

# [Pneumothorax: mechanical ventilation and medicine net essay sample](https://assignbuster.com/pneumothorax-mechanical-ventilation-and-medicine-net-essay-sample/)

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Mechanical ventilation is the use of life-support to perform the work of breathing for patients who are unable to breathe on their own or are critically ill. The First Mechanical Ventilation machine was used in 1938 called the “ Iron Lung ” which used negative pressure. Positive Mechanical ventilators began to be used in anesthesia and intensive care during the 1950s. The development was confirmed by the need to treat polio patients and the increasing use of muscle relaxation, during anesthesia. Modern ventilators today are classified by the method of cycling from inspiratory phase to the expiatory phase.

Today we use positive ventilation over negative, negative is not as invasive but mimics normal breathing but is uncomfortable, today it is not commonly used. Positive-pressure ventilation means that pressure is applied at the patient’s lungs through an ETT or tracheotomy tube. The positive pressure causes the gas to flow into the lungs until the ventilator breath has ended. As the airway pressure drops back to zero, elastic recoil of the chest accomplishes passive exhalation by pushing the tidal volume out. Every patient is treated differently depending on the reason to intubate, until we can extubate we have to fix the underlying problem. Prolonged mechanical ventilation can lead to nosocomial pneumonia, cardiac morbidity, and death. However, extubating a patient too soon may result in having to reintubate which can result in the same illnesses as prolonged intubation. “ Respiratory therapists start testing for the opportunity to reduce support very soon after intubation and reduces support at every opportunity” (Cook 2000).

Most common mode of ventilation is AC-VC it provides a consistent breath-to-breath tidal volume, making the tidal volume and rate preset and guaranteed. The patient can attribute to the frequency and timing of the breaths. If the patient makes an inspiratory effort, the ventilator senses a decrease in the circuit pressure and delivers the preset tidal volume. This way the patient can determine a comfortable respiratory pattern and trigger additional breaths above the set rate. If the patient does not initiate a breath, the ventilator automatically delivers the preset rate and volume, ensuring minimum Ve. Assist-control is better than controlled ventilation because the patient can trigger the ventilator to deliver a breath and, adjust their Ve. In controlled ventilation, the patient receives only breaths initiated by the ventilator at the preset rate, making it difficult and uncomfortable to have spontaneous breaths. If a patient needs controlled ventilation they should be sedated. Vc is best used in patients with normal lungs.

Pressure control is increasing in popularity in the setting of acute lung injury, or patients with severe adult respiratory distress syndrome (ARDS). There is no evidence that pressure control is better than volume control. Nonetheless the ability to easily control inspiratory time, allows a more effective management of MAP. Pressure ventilation also shows better gas distribution, but you can achieve this in volume control by altering flow rates and inspiratory pause. When a patient is placed on pressure-ventilation, the clinician (RT) sets the rate, inspiratory time, positive end expiatory pressure (PEEP), and most importantly, the peak airway pressure limit. When utilizing pressure-control mode the patient can receive as much inspiratory flow as needed. By limiting the delivered peak airway pressure, the RT helps limiting the risk of barotraumas delivered to the lung.

Pressure support is a method of assisting spontaneous breathing in a ventilated patient. The patient controls all parts of the breath except the pressure limit. The patient triggers the ventilator, the ventilator delivers a flow up to a preset pressure limit depending on the desired minute volume, the patient continues the breath, and flow cycles off when a certain percentage of peak inspiratory flow has been reached. Tidal volumes may vary, just as they do in normal breathing. PS the patient must be breathing fully on their own. SIMV will deliver a set number of breaths, though the patient can still breathe at their own rate and VT on top of these preset breaths with a set PS. Both of these modes are used for weaning purposes to see if the patient is ready to be extubated.

A Common respiratory problem will see as RT’s is a pneumothorax.” A pneumothorax is a collection of free air in the chest outside the lung that causes the lung to collapse.” (Medicine Net 2012). The first recognized pneumothorax was in 1803, and years later Laennec himself described the full clinical picture of it in 1819. The pneumothorax was reintroduced by the Danish physician Hans Kjaergard in 1932, and In 1941, the surgeons Tyson and Crandall introduced pleural abrasion for the treatment of pneumothorax. Today we recognize it most commonly as spontaneous pneumothorax which is called a primary or secondary. A primary pneumothorax occurs in patients that have no pulmonary diseases. Most commonly seen in thin, young males with a smoking Hx. A secondary pneumothorax occurs in patients with an underlying medical disease, such as COPD, cystic fibrosis, lung cancer and Mar fan’s disease.

If air enters the pleura space either by a hole in the lung or the chest wall, the pressure in the pleura space will equal the pressure outside the body, and causing the to lung to collapses. Spontaneous pneumothorax is caused by a rupture of a cyst on the surface of the lung. Pneumothorax may also occur by a fractured rib, gun shot, and stabbing, surgical incision of the chest, sometimes even surgical or intubation error. “ If a lung continues to leak air into the chest cavity and resulting in compression of the chest structures, including vessels that return blood to the heart, is referred to as a tension pneumothorax and can be fatal if not treated immediately.” (Medicine Net 2012). Symptoms of a pneumothorax include CP that usually sudden and onset, sometimes leading to tightness of the chest and sharp burning sensation. Other symptoms include; Sob, coughing, tachycardia, Tachypenic, and weakness. The skin may become cyanotic from a decrease in blood oxygen levels.

In recent studies an new device has come to help treat pneumothorax. “ A Small-bore catheters and Heimlich valves have been successfully used in the treatment of pneumothoraces in several studies. The Thoracic Vent is a minimally invasive device for the treatment of pneumothorax . It consists of a polyurethane catheter connected to a plastic chamber containing a one-way valve, and positive pressure within the pleural space is indicated by a pressure-sensitive diaphragm (PSD) contained within the plastic chamber. As there is no need to connect the Thoracic Vent to an underwater seal device, immobilization and hospitalization can be avoided.”( Consultant Physician, Glan Clwyd Hospital, Wales, 2007). Basically it provides easier drainage and is compact.

To determine a Pneumothorax you would view a chest x-ray or hear no breath sounds over the collapsed lung. A large pneumothorax often requires aspiration of the free air by placing a chest tube to evacuate the air. “ Having one pneumothorax increases the risk of developing the condition again. The recurrence rate for both primary and secondary pneumothorax is about 40%; most recurrences occur within 1. 5 to two years.” (Medicine Net 2012). A simple pneumothorax often is treated with a chest tube as well. If the simple pneumothorax is small you can use inhalation techniques with 100% oxygen to cause spontaneous expansion of the collapsed lung, or a small catheter can be placed in the chest and the air removed via suctioning techniques. A small pneumothorax may resolve on its own within two weeks . After multiple collapsed lungs or persistent collapse, surgical adhesion of the lung to the chest wall may be necessary. If patient is showing signs of respiratory distress with tachycardia, Tachypenic, hypotension and hypoxia they may need to be intubated until the lungs have repaired.

Pneumothorax is not a sure indication for intubation, but if a patient is having an increase WOB and ABG shows deterioration then the physician may request intubation with a PC mode. Patients with a pneumothorax have trauma to the chest wall and are unable to expand correctly so a chest tube might be in place keeping the lung open. With a pneumothorax you would want high pressures and patients own limitation of volume to rest the ventilator muscles, avoid further dynamic hyperinflation, and avoid over inflation and acute alkalemia. To give a patient fixed volume could cause barotraumas or over distention of the damaged lung causing the lung to become weaker, thus increasing the risk for a future pneumothorax. You need Vts of 5-7 mL/kg and a rapid inspiratory flow 80–100 L/min to maximize expiratory time and avoid air trapping. “ Current best evidence indicates that a “ lung-protective” ventilation strategy that keeps VT to a maximum of 6 mL/kg predicted body weight and avoids end-inspiratory plateau (static) pressures above 30 cm H2O minimizes ventilator-induced lung injury and reduces mortality.” (Copyright © 2008 University of Washington.)

In conclusion most pneumothorax patients are able to heal themselves, though others may need more interventions such as chest tubes or drains may be placed. It is common for patients who have had a pneumothorax to have another occurrence. It is not as common for someone to be intubated for a pneumothorax unless there in severe distress. If so most pulmonologist stated they would place the patient on pressure control to insure that they don’t over inflate with to high of a tidal volume. If left untreated a pneumothorax can be life threatening and cause death, if you show any signs and symptoms don’t ignore them go see a doctor. This paper has helped me have a better understanding of what a pneumothorax is and how its treated, and that it happens more often after you have already had one. I have not yet treated a patient with a pneumothorax but have treated a patient with a chest tube. I now know what to expect when treating these patients. There is no way to prevent a collapsed lung, but you can decrease your risk by not smoking!

References

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