APPENDIX

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TITLE: BASIC AIRWAY SUPPORT PROCEDURES

REVISED: May 1, 2012

I. BASIC OXYGEN ADMINISTRATION

Supplemental oxygen shall be administered to all patients at risk for hypoxia/hypoxemia. Current AHA guidelines also recommend supplemental oxygen administration for patients with SPO2 ≤ 94% unless otherwise contraindicated.

Adjunct	Flow Rate	% Oxygen Delivered
Nasal Cannula	1-6 L/min	Approx. 24-44%
Simple Mask	8-10 L/min	Approx. 40-60%
Non-Rebreather Mask	10-12 L/min	Approx. 90-100%
Bag-Mask w/ Reservoir	10-12 L/min	Approx. 100%
FROPVD/ Demand Valve	(good seal)	Approx. 100%

If hypoventilation is present, utilize bag/mask or demand valve with 100% oxygen to insure adequate ventilation and oxygenation.

Other devices, such as a trach mask, venture mask, or other device may also be used based on clinical judgment and presentation of the patient.

II. BASIC VENTILTORY SUPPORT

If supplemental oxygen support is inappropriate, ineffective, or impractical, and the patent is considered to be at risk for hypoventilation, hypoxia, or respiratory failure/compromise, then more aggressive respiratory support be indicated. Interventions include, but are not limited to,

- *Intermittent Positive Pressure Ventilation* (IPPV) using a bag valve manual resuscitator with a traditional face mask, an intra-oral mask (IOM), ETT, other advanced airway (i.e. supra-glottic airways) , or to a tracheostomys tube.
- *Flow-restricted, oxygen-powered ventilation device* (FROPVD), AKA Demand Valve, or an Elder valve, as available or indicated, using a traditional face mask, an intra-oral mask (IOM) ETT, other advanced airways (i.e. supra-glottic airways) , or to a tracheostomy tube.
- CPAP/PEEP (See appendix E)

When possible, providers should maintain strict ventilatory discipline to reduce adverse hemodynamic effects and baro-trauma, particularly during cardiac arrest, low perfusion states, and those with fragile respiratory anatomy (i.e. Asthmatics, COPD).

Providers should adjust mechanical ventilatory support based on the measured SPO2, ETCO2, and patient-ventilator synchrony/compliance. As spontaneous ventilation becomes more efficient and as concurrent medical conditions allow, the level of support may be adjusted.

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III. PULSE OXIMETRY

Pulse Oximetry monitoring shall be utilized on all patients at risk for hypoxemia. Oxygen saturation data shall be documented in the objective findings portion of patient run reports as oxygen saturation in terms of percentage (%) of hemoglobin saturation.

NOTE: Hemoglobin binding gases (CO, etc.), acidosis, and low peripheral perfusion may give false high or low pulse oximetry data.

IV. EXPIRED CO2 MONITORING

Expired/End Tidal CO2 (ETCO2) monitoring shall be utilized on all intubated patients using the most appropriate device available. These devices include, but are not limited to:

- STAT-CAP or EASY-CAP expired CO2 monitoring devices.
- Basic End Tidal CO2 devices (for example: the Nelcor N20, or the Nonin Multi)
- Advanced End Tidal CO2 devices with wave form devices (For Example: ProPaq monitoring systems, Medtronic LifePak 12 / 15, Zoll M Series devices)

Expired CO2 levels shall be documented as ETCO2 in terms of approximate mm/Hg (Torr).

ETCO2 is a useful adjunct for determining perfusion and measuring expired C02 in the intubated patient. Correctly interpreted end tidal volume capnometry is an excellent method of confirming correct ET placement. It is a reliable method, but it is only a tool and has several limiting factors in its interpretation.
This does not imply the device itself has inherent defects or limitations, only that it measures the amount of C02 in the air passing through it and there are many factors affecting this quantitative analysis. Some factors that can cause false or misleading readings are:

- Pulmonary shunt – limits the perfusion of available lung parenchyma causing poor gas exchange
- Hypovolemic shock – limits available hemoglobin for gas exchange by limiting pulmonary perfusion and circulating RBC's
- Cardiogenic shock – poor gas exchange from limited perfusion of blood through the lungs
- Neurogenic shock – limits available hemoglobin for gas exchange by limiting pulmonary perfusion
- Lack of C02 production – i.e. cellular death
- Tube dislodgement, kinking, obstruction

The major limitation of any ETCO2 is the user, not the device. Appropriate decision-making must utilize all available information and good judgment. In the intubated patient with good breath sounds, fogging of the tube, equal chest excursion and direct visualization of the cords with observation of the tube passing between them, a low reading with ETCO2 is not an absolute indication for extubation. It is, however, always appropriate to recheck ET tube placement through multiple independent means if any question of patency or placement arises and Extubate promptly if ET placement cannot be satisfactory confirmed.

NOTE: The EASY CAP and STAT-CAP devices are disposable colormetric devices that measure ETCO2. The device attaches directly to the bag valve or mechanical ventilator and ET tube, and registers the percent of expired C02 by exhibiting a color change in its face. This color change is compared with the attached chart on the face of the device to determine the approximate percent of expired C02. These devices are simple, have nothing to calibrate or adjust, and if properly stored will react to changes in expired C02 within 30 seconds. The detector will function for approximately 1-2 hours before becoming saturated with C02, however if the patient has received Epinephrine via the endotracheal route, colormetric ETCO2 may give false readings. Once saturated, the device should be disposed of in an appropriate biohazard container.

Constant qualitative or quantitative End Tidal Capnography is preferred to the color-metric ETCO2 devices, and should be used for any transport over 10 minutes when ever available.

V. REFERENCE:

1. "Adjuncts for Airway Control, Ventilation, and Supplemental Oxygen." Textbook of Advanced Cardiac Care Life Support. American Heart Association, 1994.

2. "Part 9: post– cardiac arrest care: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care". Circulation. 2010;122(suppl 3):S768 –S786.

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