CCT ADVANCED AIRWAY INTERIM GUIDANCE

A global pandemic due to the novel coronavirus (COVID-19) has precipitated a surge in calls for Emergency Medical Services (EMS) related to viral syndromes. This information is intended to help healthcare providers reduce the risk for SARS-CoV-2 (the virus that causes COVID-19) transmission, especially with regards to resuscitation care. The information presented is drawn primarily from U.S. Centers for Disease Control (CDC) recommendations. Centers for Disease Control and Prevention (CDC) guidance for EMS providers and healthcare personnel are continuously updated. All healthcare personnel should review these recommendations regularly. EMS providers may encounter a known or suspected symptomatic COVID-19 patient.

The COVID-19 virus will precipitate respiratory emergencies that may require treatment. The CDC has advised that these procedures are considered “HIGH RISK” and require full PPE.

Best practices for management of the COVID-19 outbreak are dynamic due to the rapidly evolving situation and changing scientific knowledge. In the interest of provider safety, infection control, and high-quality patient care, the following emergency protocol is enacted.

A. This protocol applies to CCT level providers for considerations for Airway, Ventilator, and Treatment Interventions during the COVID-19 Crisis.

B. Avoid aerosol producing interventions at all possible costs, these include: suctioning, nebulization treatments, BVM without a good seal and in-line viral filter, CPAP, BiPAP, HFNC, and intubation. If such procedures or CPR absolutely need to be performed, assure all participating crewmembers are in full PPE (N-95, face shield/eye protection, gown, and gloves).

C. If patients are hypoxic or demonstrating evidence of impending respiratory failure and confirmed or suspected COVID-19 patient under investigation (PUI):

1. Apply a non-rebreather face mask (NRFM) at 15 lpm to pre-oxygenate.

2. If saturations are still below 90% add a nasal cannula under the NRFM at 10 to 15 lpm as tolerated by the patient.

3. Perform early rapid sequence intubation (RSI) utilizing video laryngoscopy (VL) (whenever possible) to maintain distance from the patient’s airway limiting aerosol exposure and to increase the likelihood of first pass success. The intubation should be performed by the most proficient provider present.

4. Consider a plastic drape or barrier over the patient’s face to limit aerosol exposure.

D. Endotracheal tube selection:

1. A **cuffed tube** is preferred to ensure minimization of air leak (aerosolization). This applies to all patients, including pediatric and neonatal.

2. Appropriate tube size selection is imperative. Use the following table to calculate the correct tube size and depth of insertion for pediatric patients. These tube sizes are correct, even when they appear too large for the given patient. Select a smaller tube size only if the calculated size will not pass:

Age	ETT Size	Depth at Lip
Neonate	3.5	9 – 10 cm
3 months	3.5	10 – 11 cm
1 year	4	12 cm
2 years	4.5	14 cm
>2 years	(Age in years + 16)/4	3 x ETT size

E. RSI Medication selection:

1. Hemodynamically **unstable ADULT** patient:

   a. Sedation: Ketamine 2 mg/kg IV/IO
   b. Paralysis: Succinylcholine 1.5 mg/kg IV/IO
      Rocuronium 1 mg/kg IV/IO *(if Succinylcholine is contraindicated)*

2. Hemodynamically **stable ADULT** patient:

   a. Sedation: Etomidate 0.3 mg/kg IV/IO or Ketamine as above
   b. Paralysis: Succinylcholine 1.5 mg/kg IV/IO
      Rocuronium 1 mg/kg IV/IO *(if Succinylcholine is contraindicated)*

3. Hemodynamically **unstable PEDIATRIC** patient:

   a. Sedation: Ketamine 2 mg/kg IV/IO
   b. Paralysis: Rocuronium 1 mg/kg IV/IO

4. Hemodynamically **stable PEDIATRIC** patient:

   a. Sedation: Ketamine 2 mg/kg IV/IO **-or-** Etomidate 0.3 mg/kg IV/IO
   b. Paralysis: Rocuronium 1 mg/kg IV/IO

5. If hypoxic, these patients will have little to no pulmonary reserve, implying they will desaturate rapidly during RSI. Combat this by administering the sedative and paralytic in rapid succession followed by an appropriate flush. As soon as the jaw relaxes, and apnea occurs (apnea important to limit aerosolization) quickly place the endotracheal tube via VL.

6. Apply the viral filter between the bag-valve device and airway, then assure the circuit is completely closed prior to ventilating.

7. Confirm placement utilizing VL visualization, ETCO2, and auscultation.

8. If endotracheal intubation is unsuccessful, immediately replace it with a King airway. Inflate the cuffs to a sufficient volume, enough to assure no air leak. If there is an air leak, aerosolization, is occurring. No ventilations shall be administered until the circuit is closed with a viral filter in-line between the King airway and bag-valve.

9. COVID-19 confirmed/PUIs should be kept sedated and chemically paralyzed, during transport, to reduce the chance of accidental extubation or circuit disruption leading to potential aerosolization of viral contaminants. Once the airway is secured:

    a. Maintain sedation with one of the following agents per protocol or referring orders:
        - Midazolam
        - Ketamine
        - Propofol
        - Precedex

    b. Maintain analgesia with one of the following agents per protocol or referring orders:

        - Fentanyl
        - Morphine
        - Ketamine

    c. Administer a long-term paralytic for transfer to prevent self-extubation using one of the following agents:

        - Rocuronium 1 mg/kg IV/IO PRN patient movement
        - Vecuronium 0.1 mg/kg IV/IO PRN patient movement

    d. Monitor continuous ECG, pulse ox, and ETCO2.

F. Ventilator Strategies: Lung protective.

1. Volume control - **ADULT**

   a. Set volume at 6 - 7 ml/kg of **ideal body weight** *(not actual weight)*

   b. Set rate of 10 - 12/min and titrate higher for evidence of hypercapnia. Goal of ETCO2 = 35 – 45 mm Hg

   c. FiO2 1.0, titrate for goal SpO2 ≥ 90%.

   d. PEEP: COVID-19 causes extensive atelectasis leading to hypoxia, therefore PEEP is necessary. Begin with 5 cmH2O, gradually titrate in increments of 2 cmH2O up to 15 cmH2O. Keeping peak inspiratory pressure (PIP) ≤ 30 cmH20

   e. Contact Medical Command Physician (MCP) if FIO2 and PEEP have not met goal saturation.

   f. Keep the peak inspiratory pressure (PIP) ≤ 30 cmH2O.

2. Volume control - **PEDIATRIC**

   a. If you are uncomfortable estimating the patients ideal body weight choose pressure control (or) contact receiving facility Physician/MCP/Transferring Facility Physician for ventilator settings.

   b. Tidal volume at 6 - 8 ml/kg, target PIP < 30 cm H2O

   c. Rate – titrate for goal ETCO2 35 – 45 mm Hg. Begin with the following
   age-based rates:

      - <1y: 20-30 breaths/min
      - 1 to 12y: 15-25 breaths/min
      - >12y: 12-20 breaths/min

   d. FiO2: Begin with 1.0 and wean for goal SpO2 ≥ 90%

   e. PEEP: Begin with 5 cmH2O. Titrate at 2 cmH20 increments to a maximum of 12 cmH2O as needed to improve lung inflation and oxygenation. Keeping PIP < 30 cm H2O

   f. Contact MCP if FIO2 and PEEP have not met goal saturations

3. Pressure Control - **ADULT**: Consider if the above volume control adjustments cannot maintain the goal saturation.

   a. Switch to Pressure Control

   b. Rate 10-12/min and titrate higher per above.

   c. FiO2 100%, titrate per above

   d. PEEP 5 cmH2O and titrate up per above

   e. Keep PIP ≤ 30 cmH2O (if possible)

4. Pressure Control – **PEDIATRIC**: Consider if volume control adjustments cannot maintain goal saturation.

   a. Set ventilator to Pressure Control

   b. Target PIP 20-30 cmH2O to achieve tidal volume 6 - 8 ml/Kg. Keep PIP < 30 cmH2O (if possible).

   c. Rate – titrate for goal ETCO2 35 – 45 mm Hg Begin with the following age-based rates:

      - <1y: 20-30 breaths/min
      - 1 to 12y: 15-25 breaths/min
      - >12y: 12-20 breaths/min

   d. PEEP: Begin with 5 cmH2O. Titrate at 2 cm H20 increments to a maximum of 12 cmH2O as needed to improve lung inflation and oxygenation

   e. FiO2: Begin with 1.0 and wean for goal SpO2 ≥ 90%

5. If neither of these strategies work, contact MCP to consider increasing inspiration time gradually to try to improve alveolar recruitment. 

G. IV fluid volume resuscitation:

1. **ADULT**: Keep IV fluids at maintenance and bolus only if there are clear signs of dehydration or hypovolemia such as poor urine output, clinical exam, etc. This is because COVID-19 patients have not responded well to the 30 ml/kg bolus of IV fluid. Do not use an elevated lactate level as the only indicator of

dehydration status and need for IV fluids. Early utilization of vasopressors is recommended if hypoperfusion exists.

2. **PEDIATRIC:** COVID-19 patients may respond favorably to continued volume resuscitation in 20 cc/kg boluses up to 60 cc/kg, especially in the presence of clear evidence of hypovolemia (dry mucous membranes, tachycardia, hypotension, delayed capillary refill, poor skin turgor, etc.). Following adequate volume resuscitation, run IV fluids at maintenance. Vasopressors are recommended if hypoperfusion persists.

3. Early utilization of vasopressors is recommended if hypoperfusion exists.

H. Prone positioning:

1. Prone positioning has been demonstrated to improve alveolar recruitment and, therefore, oxygenation. Patients in referring facilities may have been placed in the prone position prior to transport team arrival. This position may be maintained during HEMS or critical care ground transfers, however, extra caution must be taken to prevent accidental extubation or disruption of the ventilator circuit.

2. Should CPR be required on a patient who is in the prone position, compressions are performed by compressing over the spine between the inferior medial borders of the scapulae in the standard hand arrangement or using both hands palms down, side by side, on either side of the spine, between the inferior medial scapulae.

3. Defibrillation pads should be appropriately applied to the patient at the referring facility, prior to securing the patient on the stretcher. Applying these pads on a prone patient during transport can be quite difficult.

I. It is essential that you notify the receiving facility, as early as possible, about your ETA and any potential complicating factors you may need assistance with such as: on-going aerosol producing interventions (CPAP, BiPAP, or HFNC), lack of an in-line viral filter, prone positioning, need for replacement PPE due to soiling, ventilator complications, need for additional oxygen/personnel, etc.