



### What are these?

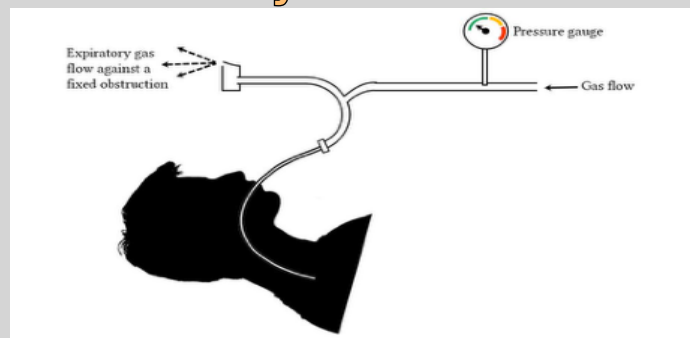
Non-adjustable Positive End Expiratory Pressure (PEEP) Valves

### What are they used for?

This valve, when placed in a non-invasive circuit, allows generation of PEEP (Continuous Positive Airways Pressure-CPAP- is a mode of ventilation which employs PEEP)

PEEP increases the mean airways pressure which does several things to improve oxygenation in the patient with hypoxic respiratory failure. (1) It prevents collapse of alveoli by splinting them open at the end of expiration (2) This in turn prevents atelecto-trauma (a form of Ventilator Induced Lung Injury) and may help to reduce inflammation in the lungs associated with ventilation (3) the increase in number of recruited alveolar units increases the functional residual capacity which can act as a reservoir of oxygen (4) more splinted open alveoli improves V/Q matching and increases the overall lung compliance (5) and reduce work of breathing.

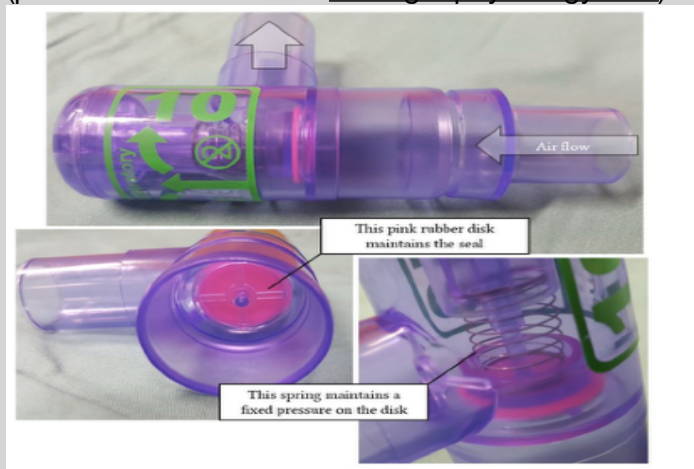
### How do they work?



In order for pressure to be generated in the system, there has to be flow and resistance. The valve

contains a spring that pushes against a plastic diaphragm. When applied to the expiratory limb of the circuit, it acts as a resistor and generates PEEP against expiratory gas flow. These valves are numbered to show the amount of PEEP they generate under standard conditions (2.5-20 cmH<sub>2</sub>O). Each valve cannot be adjusted but different valves may be swapped in as required.

(pictures borrowed from [derangedphysiology.com](http://derangedphysiology.com))



### What are the hazards of use?

The valves are designed to only allow insertion in the circuit at the correct point (on the expiratory limb of the circuit).

The PEEP actually generated depend on gas flow rate as well as the integral structure of the valve. At lower flows, the valves generally generate higher PEEP but there are so many variables at play that it is generally better to try out a valve to see what PEEP is measured by the machine. It is safe to say that the higher numbered valves will generate a higher PEEP but the exact amount will need to be checked by trial and error.

The effects of PEEP itself can be deleterious:

- (1) Increased risk of barotrauma- pneumothorax and anecdotally, pneumomediastinum in C-19 patients
- (2) PEEP raises intrathoracic pressure, reducing venous return to the heart and thereby cardiac output- this can have positive effects (e.g. in cardiogenic pulmonary oedema) or cause unwelcome cardiovascular instability- ensure you optimise volume status
- (3) Raised intrathoracic pressure is transmitted to the pulmonary arteries. This causes increased afterload on the right ventricle and can cause a spiral of doom that ultimately leads to profound cardiovascular instability in certain conditions (e.g. massive PE).
- (4) High PEEP with base of skull fracture can cause pneumocranium
- (5) High PEEP can also cause anastomotic breakdown in the post-operative upper GI surgery patient.