Queensland Paediatric Emergency Care

Skill Sheets

Bag Valve Mask (BVM) Ventilation

Where respiratory effort is absent or inadequate, a self-inflating bag and mask (commonly known as a bag-valve mask (BVM)) may be used to manually ventilate the patient. Manual ventilation will only be effective with the correct use of equipment and using a correctly fitted mask, a correctly sized self-inflating bag and obtaining an air-tight seal within the circuit. Airway positioning is a key foundational component of BVM operation. For more information on airway positioning and manoeuvres refer to the <u>Airway Manoeuvres Skill Sheet</u>.

Key Points

- The self-inflating bag should be used connected to oxygen. At least 15L per minute of oxygen flow is required to ensure adequate oxygen volume in the reservoir. This will provide an FiO2 of 100%.
- In an emergency, the self-inflating bag can be used to ventilate without the need for oxygen flow. You will still be able to deliver breaths, however the FiO2 will be that which is in room air (21%).
- The BVM can be attached to either an Endotracheal Tube (ETT) or to a face mask.
- PEEP Valves can be attached to self-inflating bags and dialled to a specific positive end expiratory pressure (PEEP).





ALERT

It is important to remember that infants and children cannot adequately self-ventilate through the expiratory valve of a self inflating bag. Under no circumstances should the a self inflating bag and face mask be held on an infant or child's face without breaths being delivered.

Face-mask selection

Self-inflating bags can be used to ventilate both intubated and non-intubated children. For children who are not intubated, it is essential that the appropriately sized mask us attached. An incorrectly fitted mask will result in a poor seal, leading to ineffective ventilation due to air leakage.



Correct Fit A correctly fitted mask should sit on the bridge of the nose, cover the entire mouth and finish on the cleft of the chin. It should provide an air-tight seal.



Too Small A mask that is too small will not fully cover the nose and mouth.



Too Big A mask that is too big, may cover the eyes partially or extend over the chin. An ill-fitting mask will result in a poor seal, leading to ineffective ventilation.





Face-mask application techniques

There are two techniques that may be utilised to ensure an adequate seal. Ensure that there is no pressure placed on the trachea when creating a seal between the mask and the patient's skin. The two-handed technique is preferred where there is available staffing.

One-handed CE Grip - Single Operator



Using your dominant hand take your thumb and index finger and hold them in the shape of the letter 'C'.



Hold the mask on the face, with your fingers in the 'C' shape.



Use your other three fingers to make an 'E' shape, lifting the mandible. This helps to lift the tongue, thus assisting in opening the airway. Your little finger should be positioned at the angle of the jaw. Use your nondominant hand on the self-inflating bag to deliver breaths.

Two-handed CE Grip - Two Operators



Using both hands, take your thumb and index finger and hold them in the shape of the letter 'C'.



Use both your hands in the previously described C-E grip to apply the mask and obtain an air tight seal.



Once the mask is applied to the face, the second person may gently squeeze the self-inflating bag to deliver breaths. Observe the rise and fall of the chest for feedback on the adequacy of the seal.





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Self-inflating bag

Please refer to manufacturer instructions on recommendation in regards to the correct self-inflating bag size for the patient. They are usually available in infant, child and adult sizes, though weight ranges vary between brands. Size is often described by weight, which is the ideal body weight (IBW) of the child. The goal of using of the self-inflating bag is to deliver enough air by squeezing the bag to see chest rise and fall. Be mindful not to squeeze too hard, as this may cause barotrauma.

Self inflating bag - important elements

Expiratory Valve: Placing pressure on the self inflating bag, the valve opens to allow air to flow out of the circuit. When the pressure is released, the valve closes.



Expiratory Pressure (PEEP) valves provide consistent PEEP. The PEEP values can be adjusted on the PEEP valve. PEEP helps to increase gas exchange by splinting alveoli open. Different brands and sizes of PEEP valves are available.

PEEP Valve: Positive End

Reservoir Bag: Fills when connected to oxygen. The manual ventilation can be delivered without the use of the reservoir

bag.





Pressure Release Valve: This valve should remain OPEN, This prevents excess pressure in the lungs, thus reducing the risk of barotrauma.

Self-inflating bag:

Pressure applied to the self-inflating bag forces air out of the bag to deliver the inspiratory phase of a breath. Releasing the pressure on the self-inflating bag allows the lungs to deflate, thus completing the breath.



Oxygen inlet and tubing: Connect the oxygen tubing to the oxygen regulator, ensuring the flow is 15L/min.



ALERT

If the pressure relief valve is closed or occluded, the patient is at high risk of barotrauma. If higher pressures are required to provide adequate ventilation, ensure that the operator is a senior clinician.









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For further information:

Airway Support Skill Sheets <u>Airway manoeuvers</u> <u>Nasopharyngeal Airway insertion</u> O<u>ropharyngeal Airway insertion</u>

Videos
<u>Bag Valve Mask</u>
<u>
2 Person Self Inflating Bag Ventilation</u>
<u>
1 Person Self Inflating Bag Ventilation (CE Grip)</u>

References:

Queensland Ambulance Service. (2022, August). Respiratory/Bag valve mask - Mayo Health Care. Queensland Ambulance Service - Clinical Practice Procedures. https://www.ambulance.qld.gov.au/docs/clinical/cpp/CPP_BVM%20ventilation_Mayo.pdf

Scaini, L., & Ellis-Cohen, E. (2017). Airway Management - Module 9. In J. Hanischfeger & I. Chang (Eds.), Children's Health Queensland Transition to Paediatric Practice: Paediatric Intensive Care Program (3rd ed., pp. 5–10). State of Queensland (Queensland Health).

Townsville Hospital and Health Service. (2023, November). Paediatric Patient - Manual hand ventilation and artificial airway suctioning Queensland Health Intranet. https://qheps.health.qld.gov.au/__data/assets/pdf_file/0028/480565/cca-man-hand-ventilation-paed.pdf

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• Supporting consumer rights and informed decision making in partnership with healthcare practitioners including the right to decline intervention or ongoing management.

- Advising consumers of their choices in an environment that is culturally appropriate and which enables comfortable and confidential discussion. This includes the use of interpreter services where necessary.
- Ensuring informed consent is obtained prior to delivering care.
- Meeting all legislative requirements and professional standards.
- Applying standard precautions, and additional precautions as necessary, when delivering care.
- Documenting all care in accordance with mandatory and local requirements.

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