



Clinical Practice Procedures: Respiratory/Positive end expiratory pressure

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Purpose	To ensure a consistent procedural approach for positive end expiratory pressure.
Scope	Applies to Queensland Ambulance Service (QAS) clinical staff.
Health care setting	Pre-hospital assessment and treatment.
Population	Applies to all ages unless stated otherwise.
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Positive end expiratory pressure

September, 2024

Positive end expiratory pressure (PEEP) is the alveolar pressure above atmospheric pressure that exists at the end of expiration.

There are two types of PEEP:^[1]

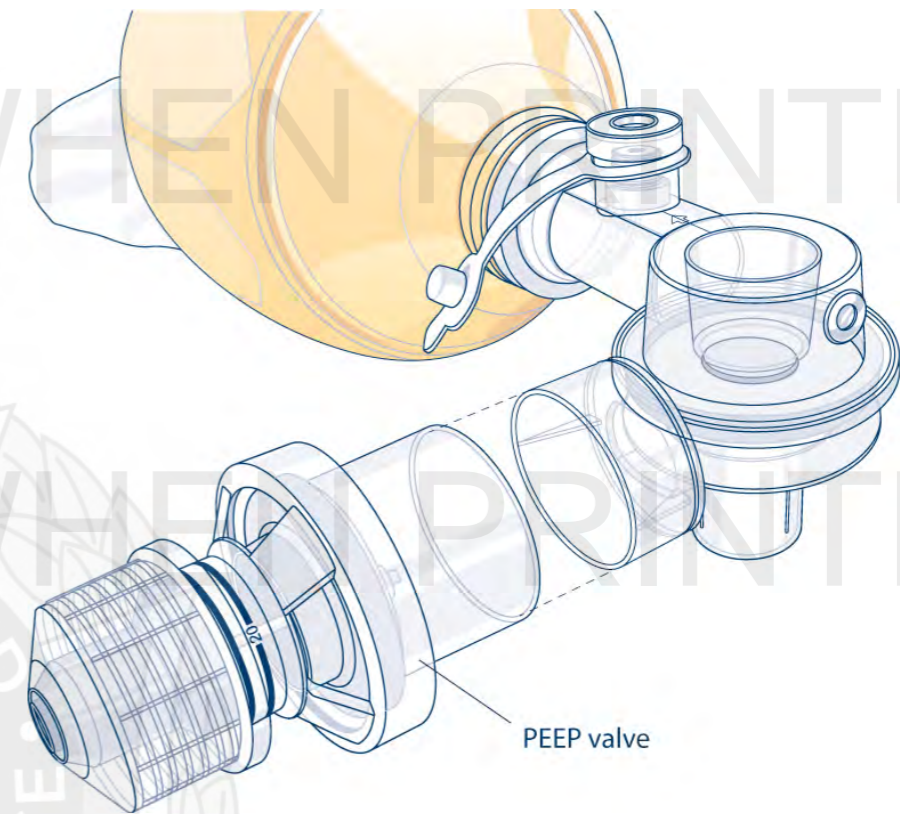
Intrinsic PEEP (or air trapping) is an undesirable effect that occurs secondary to incomplete expiration in conditions such as asthma or obstructive lung disease.

Extrinsic PEEP (provided by mechanical ventilation) is a therapeutic technique that can provide a number of potential benefits to patients with certain respiratory conditions.

The potential benefits of using extrinsic PEEP with intermittent positive pressure ventilation (IPPV) include:

- Improving oxygenation in patients with acute respiratory distress syndrome (ARDS) and other types of hypoxemic respiratory failure.^[1]
- Reducing gas trapping in patients who have an expiratory airflow limitation, by increasing lung compliance and therefore improving ventilation. Extrinsic PEEP should always be set to a low pressure to ensure it is lower than auto PEEP.^[1]
- Minimising potential lung injury by preventing repeated alveolar collapse and reinflation, which is shown to cause significant lung damage.^[2]
- Reducing ventilation/perfusion (V/Q) mismatch by increasing alveolar volume in the affected areas of the lungs.^[3]
- Enabling a decreased workload of breathing through assisting the muscles of respiration and through the mechanisms described in the points above.

The Mayo Healthcare disposable PEEP valve is designed for use with the Mayo Healthcare disposable manual resuscitator to provide PEEP between 5–20 cmH₂O.



Indications

- Pulmonary oedema (cardiogenic and non-cardiogenic)
- Severe and life-threatening asthma (with SpO₂ < 90%)
- COPD with severe respiratory distress (with SpO₂ < 90%)
- Profound hypoxaemia associated with:
 - Flail segment(s)
 - Pulmonary contusion(s)
 - Aspiration
- Newborn resuscitation

Contraindications



- **Absolute:**
 - Hypotension (SBP < 90 mmHg)
- **Relative:**
 - Pneumothorax
 - Uni-lateral lung disease
 - Broncho-pleural fistula
 - Hypovolaemia

Complications

- Caution should be used in asthma and those with obstructive lung disease due to increased risk of air trapping and causing a pneumothorax. PEEP levels should be kept low (less than 5 cmH₂O) for this group of patients.^[1,4]
- Hypotension

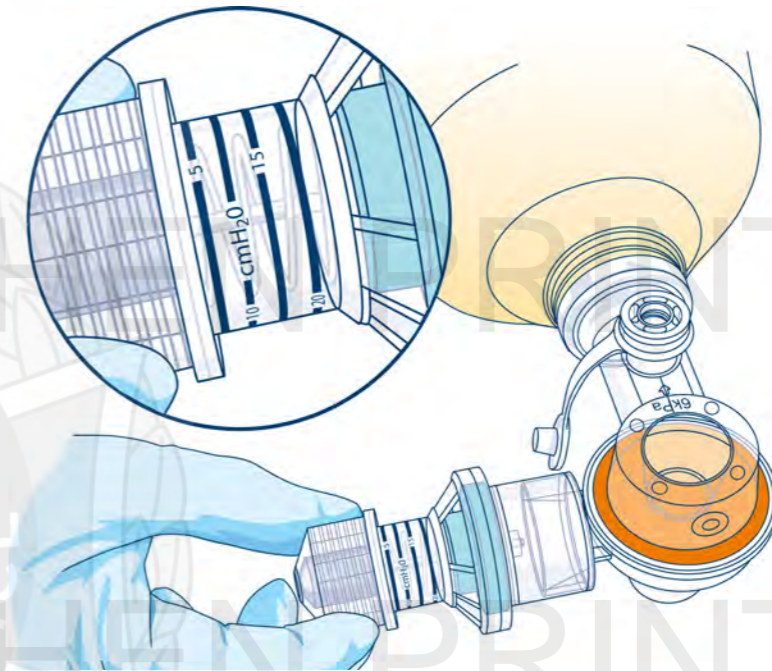
PROCEDURE

PEEP valve assembly and use

1. If PEEP is indicated, take the patient's blood pressure & confirm there are no contraindications.
2. Attach the PEEP valve to the assembled Bag Valve Mask (BVM) expiratory flow diverter.
3. Adjust the PEEP valve to 5 cmH₂O.
4. Check the patient's EtCO₂ (if the patient has an advanced airway) and SpO₂ before commencing positive pressure ventilation (PPV).
5. Commence PPV with appropriate minute ventilation, ensuring neither tidal volume or ventilatory rate are too high.

6. Continually monitor the patient's:

- SpO₂: (this should remain higher than the original reading)
- Blood Pressure: (ensure the patient does not become hypotensive)
- EtCO₂: (If the patient has an advanced airway – aim to maintain level at 35–45 mmHg)
- Other vital signs: (to ensure IPPV with PEEP is having the desired effect)
- Continually assess the airway, BVM, O₂ flow, mask seal on the patient's face.



+ Additional information

- Do not increase PEEP above 5 cmH₂O in patients with asthma or obstructive lung disease.
- PEEP may be increased to 10 cmH₂O in acute pulmonary oedema if after 10 minutes oxygen saturations do not increase above 90%.^[3]
- The use of PEEP with an i-gel® may affect the accuracy of end tidal CO₂ (EtCO₂) readings, or cause the loss of the capnography waveform altogether, due to an increase in airway pressures.