

**APPENDIX: 01**

**TITLE: BASIC AIRWAY SUPPORT PROCEDURES**

**REVISED: April 01, 2023**

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**I. BASIC OXYGEN ADMINISTRATION**

Oxygen should be titrated for a SpO<sub>2</sub> ≤ 92%, with a goal 92-96%. Supplemental oxygen shall be administered to all patients at risk for decompensation or hypoxia/hypoxemia.

<u>Adjunct</u>	<u>Flow Rate</u>
Nasal Cannula/ETCO <sub>2</sub> NC	1-6 L/min
Simple Mask	8-10 L/min
Non-Rebreather Mask	10-15 + L/min
Bag-Mask w/ Reservoir	10-15 + L/min

If hypoventilation is present, utilize bag/mask to insure adequate ventilation and oxygenation.

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

\* Adjustments may be made to flow rates, etc based on clinical judgement and circumstances (ex. Apneic Oxygenation, High Flow Nasal Cannula)

**II. BASIC VENTILATORY SUPPORT**

If supplemental oxygen support is inappropriate, ineffective, or impractical, and the patient is considered to be at risk for hypoventilation, hypoxia, or respiratory failure/compromise, then 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) , mechanical ventilator, or to a tracheostomy tube.
- PEEP
- CPAP (See Appendix 6)

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 SPO<sub>2</sub>, ETCO<sub>2</sub>, and patient-ventilator synchrony/compliance. As spontaneous ventilation becomes more efficient and as concurrent medical conditions allow, the level of support may be adjusted.

**III. PULSE OXIMETRY**

Pulse Oximetry (SPO<sub>2</sub>) is a useful clinical tool in the care of patients. Supplemental oxygen should be considered for patients who are at risk of hypoxemia while avoiding the negative effects of hyperoxia. Therefore, supplemental oxygen administration should be initiated for patients with an SPO<sub>2</sub> < 92% or who are at risk for decompensation. Supplemental oxygen should be titrated to maintain an SPO<sub>2</sub> of 92-96% to avoid hyperoxia.

SPO<sub>2</sub> is not a perfectly reliable indication of oxygenation or perfusion status and findings should always be clinically correlated. Indicated SPO<sub>2</sub> may be delayed (“Saturation Lag”), especially by poor perfusion.

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

#### IV. EXPIRED CO<sub>2</sub> MONITORING

Expired/End Tidal CO<sub>2</sub> (ETCO<sub>2</sub>) monitoring shall be utilized and documented on all patients with an advanced airway patients using the most appropriate device available.

ETCO<sub>2</sub> is a useful adjunct for determining perfusion and measuring expired CO<sub>2</sub> in the intubated patient. Correctly interpreted end tidal volume capnometry is an excellent method of confirming correct ETT placement. It is a reliable method, but it is only a tool and has several limiting factors in its interpretation.

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 CO<sub>2</sub> production – i.e. cellular death
- Tube dislodgement, kinking, obstruction

The major limitation of any ETCO<sub>2</sub> 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 (but otherwise present waveform)* reading with ETCO<sub>2</sub> is not an absolute indication for extubation.

Conversely, an absent or inability to obtain a waveform/other ETCO<sub>2</sub> indication (i.e. Colorimetric ETCO<sub>2</sub>) is always suspicious for misplaced ETT. It is, however, always appropriate to recheck ETT placement through multiple independent means if any question of patency or placement arises and extubate promptly if ETT placement cannot be satisfactory confirmed.

#### IV. USE OF PEEP WITH VENTILATION

Positive End Expiratory Pressure (PEEP) should be considered in patients receiving artificial ventilation, of all age groups; to increase alveolar recruitment, reduce risk of repetitive alveolar collapse injury, and increase oxygenation. It may be applied either via a “PEEP” valve on a Bag-Valve-Mask device or with a mechanical ventilator.

Patients presenting with the following history or signs may benefit from PEEP:

- Conditions prior to respiratory arrest that would indicate CPAP (but it is not available).
  - See *Appendix 6: CPAP*
- Hypoxia
- Lung disease prior to intubation such as ARDS or COPD
- Suspected atelectasis (alveoli collapse)
- Extended duration of artificial respiration such as interfacility transfer (Greater than 30 minutes)
- Pulmonary contusion or flail chest
- Drowning and Aspiration related conditions.
- Congestive Heart Failure.

PEEP is (relatively) contraindicated with:

- Untreated Pneumothorax

Special Considerations with PEEP

- Patients should be monitored closely for pneumothorax.
- Hypotension (Systolic BP less than 90)
- The airway should be monitored closely for the need to suction.
- Higher levels of PEEP can decrease ETCO<sub>2</sub>.
- Monitor for stacked breaths (Auto-PEEP) due to incomplete exhalation.
- Decreased tidal volumes are often required to achieve adequate chest rise with PEEP.
- Nebulized medications can be administered during PEEP use.

APPENDIX

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