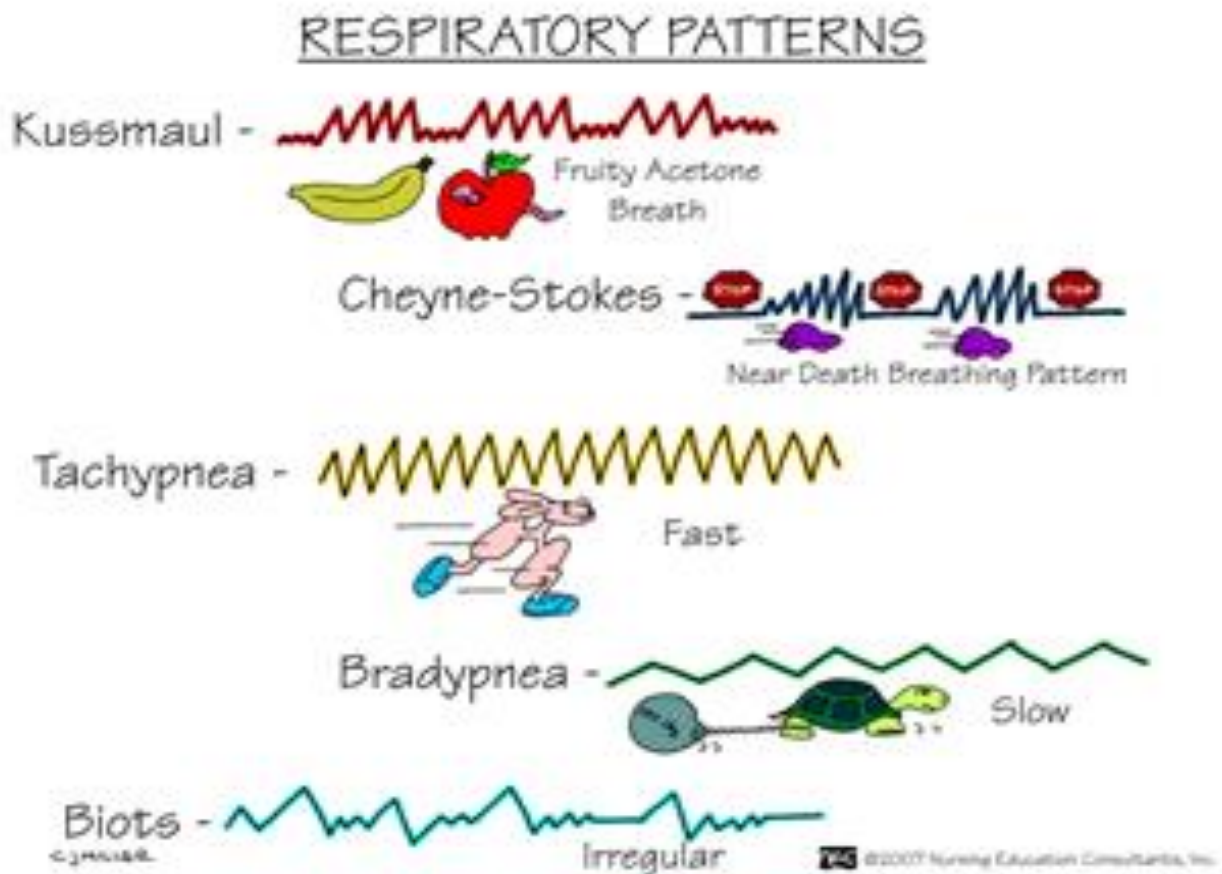
## Hypoxia

- ❖ Condition of insufficient oxygen anywhere in the body
- ❖ Rapid pulse
- ❖ Rapid, shallow respirations and dyspnea

- ❖ Increased restlessness or lightheadedness
- ❖ Flaring of nares
- ❖ Sub sternal or intercostal retractions
- ❖ Cyanosis

## Abnormal Respiratory Patterns

- ❖ Tachypnea (rapid rate)
- ❖ Bradypnea (abnormally slow rate)
- ❖ Apnea (cessation of breathing)
- ❖ Kussmaul's breathing
- ❖ Cheyne-Stokes respirations
- ❖ Biot's respirations



## Nursing Measures to Promote Respiratory Function

- ❖ Ensure a patent airway
- ❖ Positioning

- ❖ Encourage deep breathing, coughing
- ❖ Ensure adequate hydration

## **Nursing Responsibilities**

### Physical Assessment:

- ❖ Lung auscultation and breathing pattern
- ❖ Abdominal assessment
- ❖ Urine output
- ❖ Skin and mucous membranes
- ❖ Heart sounds
- ❖ Circulation
- ❖ Edema
- ❖ DVT

### Lung sounds:

- ❖ Diminished or absent
- ❖ Crackles course and fine
- ❖ Discontinuous course bubbling
- ❖ Fine crackling sound at the middle or end of inspiration
- ❖ Rhonchi
- ❖ A continuous sonorous sound
- ❖ Wheezes
- ❖ High pitch musical sounds
- ❖ Pleural friction rub
- ❖ Grating rubbing, sound

## **What is meaning of O<sub>2</sub> therapy:**

- ❖ Oxygen therapy is the administration of oxygen at a concentration of pressure greater than that found in the environmental atmosphere
- ❖ The air that we breathe contain approximately 21% oxygen
- ❖ The heart relies on oxygen to pump blood.

## **Classification of Oxygen Delivery Systems:**

### **Low flow systems**

- ❖ Contribute partially to inspired gas client breathes
- ❖ Ex: nasal cannula, simple mask, non-re breather mask, Partial rebreather mask

### **High flow systems**

- ❖ Deliver specific and constant percent of oxygen independent of client's breathing
- ❖ Ex: Venturi mask, track collar, T-piece

## **INDICATIONS**

- ❖ Principally Hypoxemia
- ❖ Poor ventilator effort – post operative
- ❖ Sedation
- ❖ Confusion
- ❖ Poor oxygen delivery- shock
- ❖ Severe anemia
- ❖ Heart failure
- ❖ Severe trauma
- ❖ Acute illness
- ❖ Poisoning

## **Methods of oxygen administration**

### **Nasal cannula/catheter method:**





**Definition:**

Method by which oxygen is supplemented at higher percentage than, what is available in atmosphere.

**Purpose:**

- ❖ To relieve dyspnea
- ❖ To reduce or prevent hypoxemia and hypoxia.
- ❖ To alleviate anxiety associated with struggle to breathe.

**Source of oxygen:**

Therapeutic oxygen is available from two sources.

- ❖ Piped oxygen (central supply)
- ❖ Oxygen cylinders

**Equipment:**

- ❖ Oxygen connecting tube
- ❖ Flow meter or regulator
- ❖ Humidifier filled with water distilled/ demineralized water
- ❖ No smoking sign board
- ❖ Oxygen source
- ❖ Tray with nasal catheter of appropriate size
- ❖ Water soluble lubricating jelly
- ❖ Gauze pieces
- ❖ Adhesive tape and scissors

**General instruction**

- ❖ Nasal catheter to be changed every 6-8 hours.
- ❖ Catheter to be inserted alternatively in each nostril
- ❖ Humidifier jar to be kept filled at all times.
- ❖ Patient nostril to be assessed for skin breakdown, 6-8 hours
- ❖ Relief of symptoms associated with hypoxia to be assessed periodically
- ❖ Pulse and respiration to be monitored and recorded in nurse's record.

## Procedure:

- Check doctors order
- Assemble the equipment
- Attach flow meter to wall outlet or to oxygen cylinder
- Attach humidifier to flow meter
- Attach the connecting tubing to humidifier and catheter
- Test flow setting flow meter at 2-3l/mt and insert tip of catheter into the glass of water
- Measure length of catheter by placing for insertion one end of catheter from tip of patient nose, horizontally to ear lobe and mark accordingly
- Lubricate tip of catheter with water soluble jelly
- Hyper extend head of the patient .clean nostril with saline swab. Introduce nasal catheter slowly into nostril to marked distance. Cannula issued, placed tip into patient nose
- Ensure catheter is positioned at entrance of oropharynx by
  - Having patient open mouth
  - Depressing tongue with visualizing catheter
- Initiateflow of oxygen about 2-4l/mt and then adjust to prescribed rate
- Secure nasal catheter to patients face, either to side of nose and cheek or from tip of nose and fore head
- Maintain sufficient slack in oxygen tubing. Secure connecting tube to bed
- Record time method, flow rate and patients comfort with oxygen use.

<i>Method</i>	<i>Amount Delivered F<sub>I</sub>O<sub>2</sub> (Fraction Inspired Oxygen)</i>	<i>Priority Nursing Interventions</i>	<i>Advantages</i>	<i>Disadvantages</i>
<b>nasal Cannula</b>	Low flow 24-44 % 1 L\min=24% 2 L\min=28% 3 L\min=32% 4 L\min=36% 5 L\min=40% 6 L\min=44%	<ul style="list-style-type: none"> <li>➤ Check frequently that both prongs are in clients nares</li> <li>➤ Never deliver more than 2-3 L\min to client with chronic lung disease</li> </ul>	<ul style="list-style-type: none"> <li>➤ Client able to talk and eat with oxygen in place</li> <li>➤ Easily used in home setting</li> </ul>	<ul style="list-style-type: none"> <li>➤ may cause irritation to the nasal and pharyngeal mucosa</li> <li>➤ if oxygen flow rates are above 6 liters/minute Variable FIO<sub>2</sub></li> </ul>

## Face mask

Prepared by  
R.SUNDARI, BSC (Nursing)

- ❖ The simple Oxygen mask
- ❖ The partial rebreather mask:
- ❖ The non rebreather mask:
- ❖ The venturi mask:



### The simple Oxygen mask

- ❖ It delivers 35% to 60% oxygen.
- ❖ A flow rate of 6 to 10 liters per minute.
- ❖ Often it is used when an increased delivery of oxygen is needed for short periods
- ❖ (i.e., less than 12 hours).

### Equipment:

- ❖ Oxygen source
- ❖ Flow meter
- ❖ Face mask
- ❖ Large bore tubing
- ❖ Humidifier
- ❖ No smoking sign board

### Procedure:

- ❖ Ensure no source of fire near patient
- ❖ Show mask to mask to patient and explain the procedure

- ❖ Set desired concentration of oxygen and adjust flow rates as prescribed.
- ❖ Place mask on patient, adjust head strap and ensure a tight seal
- ❖ Initiate oxygen flow
- ❖ Stay with patients comfort and functioning of equipment frequently
- ❖ Record patient's response to oxygen toxicity.

Method	Amount Delivered F <sub>I</sub> O <sub>2</sub> (Fraction Inspired Oxygen)	Priority Nursing Interventions	Advantages	Disadvantages
Simple mask	<ul style="list-style-type: none"> <li>✓ Low Flow</li> <li>✓ 6-10 L/min</li> <li>✓ 35%-60%</li> </ul>	<ul style="list-style-type: none"> <li>✓ Monitor client frequently to check placement of the mask.</li> <li>✓ Support client if claustrophobia is concern</li> <li>✓ Secure physician's order to replace mask with nasal cannula during meal time</li> </ul>	<ul style="list-style-type: none"> <li>✓ Can provide increased delivery of oxygen for short period of time</li> </ul>	<ul style="list-style-type: none"> <li>✓ Tight seal required to deliver higher concentration</li> <li>✓ Difficult to keep mask in position over nose and mouth</li> <li>✓ Potential for skin breakdown (pressure, moisture)</li> <li>✓ Wasting</li> <li>✓ Uncomfortable for pt while eating or talking</li> <li>✓ Expensive with nasal tube</li> </ul>

DEVICE	FLOW RATE L/min	% OXYGEN
Nasal cannula	1-6	25-45
Simple face mask	6-8	40-60
Partial Rebreather	8-11	50-75
Non Rebreather	10-15	90 -100
Venturi Mask	4-8	24-40



## Side effect & complication of oxygen therapy

- Oxygen toxicity
- Retrolental fibroplasia
- Absorption atelectasis

## Oxygen toxicity:

- ❖ It is a condition in which ventilator failure
- ❖ occurs due to inspiration of a high
- ❖ Concentration of oxygen for prolonged period of time.
- ❖ Oxygen concentration greater than 50% over 24 to 48 hours can cause pathological changes in the lungs

## Signs and symptoms of oxygen toxicity:

- Non-productive cough.
- Nausea and vomiting.
- Sub sternal chest pain.
- Fatigue.
- Nasal stuffiness.
- Headache.
- Sore throat.
- Hypoventilation.
- Nasal congestion.
- Dyspnea.



## **Oxygen tent**

**Process of administering oxygen by means**



## Venture mask

- ❖ It is high flow concentration of oxygen.
- ❖ Oxygen from 40 - 50%
- ❖ At liters flow of 4 to 15 L/min.



## Equipment:

- ❖ Oxygen source
- ❖ Flow meter
- ❖ Venturi mask for correct concentration
- ❖ Colour code adapter 24%,28%,31%,35%40%,60%
- ❖ Humidifier
- ❖



