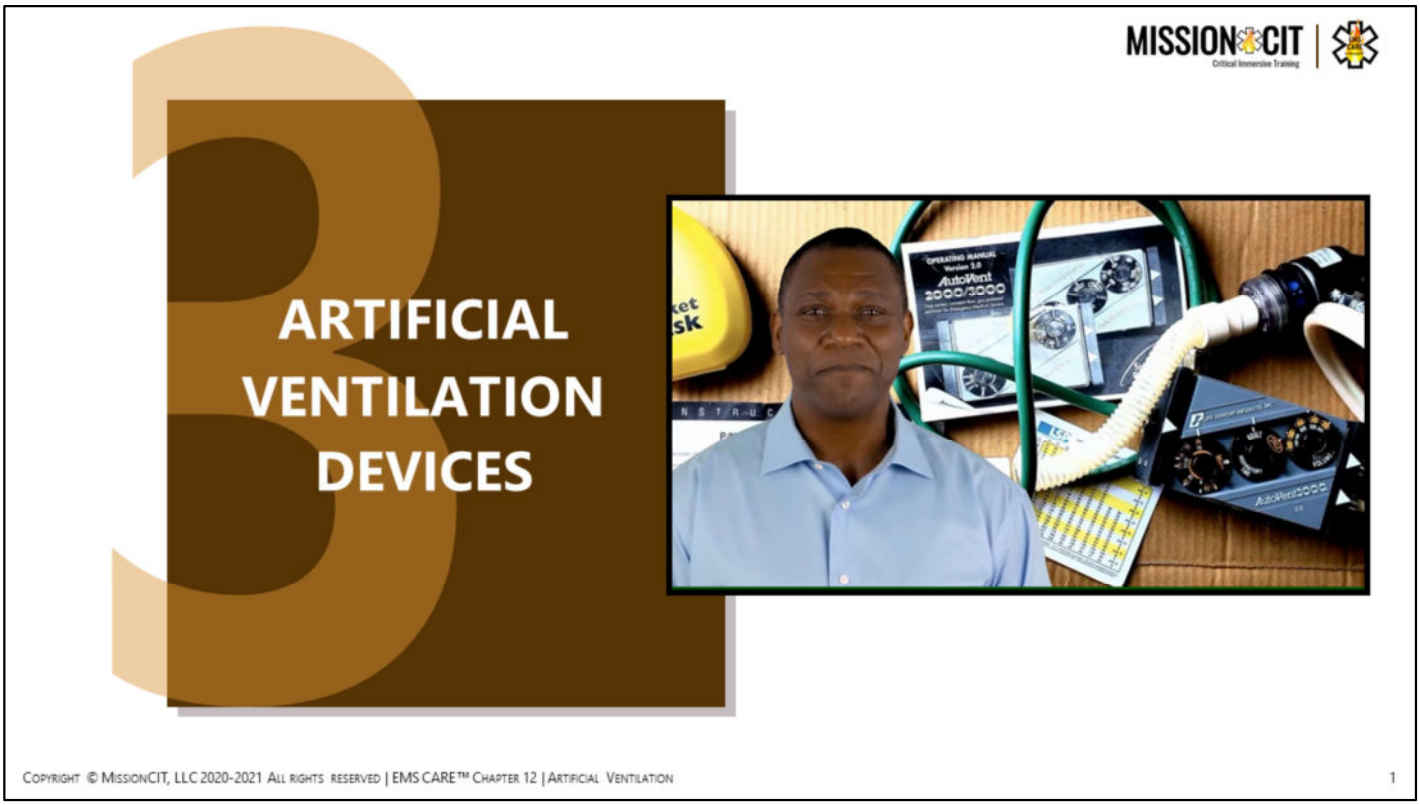
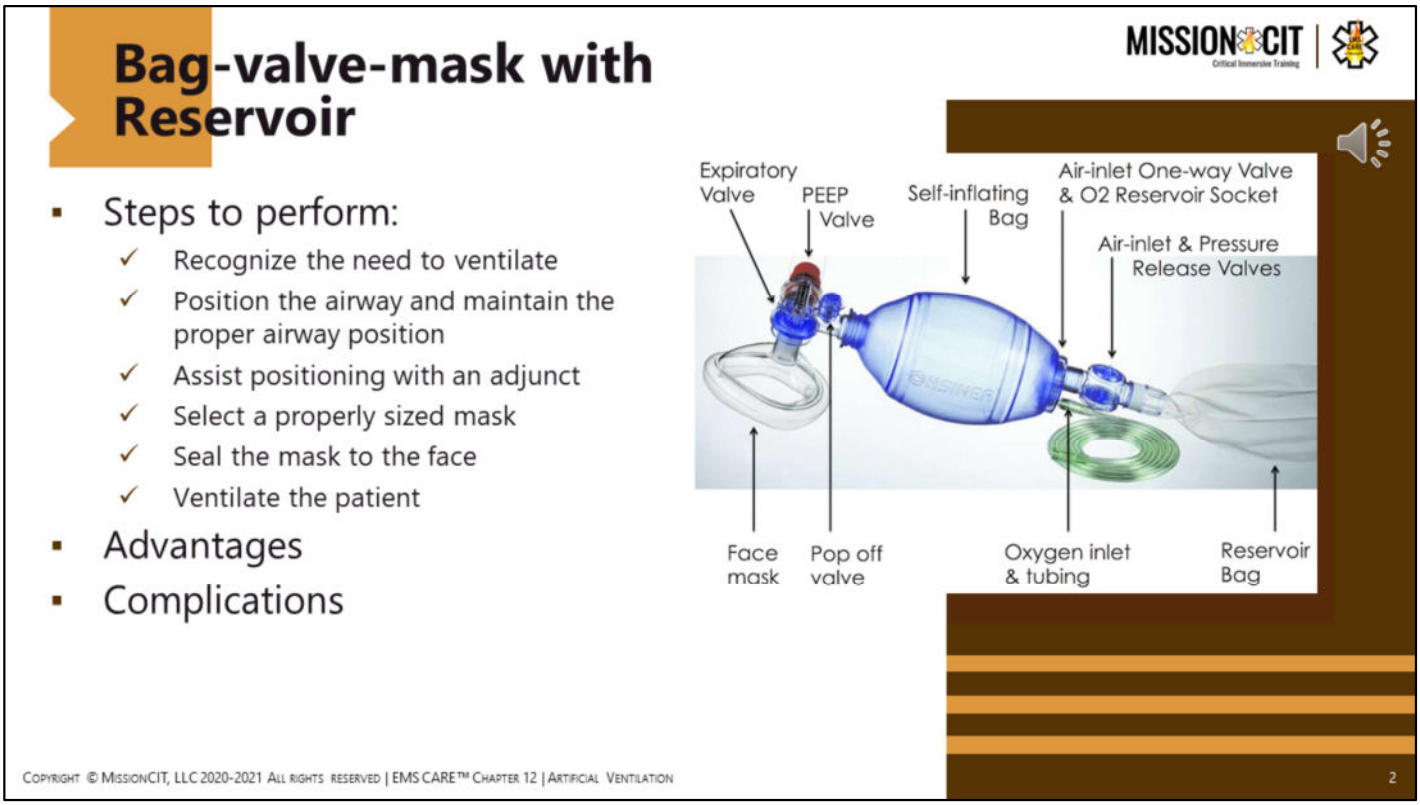


Thank you, Justin!

In this lesson, let's talk about artificial ventilation devices.

Mechanical ventilation is a form of life support. A mechanical ventilator is a machine that takes over the work of breathing when a person is not able to breathe enough on their own. The mechanical ventilator is also called a ventilator, respirator, or breathing machine.



The bag-valve mask (BVM) also called bag mask or bag-mask device is a handheld ventilation device. It may also be referred to as a bag-valve-mask unit, system, device, resuscitator, or simply BVM. The bag-valve-mask unit can be used to ventilate a nonbreathing patient and is also helpful to assist ventilations in the patient whose own respiratory attempts are not enough to support life, such as a patient in respiratory failure or drug overdose.

The use of the bag-valve mask in the field is often referred to as “bagging” the patient. Here’s a quick walk-through on how to achieve the most beneficial outcome from this basic, yet critically important skill.

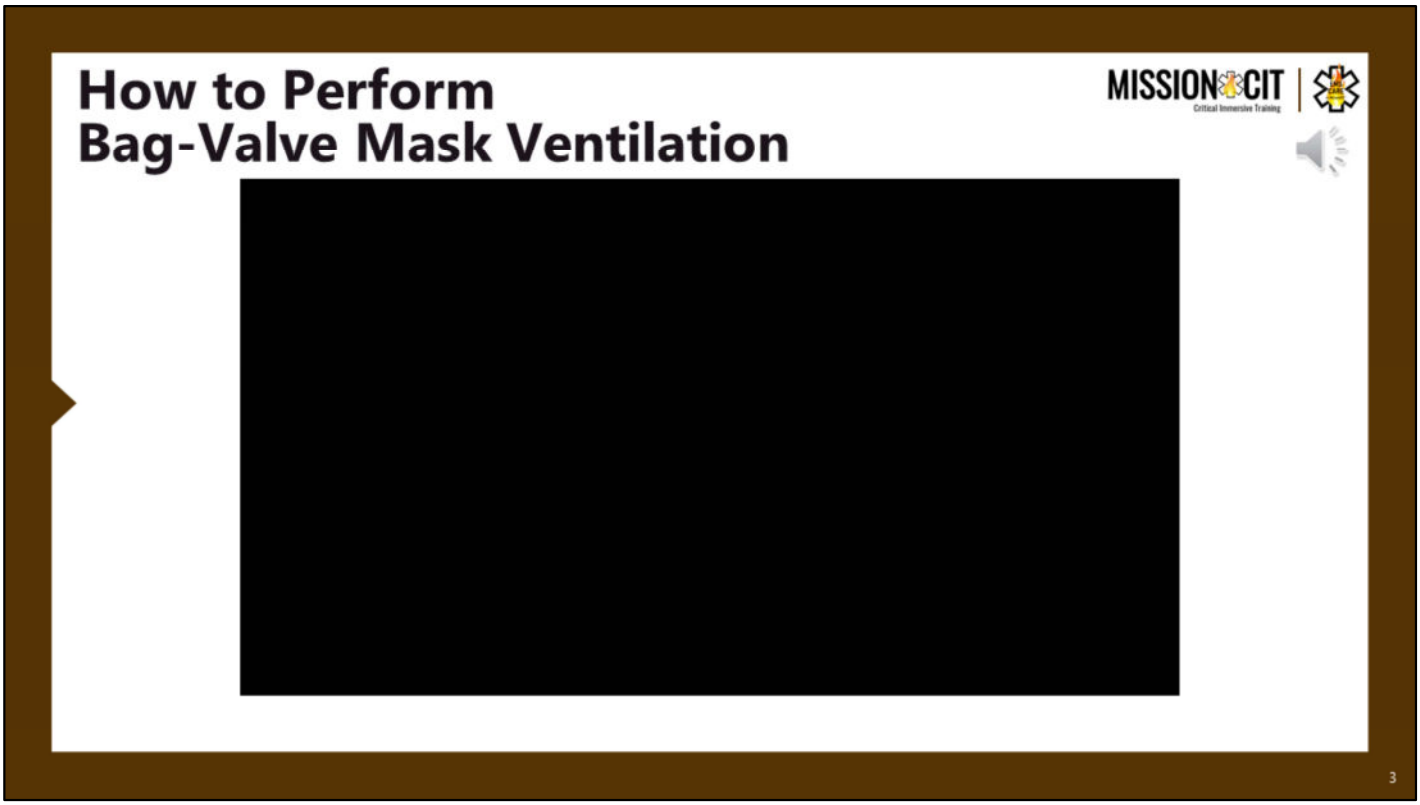
- Recognize the need to ventilate a patient, and do so immediately
- Position the patient, position the airway and maintain the proper airway position
- Assist positioning with an adjunct
- Select a properly sized mask, a properly sized mask should cover the nares and mouth without gaps
- Seal the mask to the face
- Ventilate the patient

Advantages of bag valve mask ventilation:

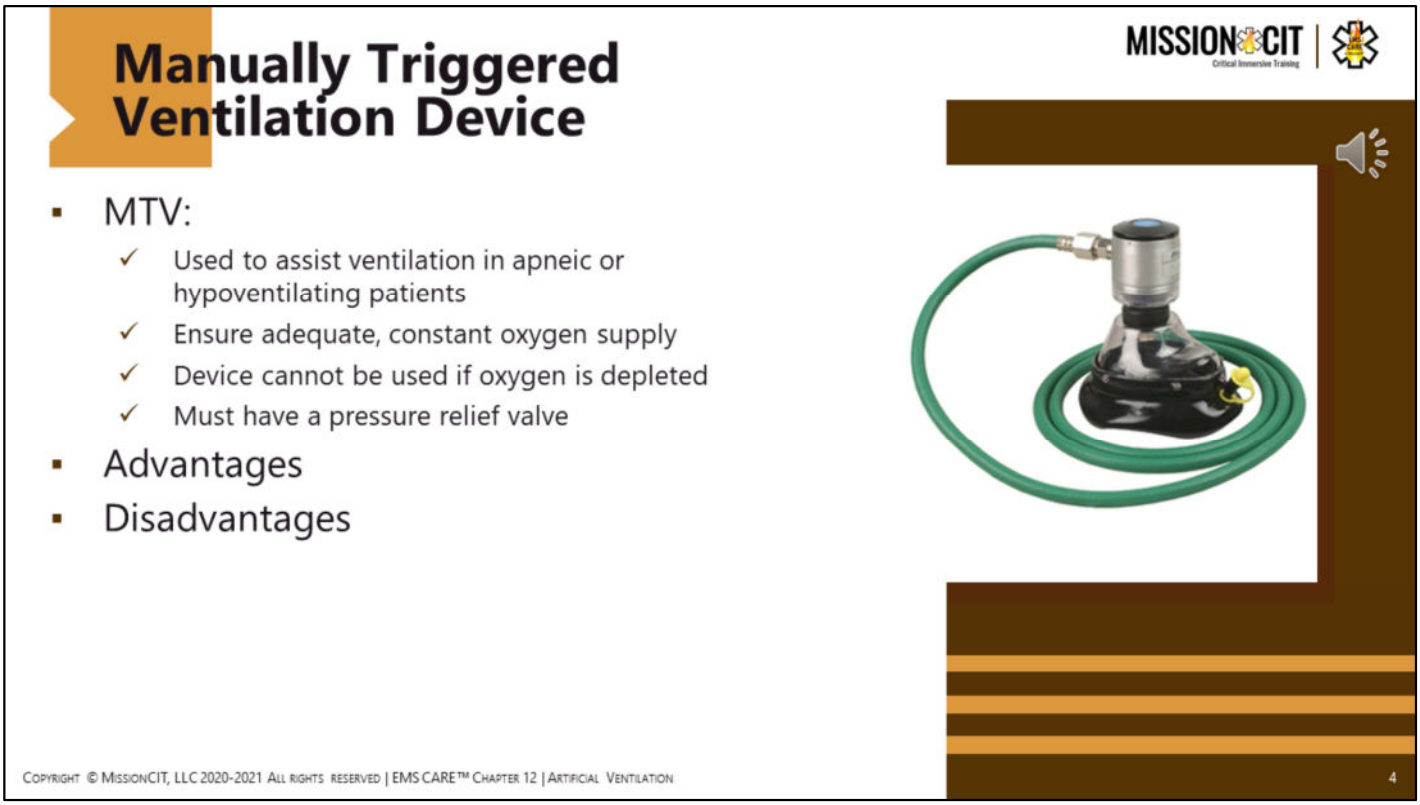
- Allows assisted breaths
- Eliminates rebreathing via valve
- Provides infection-control barrier
- Come in adult, child, and infant sizes

Complications of bag valve mask ventilation:

- Requires manual application by the emergency provider
- Over-ventilating or hyperventilation: Giving too much volume of air or giving it too fast can result in pushing of air into the stomach, leading to a condition known as gastric insufflation
- Vomiting
- Aspiration (entry of foreign objects into the airway)
- Hypoventilation
- Worsen the airway obstruction
- Accelerate hypoxia (low oxygen level in the blood)



Here is a video on how to perform the bag-valve mask ventilation.



A flow-restricted, oxygen-powered ventilation device (FROPVD), also referred to as a manually triggered ventilation device (MTV), is used to assist ventilation in apneic or hypoventilating patients, although these devices can also be used to provide supplemental oxygen to breathing patients. When ventilating a patient with a (FROPVD) you must ensure an adequate, constant oxygen supply is available. Once the oxygen source is depleted, the device can no longer be used because it is driven completely by an oxygen source. The device must have a pressure relief valve that opens at 60cm of water pressure to avoid over ventilation and trauma to the lungs.

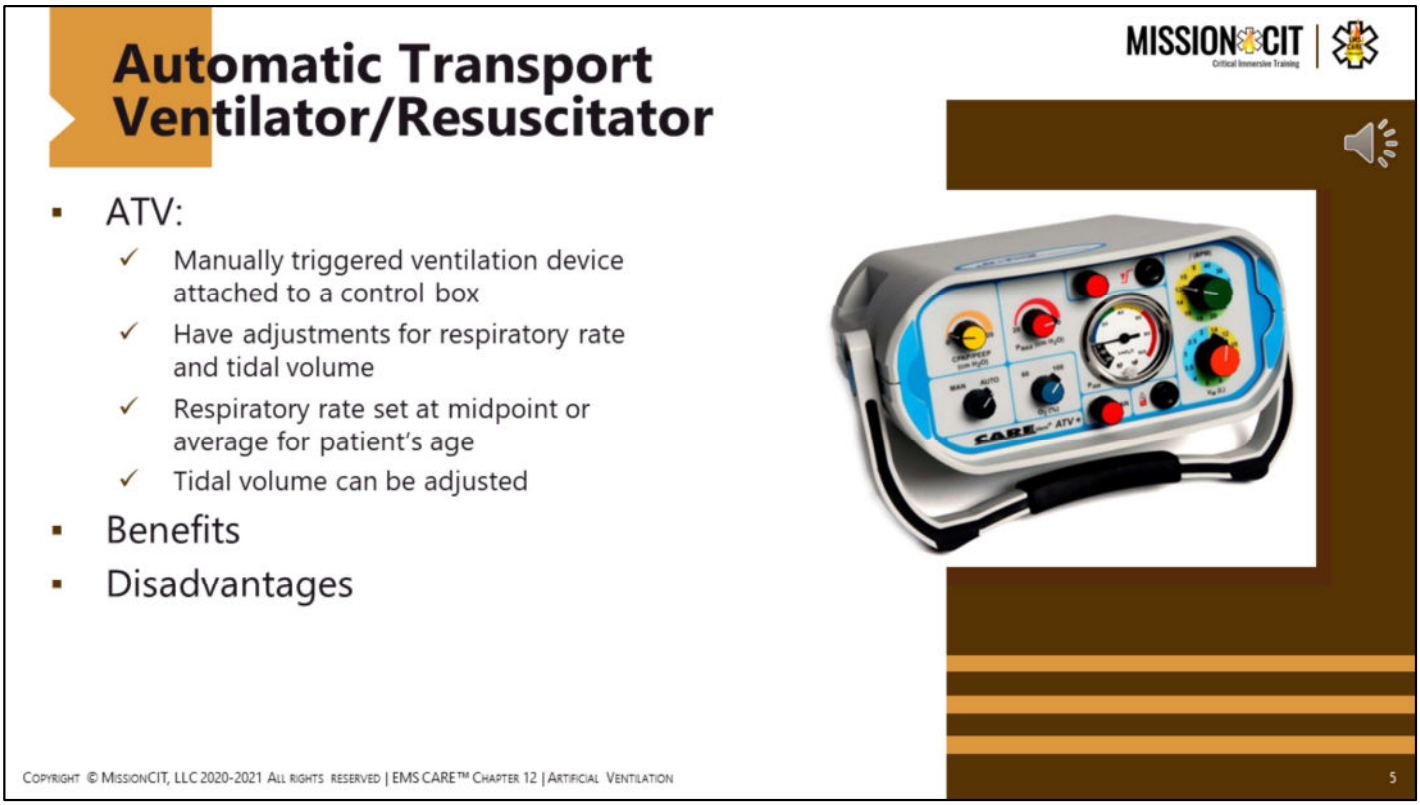
The major advantages to this device are:

- It allows a single rescuer to use both hands to maintain a mask-to-face seal while providing positive-pressure ventilation
- It reduces rescuer fatigue associated with using a bag-mask device on extended transports

Disadvantages to using the device:

- Associated with difficulty in maintaining adequate ventilation without assistance
- Requires oxygen, however, typical adult ventilation consumes 5 liters per minute O2 versus 15-25 liters per minute for a bag-valve-mask
- High incidence of gastric distention

- Possible damage to structures within the chest-cavity
- Typically used on adult patients only
- Additional training is required while using the device on infants and children
- The rescuer is unable to easily assess lung compliance
- Should not be used on patients with COPD or suspected cervical spine or chest injuries



The automatic transport ventilator (ATV) is essentially a manually triggered ventilation device attached to a control box that allows the variables of ventilation to be set. Most models have adjustments for respiratory rate and tidal volume. In most cases, the respiratory rate is set at the midpoint or average for the patient's age. The tidal volume can be adjusted based on the patient's chest rise and physiologic response.

The ATV has a pressure relief valve, which can lead to hypoventilation in patients with poor lung compliance, increased airway resistance, or airway obstruction. Constant reassessment of the patient is necessary while using an ATV.

The Benefits of Automatic Transport Ventilators:

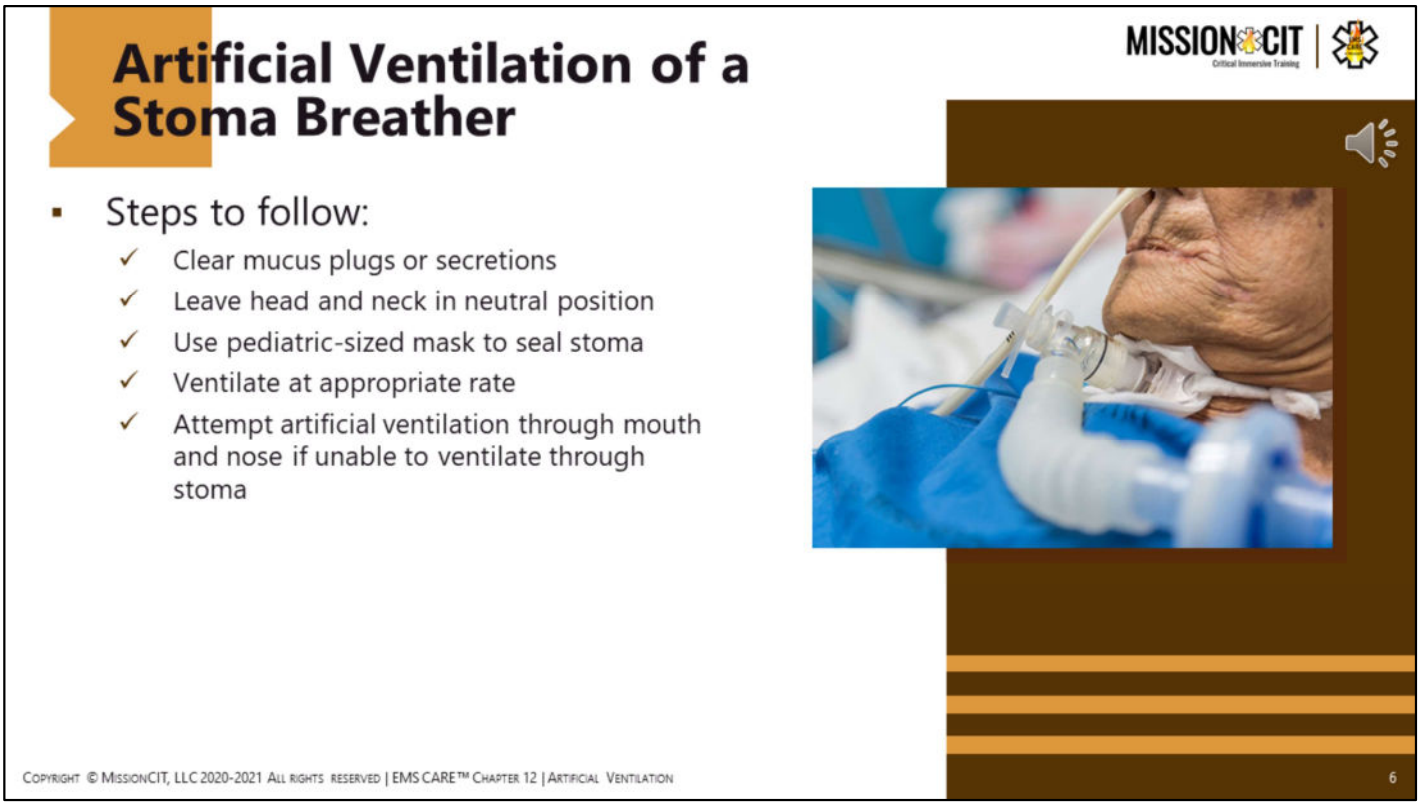
- Easy to maneuver — When the care team needs to move a patient, a transport ventilator can be affixed to their bed.
- User-friendly interface and controls — A quality transport ventilator will make it easy for care teams to calibrate and select settings.
- Automatic air delivery — Transport ventilators study a patient's breathing patterns and deliver the appropriate amount of oxygen, reducing the opportunity to over or under ventilate the patient.
- Requires less intervention — When a hospital is busy or short-staffed, having more care

professionals available can save time and capacity.

- Variety of modes — Portable ventilators come equipped with a variety of modes to optimally manage the patient, including Assist/Control (A/C), continuous positive airway pressure (CPAP), bilevel (BL), and synchronized intermittent mandatory ventilation (SIMV).
- Advanced monitoring — Transport ventilators can monitor aspects of a patient's health while they are intubated and deploy alarms if the patient is at risk.

Disadvantages of Automatic Transport Ventilators:

- Requires oxygen, however typical adult ventilation consumes 5 liters per minute O2 versus 15-25 liters per minute for a bag-valve-mask
- May require an external power source
- Must have bag-valve-mask device available
- May interfere with timing of chest compressions during CPR
- Must monitor to assure full exhalation
- Barotrauma



The BVM can be used to artificially ventilate a patient with a stoma, a surgical opening in the neck through which the patient breathes. Patients with stomas who are found to be in severe respiratory distress or respiratory arrest frequently have thick secretions blocking the stoma. It is recommended that you suction the stoma frequently in conjunction with BVM-to-stoma ventilations.

As with other BVM uses, a two-rescuer technique is preferred over a one-rescuer technique. To provide artificial ventilation to a stoma breather using a BVM, follow these steps:

- Clear any mucus plugs or secretions from the stoma.
- Leave the head and neck in a neutral position, as it is unnecessary to position the airway prior to ventilations in a stoma breather.
- Use a pediatric-sized mask to establish a seal around the stoma.
- Ventilate at the appropriate rate for the patient's age.
- If unable to artificially ventilate through the stoma, consider sealing the stoma and attempting artificial ventilation through the mouth and nose. This may work if the trachea is still connected to the passageways of the mouth, nose, and pharynx. In some cases, however, the trachea has been permanently connected to the neck opening with no remaining connection to the mouth, nose, or pharynx.

With this, we come to the end of this lesson, and next, Missah will talk about the difference between normal and positive pressure ventilation.