



The State Board of Emergency Medical, Fire, and Transportation Services (“EMFTS Board”) issues the following statement:

Regarding the Use of Capnometry and Capnography for Patients in the Prehospital Setting
February 2018

This statement is an attempt to provide general information about the above issue facing EMS providers. It should not be treated as legal advice or medical direction. For direct advice regarding a particular scenario, please consult with your medical director and legal counsel. Although the following statement represents the EMFTS Board’s general position on the above issue, this statement in no way precludes the EMFTS Board from taking disciplinary action in a particular case if necessary. Any potential complaints brought before the EMFTS Board will be decided on a case by case basis.

Introduction:

The State Board of Emergency Medical, Fire, and Transportation Services and the Ohio Department of Public Safety, Division of Emergency Medical Services (EMS), have developed a defined scope of practice for EMS providers. The scope of practice for each level of EMS providers is established in Ohio Administrative Code Chapters 4765-15, 4765-16, and 4765-17. An outline of the Ohio EMS scope of practice is available in matrix form and is posted on the Ohio Department of Public Safety, Division of EMS website as a reference for public access. This scope of practice addresses all levels of EMS providers and has been approved by the EMFTS Board. Updates to the scope of practice are made as necessary and must be approved by the EMFTS Board.

EMS providers routinely assess the respiratory status and stability of the airway regardless of the patient’s chief complaint. From time to time, EMS providers perform airway management interventions to support patients with airway instability, impending or existing compromised respiratory status, or patients in respiratory or cardiac arrest. The intent of this position paper is to address the benefits of the utilization of additional adjuncts, specifically capnometry and capnography, to assess patients by EMS providers in the prehospital setting.

Discussion:

In the past, the primary avenues to assess a patient’s ventilatory status before and after non-invasive oxygen administration included clinical patient assessment and pulse oximetry. The assessment tools to confirm the correct placement of an invasive airway device included direct visualization of the trachea, auscultation of the chest, pulse oximetry, and end tidal carbon dioxide (ETCO₂) detection. Multiple studies have demonstrated that clinically significant hypercarbia can be present or develop in patients with normal pulse oximetry readings. Particularly in the non-intubated patients, the recognition of hypoventilation or hyperventilation from any etiology may be delayed with use of pulse oximetry alone. Despite the availability of these resources, inadequate airway management leading to hypoxia, including unrecognized misplaced or displaced invasive airway devices, or respiratory arrest secondary to hypoventilation, remains one of the top five grounds for successful malpractice litigation against EMS providers and EMS agencies.

The qualitative colorimetric measurement of ETCO₂, the level of carbon dioxide (CO₂) released at the end of expiration, by a pH-sensitive paper placed at the end of an endotracheal tube has been used in the past for confirmation of correct endotracheal tube placement. Capnography, the ongoing measurement and monitoring of the concentration or partial pressure of CO₂ (P_{ETCO₂}) in respiratory gases, has been used as a patient assessment tool and airway management adjunct in the field of anesthesiology for many years.

Current research has demonstrated that capnography and capnometry are superior to pulse oximetry and ETCO₂ detection in the early identification of hypoventilation (with or without associated hypoxia) and hyperventilation. Due to advancements in technology, lightweight portable digital capnometers and waveform capnographs are readily available and amenable for use by EMS providers to assess a patient’s ventilatory status, confirm correct invasive airway device placement, and rapidly identify invasive airway device displacement. While quantitative capnometry is a viable airway assessment adjunct, waveform capnography has the additional capability to provide continuous assessment of the patient’s ventilatory status and to potentially create a capnograph, a dynamic written record of the patient’s P_{ETCO₂}.

Unlike pulse oximetry alone, the advent of capnometry and capnography devices that non-invasively monitor P_{ETCO_2} has expanded the ability of all health care providers, particularly those in the prehospital setting, to more rapidly detect airway compromise due to hypoventilation or improperly placed or displaced invasive airway devices. The American Heart Association guidelines have highlighted the recommendation that continuous quantitative waveform capnography should also be used to monitor the effectiveness of cardiopulmonary resuscitation (CPR) and the early detection of the return of spontaneous circulation (ROSC) in the patient who has sustained a cardiopulmonary arrest.

Conclusion:

The confirmation, ongoing assessment, and documentation of the security of the established airway in patients are imperative. The quality of cardiopulmonary resuscitation and the detection of the return of spontaneous circulation in the patient who has sustained a cardiopulmonary arrest are equally important. Therefore, digital capnometry or waveform capnography is currently recommended for inclusion in written protocols provided by EMS medical directors and implementation by EMS providers providing airway management intervention to patients.

The ventilatory assessment of all patients, particularly those requiring invasive airway devices, is critical. In the interest of patient safety, the EMFTS Board highly recommends the utilization of digital capnometry or waveform capnography as an assessment tool for all patients who require oxygen via any route of administration. As continuous patient monitoring is preferred, the EMFTS Board, on December 17, 2014, approved the mandatory utilization of waveform capnography for all patients requiring invasive airway devices effective January 1, 2021.