

Ventilators in ICU Anusha Swarna*

Department of Pharmacology, Nandha
College of Pharmacy, Erode, Tamilnadu,
India

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Extended Abstract

Ventilators help a patient breathe by assisting the lungs to inhale and exhale air. These machines are used to treat patients suffering from conditions including pneumonia, brain injury and stroke.

In more severe cases, when a patient suffers acute respiratory distress, an invasive form of respiratory support is required. This is provided through an artificial airway. A tube attached to a ventilator is inserted into the patient's mouth or nose (and down the windpipe), or via a surgically-made hole in the neck.

The principal function of a ventilator is to pump or blow oxygen-rich air into the lungs; this is referred to as "oxygenation". Ventilators also assist in the removal of carbon dioxide from the lungs, and this is referred to as "ventilation".

However, in situations where a gentle and controlled air exchange (oxygen in, CO₂ out) is required, mechanical ventilators are required. These look like a quintessential medical product.

Two key types:

1. Bag valve mask
 - Bag valve mask also known as Ambu Bag, operated manually by a person squeezing a self-inflating bladder.
 - Essential tools for ambulance crew and critical care units
 - Not intended for steady long term air supply is necessary
2. Modern Mechanical Ventilator
 - An automated version of BMV
 - It monitors
 - a. how long inhalation lasts
 - b. how much and how often air is received
 - c. Oxygen concentration
 - d. Pressure in patients lungs
 - e. Temperature and humidity of the air

A mechanical ventilator comprises a computerised box that sits on top of a mobile trolley. There is an array of screens, dials, data cables, power cords and gas tubes. Modern mechanical ventilators are highly complex and complicated pieces of kit. Their increased complexity in comparison with the Ambu Bag allows a superior level of care.

*Corresponding author:

Anusha Swarna

✉ anu.swarna03@gmail.com

Department of Pharmacology, Nandha College
of Pharmacy, Erode, Tamilnadu, India

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The extra features and control measures of mechanical ventilators allow adjustments such as:

- how long inhalation for a patient lasts
- how much air is received
- how often air is received
- the concentration of oxygen within the air (air is about 21% oxygen, but in some cases the percentage of oxygen is increased)
- how much pressure the patient's lungs are inflated to
- the temperature and humidity of the air.

However, instead of relying on manual activation like the Ambu Bag bladder, these designs use mechanical automation to press and release the bladder at desired intervals. Some basic controls are available, but the most significant advantage is their inherent simplicity.

Plan of care for the ventilated patient

Patient Goals:

1. Patient will have effective breathing pattern.
2. Patient will have adequate gas exchange.
3. Patient's nutritional status will be maintained to meet body needs.
4. Patient will not develop a pulmonary infection.
5. Patient will not develop problems related to immobility.
6. Patient and/or family will indicate understanding of the purpose for mechanical ventilation.