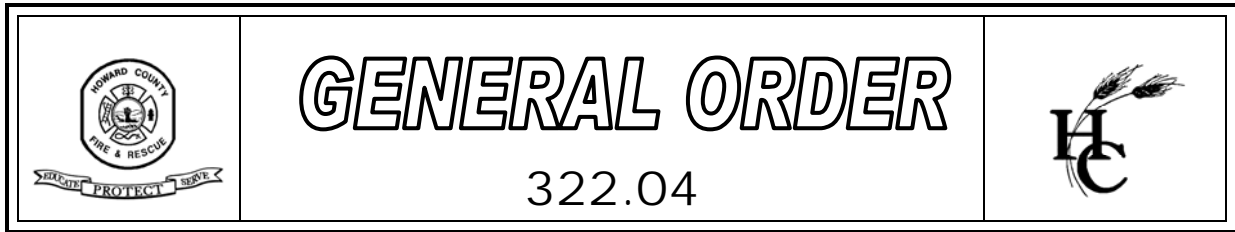


# DEPARTMENT OF FIRE AND RESCUE SERVICES



Originating From	Issue Date	Revision Date	Attachments
<b>Emergency Medical Services</b>	<b>5/13/2005</b>	<b>1/5/2009</b>	<b>A</b>

## **SUBJECT: Endotracheal Tube Placement Verification**

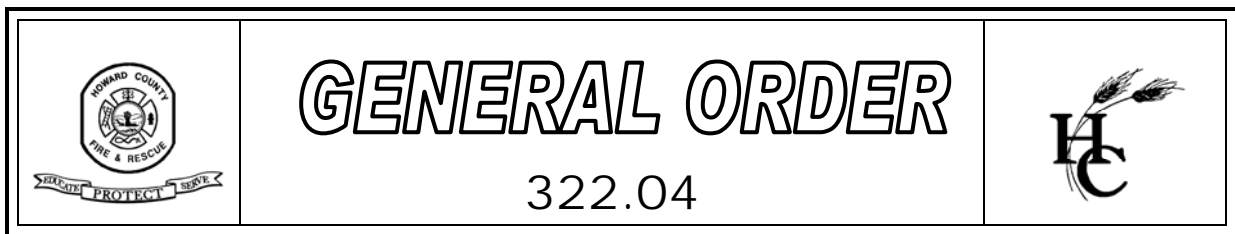
**APPLICABILITY: All Advanced Life Support Providers**

### **POLICY:**

Misplaced or dislodged endotracheal (ET) tubes, when unrecognized, pose serious consequences to the patient and represent a large majority of lawsuits filed against EMS personnel. Proper objective documentation of the advanced airway care we provide will help to protect you from risk. The following policy has been developed to verify correct tube placement and decrease the possibility of a misplaced or dislodged tube.

- 1 Confirmation of correct placement of the endotracheal tube should be performed after the following:
  - 1.1 Immediately following endotracheal intubation.
  - 1.2 Any movement (by patient or crew) of the patient's head/neck with respect to the body.
  - 1.3 Any movement of the patient (scene to stretcher, stretcher to ambulance, ambulance to ED).
  - 1.4 Prior to transfer of care (EMS Provider to EMS Provider; or EMS Provider to Hospital ED).
  - 1.5 Any clinical worsening of the patient's condition.
- 2 Any clinical situation which, in the provider's judgment, raises questions about whether the ET tube is still correctly placed.
- 3 Initial and repeat confirmation of endotracheal tube placement following direct laryngoscopy, nasotracheal intubation, or rapid sequence intubation should be performed by the following procedure:
  - 3.1 Primary Confirmation – When possible, observe passage of tube through the vocal cords into the trachea.
    - 3.1.1 Presence of breath sounds over both lungs and absence over the stomach.
    - 3.1.2 Note the tube depth (approximately 3 times the tube size) – record the depth

# DEPARTMENT OF FIRE AND RESCUE SERVICES



on the STAT pad and use it when troubleshooting the conditions listed above.

### 3.2 Secondary Confirmation

- 3.2.1 Attach the Lifepak 12 end-tidal CO<sub>2</sub> detector and observe an appropriate waveform. If the monitor tracing indicates an end-tidal CO<sub>2</sub> waveform and the tube depth is appropriate, the tube is in the correct position. Print the waveform. If the monitor tracing is not characteristic of an end-tidal CO<sub>2</sub> waveform, remove the tube and reattempt intubation per Maryland Medical Protocol.
- 3.2.2 If there is failure of the Lifepak 12 end-tidal CO<sub>2</sub> detector, attach the colorimetric detector and observe for a cyclic purple to yellow (CO<sub>2</sub>) color change on patient exhalation after 6 breaths. If absent, remove the tube and reattempt intubation.
- 3.2.3 Cardiac Arrest - results in less production of CO<sub>2</sub> by the cells and less CO<sub>2</sub> is circulated to the lungs due to pump failure.
  - 3.2.3.1 Initially, and down to fairly low levels of CO<sub>2</sub> (less than 10 mm), the end-tidal waveform is maintained.
  - 3.2.3.2 When intubating a patient in cardiac arrest, not witnessed by DFRS personnel, use the Esophageal Detector Device (EDD) after intubation, followed by the Lifepak 12 end-tidal CO<sub>2</sub> module. If an end-tidal CO<sub>2</sub> waveform is present and the ET tube is at an appropriate depth, the tube is placed correctly. If there is no end-tidal waveform then consider information from the EDD.
- 3.2.4 The procedure in (3.2.1) and (3.2.2) should be repeated for all of the indications listed above.

3.3 Documentation – on the Medical Incident Report (MIR), document the method of intubation, tube size, tube depth and confirmation techniques. Include end-tidal CO<sub>2</sub> value on intubation.

3.4 Airway Quality Assurance – Print the end-tidal CO<sub>2</sub> waveform and attach it to the MIR. Print the Code Summary and attach it to the completed Airway QA Form.

Approved:



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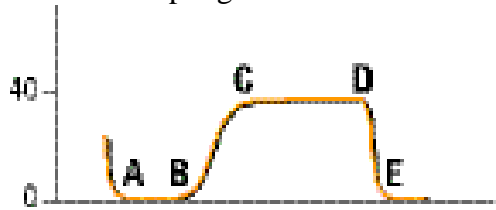
Joseph A. Herr  
Fire Chief

## Endotracheal Tube Confirmation Using End-Tidal CO<sub>2</sub> Capnography

The presence of a characteristic tracheal waveform at any CO<sub>2</sub> level confirms proper placement of the endotracheal tube. This is true in both non-arrest and arresting patients. You should use the capnography feature of the Lifepak 12 on any adult or child that you intubate. Furthermore, you should document correct ET placement by printing a copy of the waveform and including it with your MIR. Refer to the new Endotracheal Tube Placement Verification Policy for details.

What follows is a brief overview of waveforms that you may see after intubation.

Normal capnogram:

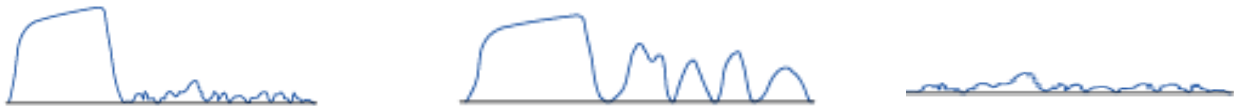


- A-B:** Near zero baseline—Exhalation of CO<sub>2</sub>-free gas contained in dead space.
- B-C:** Rapid, sharp rise—Exhalation of mixed dead space and alveolar gas.
- C-D:** Alveolar plateau—Exhalation of mostly alveolar gas.
- D:** End-tidal value—Peak CO<sub>2</sub> concentration—normally at the end of exhalation.
- D-E:** Rapid, sharp downstroke—Inhalation

Capnograms indicating proper placement:



Capnograms indicating improper placement requiring ETT removal and reattempt at intubation:



These waveforms may indicate an esophageal intubation, hypopharyngeal intubation, or a dislodged ETT.

The narrative section of the MIR should reflect your clinical care and efforts to confirm tube placement. Information which must be documented includes:

1. Route of intubation and size of tube
2. Number of attempts and results
3. Observed methods of ETT placement verification
4. Observed end-tidal CO<sub>2</sub> waveform (attach printout to MIR)
5. Depth at which tube was secured
6. Response to intubation (O<sub>2</sub> saturation, vital signs, level of consciousness)
7. Observed end-tidal CO<sub>2</sub> waveform (attach printout to MIR) after each patient movement or turnover to another provider (EMS to EMS or EMS to ED)

With any questions regarding this policy or the use of end-tidal waveforms, please contact the office of the Medical Director at 410-313-6024.