



## Upcoming Events

**EM Today**  
(Greensboro, NC)  
Oct. 3 – 5

**Chester County Fire Week**  
Oct. 3 – 9

**Air Medical Transport Conference**  
(Fort Lauderdale, Fla.)  
Oct. 11 – 14

**Edison Family Medicine Grand Opening**  
Oct. 23

**EMS Night Out in Gaston County**  
Coming in November!



## No Membership Required

As your regional provider of air medical helicopter transport for more than two decades and in collaboration with other not-for-profit providers, we want to inform you about a recent direct-mailing campaign called “Helicopter Memberships.”

### Helicopter Service Payment Structures – What is the difference?

There are several types of medical helicopters for pre-hospital and hospital services:

**Fee for Service:** The patient’s insurance is billed only if a service is provided. The patient is responsible for the co-pay and any portion of the bill not covered by insurance.

**Membership Programs:** The public pays an annual fee whether or not the service is needed. Even with memberships, the patient’s insurance is billed when services are provided.

### Before purchasing a helicopter membership, you should know...

A helicopter membership does not guarantee you will be flown by that service. Factors that might prevent you from flying in your membership helicopter include:

- Weather not suitable for flight.
- Helicopter out-of-service for maintenance.
- Membership helicopter already committed to another flight.
- Patient weight is greater than the weight limit of the aircraft used by membership service.
- Membership helicopter may be responding from too far away to meet emergency needs of the patient.
- Clinical condition of the patient exceeds capacity of the membership helicopter service.
- For calls directly to the scene of the accident, local EMS agencies will request

the most appropriate service. They will not be aware of a patient’s membership status and should not delay medical care by being concerned whether the patient has a membership or not.

### If another helicopter service transports you, your membership will not cover the cost of transport!

- If you buy a membership, your insurance company will still be billed if flown by a membership service.
- Many insurance plans cover the cost of helicopter transport if considered medically necessary.
- Check with your insurance company before purchasing a membership!

You DO NOT need a helicopter membership if you have **Medicaid or Medicare**. The cost of a medically necessary flight is covered.

Be well-informed before purchasing a helicopter membership:

- Ask if the service is aligned and governed by a hospital health system(s). Reputable hospital governed services are held to a very high standard of safety and patient care. All of North Carolina’s helicopter services are governed by hospital systems.
- Ask if the company is accredited. Accreditation means that the company meets or exceeds national standards in safety, maintenance, patient care, etc. Review the CAMTS website at [www.camts.org](http://www.camts.org) to see if the service is accredited.

Be aware of the company’s safety record. Conduct web searches to explore whether the company has a good safety record.

Inquire about the training and skill level of the medical crew and aviation staff. Programs can vary widely in the quality and experience of the flight training, as well as in the level of skill required by the staff.



Tour of the MedCenter Air helicopter at a recent event.



## Self-Inflating Bag Resuscitation

About 3 – 5 percent of infants (8 million worldwide) are resuscitated at delivery each year. The most common reason for resuscitation in a newborn is inadequate pulmonary inflation and ventilation. To generate adequate ventilation, the infant must clear lung fluid and create an adequate volume of gas. If the infant is unable to achieve adequate ventilation on its own, then manual ventilation must be provided. Newborns commonly respond well to effective manual bag mask ventilation.

Ventilation of preterm infants is ideally done with a device that delivers a consistent peak inspiratory pressure (PIP) and constant peak end expiratory pressure (PEEP). The most popular device used for resuscitation is a self-inflating bag. A self-inflating bag expands after each compression by elastic recoil (no gas source is necessary). However, the self-inflating bag device has limitations. It is impossible to deliver a consistent PIP as it depends on the strength and speed of the bag compression, the degree of leak and the compliance of the lung. It is difficult to maintain PEEP as there is no continuous gas flow and it is very easy to deliver high PIP with a self-inflating bag.

Studies have shown that inconsistent PIP and PEEP rates are delivered with self-inflating bags used in infant resuscitation by experienced healthcare professionals. The predetermined goal is to manually resuscitate using a respiratory rate of 30 breaths per minute and a PIP of 20 cmH<sub>2</sub>O. Median PIP used without a pressure manometer is 39.8 cmH<sub>2</sub>O making the median V<sub>t</sub> 17.8 ml. These numbers improve to a median PIP of 25.6 cmH<sub>2</sub>O with a median V<sub>t</sub> of 5.1 ml. when a pressure manometer is used with the device. Whether a pressure manometer is used makes no difference on the respiratory rate, with an average of 50 - 60 breaths per minute. Studies are performed in a controlled setting in which the stress of caring for the neonate is not taken into consideration.

Although there are limitations when using a self-inflating bag, clinical knowledge provides the most effective ventilation during infant resuscitation. The best way to achieve a consistent PIP is to use a pressure manometer. This device allows the clinician to monitor pressures on each manual breath delivered. Excessive pressure breaths with high V<sub>t</sub> during manual ventilation can be detrimental to the infant. Target PIP ranges for pre-term (<1500 grams) infants is between 15-20 cmH<sub>2</sub>O while term infants (>1500 grams) is a PIP between 18-28 cmH<sub>2</sub>O. Using the correct mask size for the infant is crucial. Most clinicians prefer the round-shaped mask over the anatomically shaped mask. The mask should be adequately inflated to ensure a proper seal and prevent leaks. A PEEP valve should always be used with a self-inflating bag device to open up the alveoli and increase functional residual capacity (FRC). Be mindful of how fast you are manually bagging the patient. Effectiveness of the delivered breath is decreased with rapid respiratory rates. Proper positioning of the infant during resuscitation allows you to deliver the pressure breath more effectively. These simple but effective methods will improve the outcome of infant resuscitation.



*NICU team members work to stabilize an infant prior to transfer.*

## Waveform Capnography: An Evolution in EMS

Since the early 19th century there have been documented instances of emergency medical care brought to the patient. Pre-hospital medicine via Emergency Medical Services (EMS) has only recently made strides in the autonomy granted by medical directors to healthcare professionals credentialed under their medical license. Prior to 1973, pre-hospital medical care entailed rapid transport primarily provided by funeral homes. The EMSS Act of 1973 was written to provide additional federal guidelines and funding for the development of regional EMS systems throughout the United States, based on fifteen structural guidelines. In years since, training and equipment has improved, allowing pre-hospital care providers to deliver higher quality medical care and interventions. Patients are now able to be treated quicker, resulting in improved outcomes.

One of the new and improved techniques in pre-hospital care is waveform capnography, also referred to as End Tidal Carbon Dioxide (EtCO<sub>2</sub>) monitoring. EtCO<sub>2</sub> monitoring is familiar to hospital staff, particularly those who work in operating rooms. This medical procedure can be monitored on patients who are intubated, spontaneously breathing via nasal cannulas or non re-breather masks with a normal range of 35-45 mmHg.

Capnography was introduced to pre-hospital medicine as a colorimetric device, a single-use disposable detector that is pH sensitive. The device fluctuates from yellow to purple with each ventilation that is placed in the breathing circuit between the patient and ventilation device (bag valve mask, bag valve endotracheal tube, ventilator, etc.). Respiration (cellular gas exchange) is detected by this device as a result of hydrogen ions generated when CO<sub>2</sub> is exposed to litmus paper while oxygen registers as a base.

Waveform capnography, was introduced after capnography. Known as capnometry, it incorporated the ability to view a graphical waveform along with a digital numeric



*MedCenter Air crew members with intubated patient.*

reading to show the presence of carbon dioxide through the process of ventilation.

Initially, capnography was only used to verify endotracheal tube placement as being in the trachea versus the esophagus. As time has passed, its uses have expanded to include:

- Hypoventilation: increased metabolic rate, malignant hyperthermia, decreased respiratory rate and/or volume
- Hyperventilation: decreased metabolic rate, hypothermia, increased respiratory rate and/or volume
- Diabetic ketoacidosis: elevated glucose blood sugar indicating possible dehydration and need for crystalloid infusion
- Bronchospasm: asthma
- Curare cleft: a dip in the plateau/peak of the waveform indicating need for additional sedation or paralytics wearing off after rapid sequence induction and intubation
- Mechanical airway obstruction: foreign body airway obstruction endotracheal tube that requires suctioning.

As pre-hospital clinician we are taught to recognize waveforms, what they represent, what they mean and determine appropriate care. End tidal capnography is an example of how pre-hospital medicine is evolving from very simple procedures to more complex tools used in diagnosing and optimally treating patients. Pre-hospital medicine is still in its infancy phase when compared to medicine within the hospital. As intra-hospital care grows and new procedures are developed, the care provided in ambulances and on the side of the road will continue to improve patient outcomes.

