San Francisco Fire Department

Training Bulletin 07-2

END TIDAL CO_2 MONITOR DEVICE

TOPIC

Use of the End Tidal CO_2 monitor device.

PURPOSE

This training bulletin establishes the San Francisco Fire Department EMS Division standard of practice regarding the use of the End Tidal CO_2 Device on the intubated patient.

BACKGROUND

Establishing an airway in respiratory compromised patients is the overriding priority of every paramedic and emergency medical care provider. A misplaced, dislodged or unrecognized failure of establishing an Advanced Airway could very likely cause unrecoverable deterioration in a patient's condition. The results of such errors could be anoxic brain damage or actual demise of the patient.

There are four methods of establishing Advanced Airways; Endotracheal, Nasotracheal, CombiTube and Needle Cricothyrotomy.

1. Endotracheal is the method of placing an endotrol tube into the patient's trachea, resting it just short of the carina, and securing it in place with an inflatable balloon and an external tie. The endotrol tube is introduced directly through the patient's mouth and is placed under direct visual lighting by a laryngoscope. This method is effective only in the deeply unconscious, in the sedated or in the cardiorespiratory arrest patient.

2. Nasotracheal is the method of placing an endotrol tube into the patient's trachea, resting it just short of the carina, and securing it in place with an inflatable balloon and an external tie. In this situation, as opposed to the Endotracheal route, the endotrol tube is introduced indirectly, through the patient's nares (nose) and is placed blindly, using a BAMM whistle for guidance. This method is effective in patients who are still actively breathing, but runs a very real risk of stimulating the gag reflex in the conscious posterior oropharynx.

3. CombiTube is the method of placing a dual-branch, dual-lumen endotrol tube into both the esophagus and the trachea. The insertion is done blind, with one tube resting in each of the two passages at the back of the oropharynx. The Paramedic uses a syringe of air to inflate balloons at the distal end of each tube and ventilates through the tube lodged in the trachea.

4. Needle Cricothyrotomy is the method of securing an Advanced Airway by introducing a catheter directly into the tracheal by penetrating the cricoid membrance through the patient's Adam's Apple. This method bypasses the oropharynx and internal intubation structures completely, but is less effective than the other methods due to the constricted opening of the needle catheter.

No less important than establishing the Advanced Airway, is ensuring that the device is placed properly and is working properly, is having the desired effect (improvement of the patient's condition) and remains in place throughout the course of the EMS contact time.

POLICY

There are many ways to ensure Advanced Airway placement, some passive, some active, some electronic. All are effective and all are necessary.

The San Francisco Fire Department lists four (4) methods in its Policies and Procedures to ensure placement and effectiveness of Advanced Airways and all four are to be followed every time an Advanced Airway is placed.

Direct visualization – the Paramedic watches the endotrol tube pass between the patient's vocal cords using a high-intensity light (laryngoscope) and reaffirms placement from time to time by direct visual examination

Auscultation – the Paramedic listens to the patient's chest and abdomen with a stethoscope. The Paramedic is to hear air in the patient's chest during ventilation with the Bag-Valve-Mask and to hear nothing when listening to the patient's abdomen and gastric area.

Chest rise – the Paramedic appreciates equal rise and fall of the patient's chest and rib cage during Bag-Valve-Mask ventilations.

$ETCO_2$ – the Paramedic places a device between the endotrol tube and the Bag-Valve-Mask. The device is connected to the monitor/defibrillator and measures the carbon dioxide in the patient's expelled air during artificial ventilations. The carbon dioxide levels are displayed as waveforms on the monitor screen. $ETCO_2$ monitoring and waveform interpretation are considered the Standard of Practice in the San Francisco Fire Department.

It is the policy of the San Francisco Fire Department to place the $ETCO_2$ measuring device on an endotrol tube every time an Advanced Airway is established.

PROCEDURE

At the beginning of each shift, Paramedics will check the End Tidal CO_2 component of the Zoll Monitor. The device, its components, cables and connectors will be examined for cracks, breaks, instability or contamination.

If the device is not functioning properly, the monitor will placed out of service for repair.

If a piece of the End Tidal CO_2 system is missing or broken (cable, sensor), the missing component should be replaced immediately (prior to deployment to the field).

All patients who are intubated, via endotrachael, nasal or combi-tube, will have the End Tidal CO_2 Monitor placed.

Paramedics should print an EKG strip, showing the End Tidal CO_2 levels, and attach the strip to the top copy of the Patient Care Report that gets sent to Medical Records (the white copy). A second strip should be printed for the Receiving Hospital, or a photo copy of the original may be left at the emergency department.

DOCUMENTATION

The "Advanced Airway Management Procedures" section of the PCR must be completed for every intubated patient, successful or not. The section should be documented even if direct laryngoscopy was performed without intubation attempt.

A Paramedic Captain must be notified every time a crew performs an Advanced Airway procedure, successfully or unsuccessfully, and have an Infrequent Procedure form completed as soon as possible following the call.