Indication of ICU admission and mechanical ventilation

- Many factors affect the decision to begin mechanical ventilation.because no mode of mechanical ventilation can cure a disease process, the patient should have a correctable underlying problem that can be resolved with aid of ventilatory support.

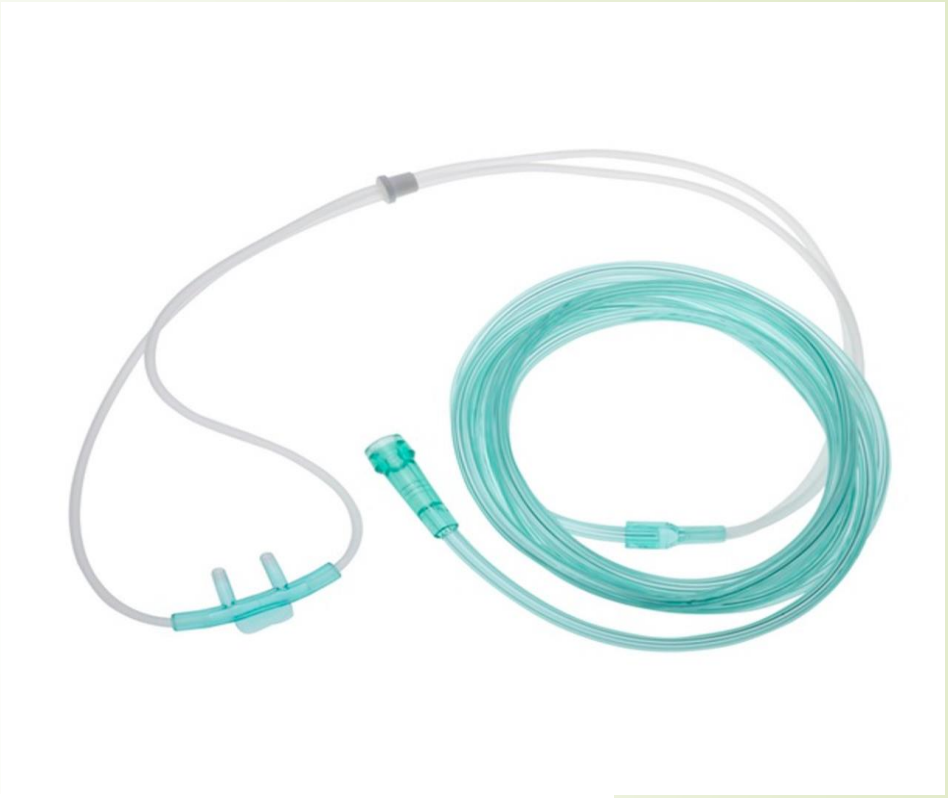
- The intervention should not be started without thoughtful consideration because intubation and mechanical ventilation are not with out potentially harmful effect

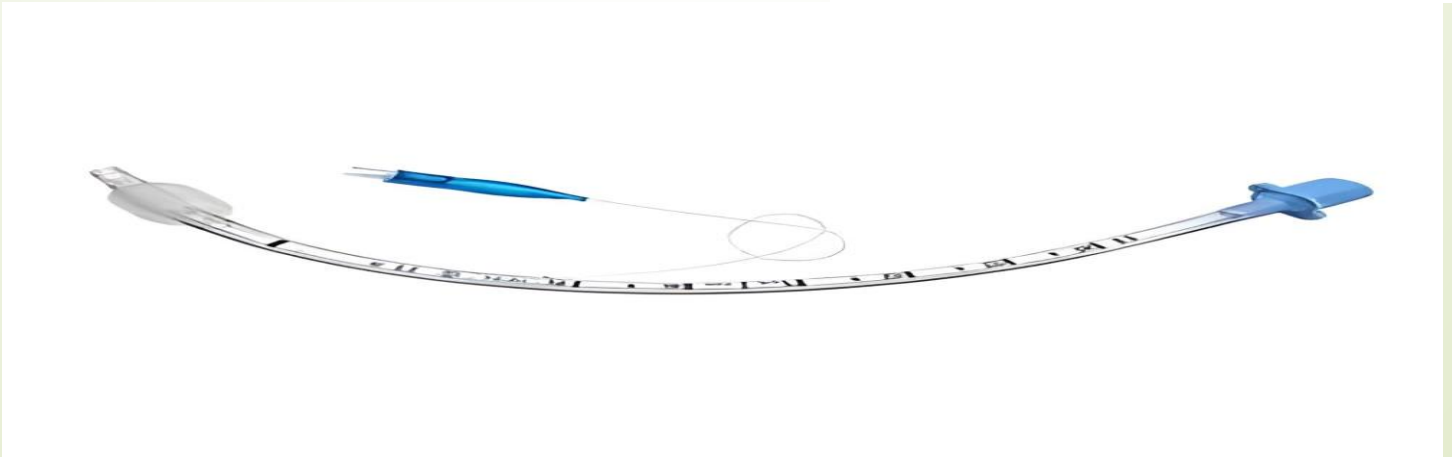
Mechanical ventilation: medical term mean help in move air into and out of the lung in order to delivery of oxygen (O2) and remove of carbon dioxide (CO2).

Terms of mechanical ventilation:

1-non invasive :used in people who are conscious and have stable vital signs …. Ex; face mask and nasal cannula.

2-invasive: involve use of endotracheal tube or nasotracheal tube.





Types of mechanical ventilation:

1-negative pressure ventilation:air pulled into lung by the machine called iron lung that create a negative pressure(sub atmospheric pressure) around chest that cause air to go to lung. It used during polio epidemic

2-positive pressure ventilation: air pushed into the lungs through the airway. It used now a day to assisted spontaneous ventilation of patient or fully control ventilatin.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Terms:

Pao2: partial pressure of oxygen in the blood.

Normal range (75 to 100 mmhg)

Paco2: partial pressure of carbon dioxide of arterial blood which determine how well co2 is able to move out of the body.(35 to 45 mmhg).

FiO2: fraction of oxygen in the inhaled gas.

Natural air contain 21% oxygen 0.21

When give oxygen rich air to patient fio2 reach to 100% as seen in mechanically ventilated patient.

PaO2 / FiO2 ratio : is a compartion between oxygen in blood and oxygen in breathing. It help determine the degree of respiratory problem and gow lung transfer oxygen to blood. Normal range 300 to 500 mmhg

If ratio equel or less than 200 mmhg mean respiratory distress.

Blood Gas Values			
↓ pH	7.250		[7.350 - 7.450]
pCO_2	35.3	mmHg	[35.0 - 45.0]
pO_2	77.7	mmHg	[75.0 - 105]
Acid Base Status			
↓ $cHCO_3^-(P)_c$	14.9	mmol/L	[22.0 - 28.0]
↕ $cBase(B)_c$	-11.1	mmol/L	[-3.0 - 3.0]
↕ $cBase(Ecf)_c$	-10.9	mmol/L	[-3.0 - 3.0]
Electrolyte Values			
cK^+	4.6	mmol/L	[3.7 - 4.7]
cNa^+	140	mmol/L	[136 - 146]
↓ cCa^{2+}	1.11	mmol/L	[1.15 - 1.30]
$cCa^{2+}(7.4)_c$	1.03	mmol/L	
cCl^-	107	mmol/L	[101 - 110]
Metabolite Values			
↑ cGlu	6.5	mmol/L	[3.5 - 5.4]
↕ cLac	11.5	mmol/L	[0.0 - 2.0]
Oxygen Status			
ctHb	122	g/L	[120 - 150]
↓ sO_2	92.4	%	[95.0 - 99.0]
$p50_c$	32.86	mmHg	
$pO_2(a/A)_e$	36.7	%	
FMetHb	0.9	%	[0.4 - 1.2]
FCOHb	0.3	%	[0.3 - 1.8]
$p50(st)_c$	28.88	mmHg	
$FShunt_e$	23.4	%	
FO_2Hb	91.3	%	[90.0 - 98.0]
Hct_c	0.375		

Tidal volume (VT) : amount of air that move in or out of the lung with each breath. It is about 500 ml in adult (6-8 ml /kg)

Respiratory rate (RR): number of breaths you take per minute .

at rest adult RR 12-18 breath per minute.

Hypoxia: low level of oxygen in the body tissue.

Hypercabnia: excess of carbon dioxide in the blood

Hypoxia and hypercabina …..signs of respiratory failure….need mechanical ventilation.

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Who need mechanical ventilation???

Respiratory failure …(patient hypoxia or /and hypercapnia)

it is the most common cause of icu admission and

it due to respiratory or non respiratory cause

Prolonged post operative recovery after major surgery

Altered conscious level

In ability to protect the airway …ex: burn or drug over dose

Following cardiac arrest

Aim of mechanical ventilation

Improve gas exchange (maintain normal paO2 and pa co2)

Reduce work of breathing (maintain normal respiratory rate)

Indicators of need for mechanical ventilation:

1- arterial oxygen tension less than 50 mmhg

2-arterial co2 tension more than 50 mmhg

3-paO2 /fiO2 ratio less than 300 mmhg

4-respiratory rate more than 35 breath per minutes

Complication of mechanical ventilation:

1- airway complication:

tracheal stenosis

infection (ventilator associated pneumonia)

retension of secretion

2-mechanical complication:

Barotruma (lung injury) :mechanical ventilation cause repture to distal air way and alveoli so air leak to pleural and lead to pneumothorax.

2- alarm turned off

3-failure of alarm or ventilator

4-in adequate nebulization or humidification

5-hypoventilation or hyperventilation

6-over heated inspired air

3-Physiological complication:

1-Hypotension

2-Gastric distension

3-Stress ulcer

4-Dyssychronus breathing pattern

4-Artificial air way complication:

Tube kink or obstructed or plugged

Cuff failure

Laryngeal odema

Bleeding from tracheostomy site

Essential component in mechanical ventilation:

- Patient
- Artificial airway…..endotracheal tube or supraglottic air way or tracheostomy
- Ventilator circuit
- Mechanical ventilator
- Power source
- O2 cylinder or central oxygen supply

Artificial air way

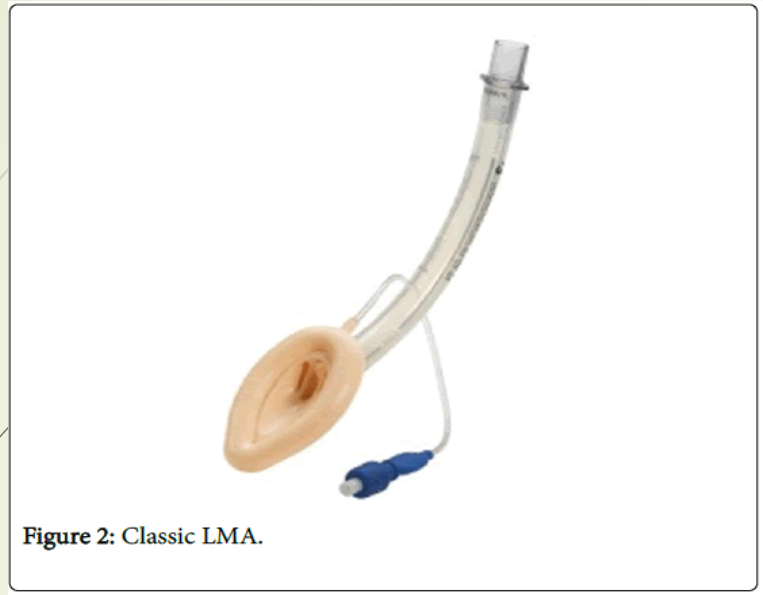
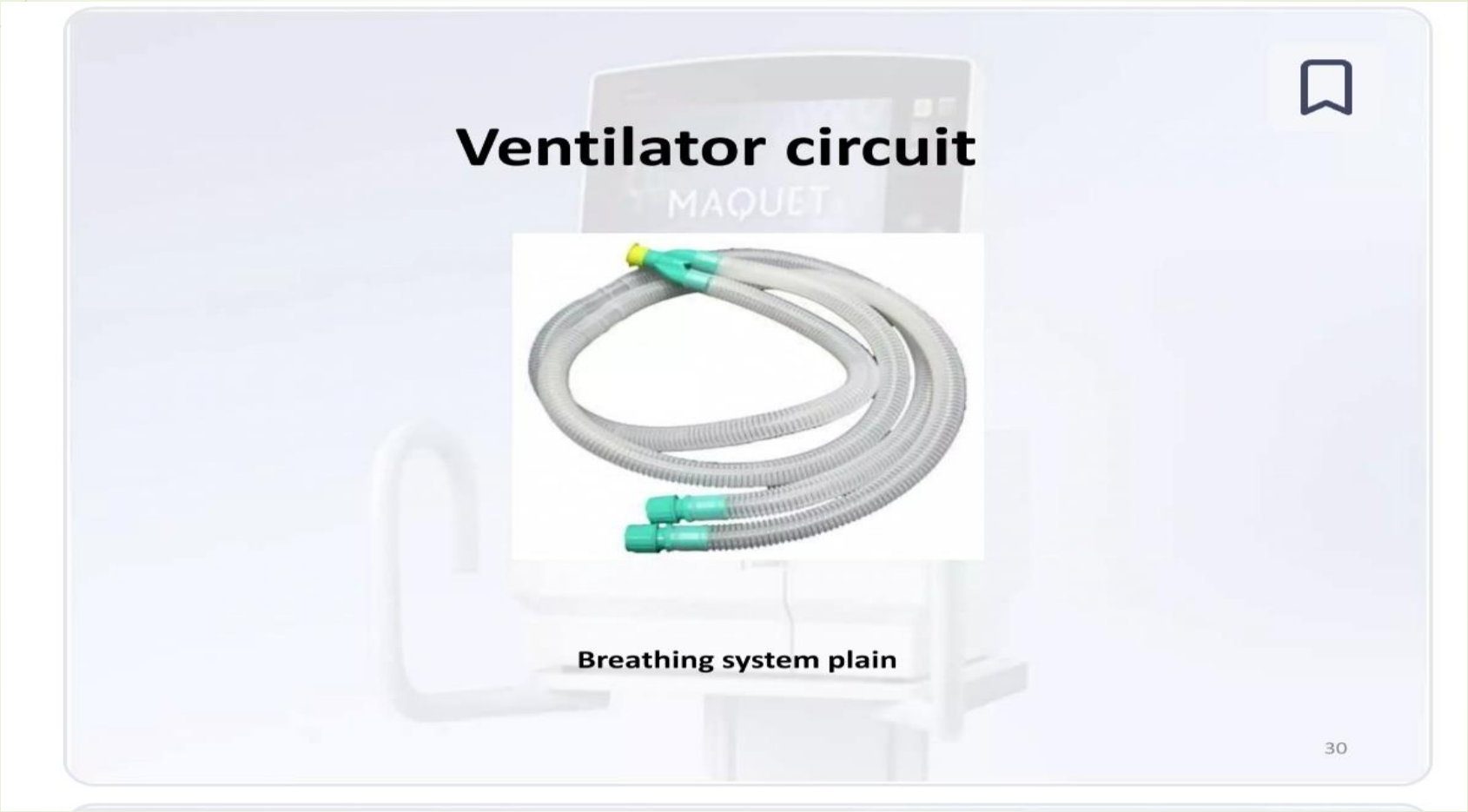


Figure 2: Classic LMA.

Ventilator circuit



Nursing care of patient on mechanical ventilation:

1- maintain airway patency and oxygenation

2-promot comfort

3-maintain fluid and electrolyte balance

4-maintain nutritional state

5-maintain urinary and bowel elimination

6-maintain eye ,mouth

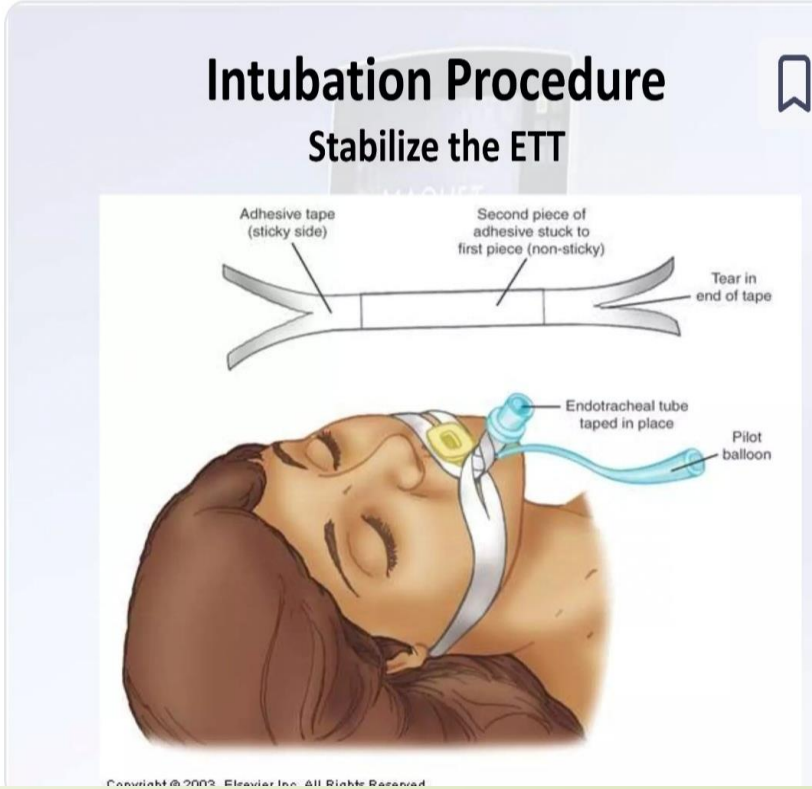
7-maintain mobility and musculoskeletal function

8-provide psychological support

9-respond to ventilator alar

10- prevent nosocomial infection

11- documentation



Thank you

any questions???