Department of Anesthesiology Guidance on Airway Management in COVID-19 Positive & COVID-19 Suspected Patients (Version 4 – May 6, 2020)

Michael Fierro, MD, Jason Vitek, MD, Ryan Davidovich MD, M. Tracy Zundel, MD, Jeffrey Kirsch MD, Rozalin Thapa DO, Timothy Lazicki DO, Jessica Zenga, MD, Carolyn Pinkerton, MD, Sheila Blogg, RN, MSN, Airway Response Team Committee, Medical Emergency Response Committee, Cindy Lien, MD, Kathy Lauer, MD

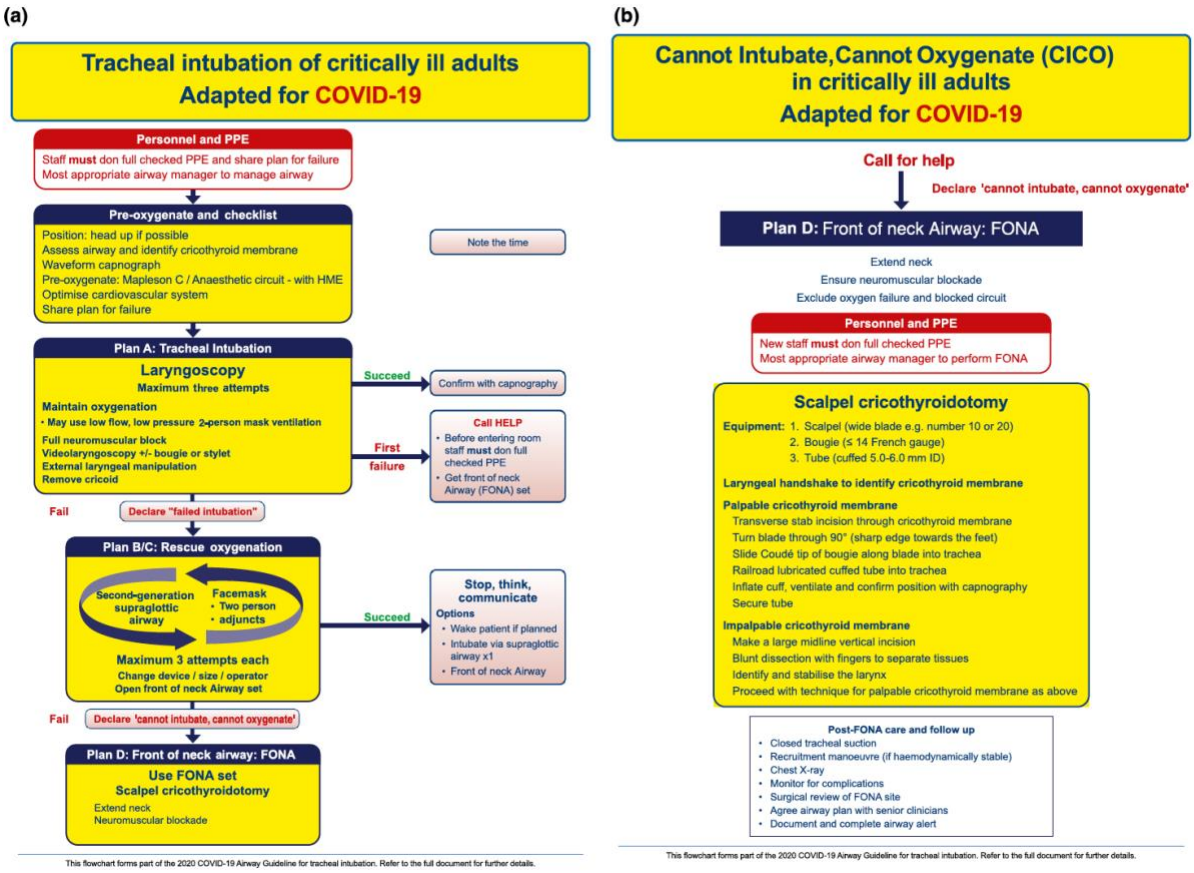
Purpose: This guidance is a compilation of (preferentially) peer-reviewed and non-peer reviewed literature published since the outbreak of COVID-19 pandemic. Always refer to the most recent policies for Personal Protective Equipment (PPE) utilization. This guidance is not prescriptive to individual patient management with an emphasis placed on provider judgement. Procedures in reference to airway response and code4 teams have also been approved by the respective hospital committees.

General Practices:[1-7]

1) Utilize PPE as directed based on Institutional Guidance for Aerosol-Generating Procedures (Refer to https://www.mcwanet.com/covid19/ for most recent documents)
2) For patients requiring tracheal intubation, performance of laryngoscopy as soon as patient conditions acceptable, without Bag-Mask Ventilation/Bag-valve-mask ventilation (BMV), is preferred whenever feasible. This includes OR intubation, out-of-OR intubations/Airway response team (ART), and ACLS encounters.
3) A viral filter or HMEF (Heat and Moisture Exchanging Filter) must be placed between the patient's facemask, LMA, or ETT and bag or circuit prior to initiation of ventilation
4) Intubating conditions should be optimized prior to utilization of laryngoscopy technique with greatest probability of first-pass success (Video Laryngoscopy unless clinical situation dictates otherwise). This includes:
    a. Preoxygenation with 100% oxygen and a tight-fitting mask for at least 5 minutes prior to intubation using normal tidal volume breathing
    b. Optimization of patient positioning (consider head elevated positioning)
    c. Rapid Sequence Intubation whenever feasible and appropriate clinically
5) The most experienced team member should perform intubation whenever possible
6) For Difficult Airways, consider utilization of flowsheet published in "*Consensus guidelines for managing the airway in patients with COVID-19*" - Contact on call trauma surgeon at earliest time front of neck airway/cricothyroidotomy is considered.[4]
7) If feasible, place LMA prior to attempts at BMV following failed intubation.
    a. Ensure LMA is well seated and minimize airway pressures when ventilating
    b. If utilized for prolonged ventilation, spontaneous negative-pressure ventilation through LMA is preferred if feasible
8) Bag-Mask Ventilation/Bag-valve-mask ventilation (BMV) should be two-handed, with most experienced person at airway management securing the mask. A tight seal is essential to reduce aerosolization and the lowest necessary tidal volumes should be utilized. Consider oral-pharyngeal airway (eg Berman or Guedel) or nasal airway.[2,4]

9) Avoid fiberoptic intubation unless specifically required (topicalization of airway and suctioning through bronchoscope both cause aerosolization)

Difficult Airway Algorithm:



Guidance for specific situations in addition to above “General Practices”:

Operating Room:

Refer to departmental policies regarding for COVID positive/PUI patients versus non-COVID suspected patients for PPE utilization and generalized procedural guidance.

1) Perform an RSI (ensure a skilled assistant is available to perform cricoid pressure) or a modified RSI as clinically indicated. If manual ventilation is required, apply small tidal volumes.[1]

2) Prepare to preoxygenate for a minimum of 5 minutes with 100% oxygen and perform a rapid sequence induction (RSI) in order to avoid manual ventilation of patient's lungs and potential aerosolization of virus from airways. Utilize end-tidal oxygen monitoring to ensure efficacy of preoxygenation.[1]

3) Avoid BMV unless necessary to provide oxygenation or decarboxylation to the patient in order to prevent decompensation (Examples of situations in which BMV should be considered: Patient has contraindication to RSI; inability to intubate using video laryngoscopy; Incorporation of BMV in difficult airway algorithm)

Airway Response Team:

This practice suggestion refers only to COVID-19 positive or suspected patients. ART responders will be notified of changes to the hospital policy.

1) Preoxygenate for a minimum of 5 minutes with patient taking normal-tidal volume breaths, using 100% oxygen/10 LPM Ambu flow and perform a rapid sequence induction (RSI) in order to avoid manual ventilation of patient's lungs and potential aerosolization of virus from airways. [1]

2) Consider manual positive pressure ventilation using BMV if preoxygenation fails to improve oxygenation and a tight mask seal can be achieved.[2,3,5,6]

3) Consider utilizing clear plastic sheet over the patients face during preoxygenation and airway management if feasible

4) During huddles, establish and convey plans for airway management and induction medications (including how they should be administered) with RT and RN

5) The use of high-flow nasal cannula (HFNC) for pre-oxygenation is controversial due to possible risk of spread of contagion through aerosolization. [4,6,7,8,9] In our institutional experience some COVID-19 patients have experienced desaturations during transition from HFNC to passive oxygenation with BVM. Consider continuation of HFNC for preoxygenation on in patient currently on the therapy at time of ART call.

> *"Given the lack of evidence regarding the safety of HFNC during tracheal intubation, its use should be based on the benefit/risk ratio in individual patients. In the absence of clear evidence, high-level PPE precautions should be used when HFNC is used during intubation."*[7]

Code4 Responses:

As of the time of publication of this guidance, the below statements refer only to COVID-19 positive or suspected patients. Continue to follow standard AHA ACLS guidelines for non-COVID patients. Utilize PPE based on hospital guidance.

Based on AHA Guidance and Departmental/Institutional Review, the following modifications to CPR can be used at the discretion of the anesthesiologist and respiratory therapist on the code team.[3]

Recommendation 1a: For patients with cardiac arrest and an unprotected airway, the first responders to the scene will continue to provide compression-only CPR without assisted ventilation. The patient's face should be covered with a disposable gown, bedsheet, or other lightweight barrier.

Recommendation 1b: For patients with cardiac arrest and an unprotected airway, the following modifications to CPR can be used at the discretion of the anesthesiologist and respiratory therapist on the code team. Priority must be placed on early establishment of an artificial airway.

- Provide patient with passive flow oxygenation using a bag-valve-mask (BVM) with a tight seal and viral filter.
- Prioritize early intubation with optimization of conditions.
- A videoscope should be utilized, if available.
- CPR may be paused at the discretion of the anesthesiologist.
- If intubation is delayed or unsuccessful consider low-tidal volume, 2-hand bag mask ventilations with tight seal by anesthesiologist and RT or placement of supra-glottic airway.

Recommendation 2: During cardiac arrest in a patient with an advanced airway that is connected to the ventilator, disconnect from the ventilator and provide ventilations using a BVM with tight seal and viral filter. Clamp endotracheal tube whenever ventilator or BVM detached and/or upon termination of resuscitation efforts.

Recommendation 3: For a patient in prone position at the time of arrest, responders are to fully don recommended PPE prior to entering room. Patient is to be placed in the supine position before beginning compressions, providing assisted breaths, or attempting to secure the airway.

<u>Appendix:</u>

In a study of aerosolization, the dispersion of exhaled air with bag-mask ventilation by anesthesiologists resulted in spread of 128 ± 21 mm (approximately 4-6 inches) when using the Ambu silicone resuscitator mask and a viral filter. Dispersion distance increased when BMV performed by other groups.[10]

In a study of HFNC gas dispersion, Mean ± SD exhaled air distances increased from 65±15 to 172±33 mm when HFNC was increased from 10 to 60 L·min^{-1}. Air leakage to 620 mm occurred laterally when HFNC and the interface tube became loose. Distance decreased with increasing severity of respiratory failure.[11]

References:

1) Anesthesia Patient Safety Foundation Perioperative Considerations for the 2019 Novel Coronavirus (COVID-19) https://www.apsf.org/news-updates/perioperative-considerations-for-the-2019-novel-coronavirus-covid-19/
2) Intubation and Ventilation amid the COVID-19 Outbreak: Wuhan's Experience, Meng et al., *Anesthesiology* 2020; XXX:00–00
3) ACLS Cardiac Arrest Algorithm for Suspected or Confirmed COVID-19 Patients: https://cpr.heart.org/-/media/cpr-files/resources/covid-19-resources-for-cpr-training/english/algorithmacls_cacovid_200406.pdf?la=en&hash=C8D69AA2B4226798CA5D293CC5A36A5D57697D1C
4) Consensus guidelines for managing the airway in patients with COVID-19 Guidelines from the Difficult Airway Society, the Association of Anaesthetists the Intensive Care Society, the Faculty of Intensive Care Medicine and the Royal College of Anaesthetists. Cook, et al. *Anaesthesia*, 2020.
5) *UpToDate: "Coronavirus disease 2019 (COVID-19): Airway management, anesthesia machine ventilation, and anesthetic care"*
6) Brewster, et al. Consensus statement: Safe Airway Society principles of airway management and tracheal intubation specific to the COVID-19 adult patient group. The Medical Journal of Australia - Preprint only - Version 2, updated 1 April 2020
7) Yao, et al. Emergency tracheal intubation in 202 patients with COVID-19 in Wuhan, China: lessons learnt and international expert recommendations. British Journal of Anesthesiology. Proof. Accepted March 31, 2020.
8) Cornell/New York Presbyterian/Columbia Guidelines: https://www.cuimc.columbia.edu/file/44538/download?token=luHx0iV_
9) Kotoda, M et al. Assessment of the potential for pathogen dispersal during high-flow nasal therapy. Journal of Hospital Infection. J Hosp Infect. 2020 Apr;104(4):534-537.
10) Chan, MTV et al. Exhaled air dispersion during bag-mask ventilation and sputum suctioning - Implications for infection control. Sci Rep. 2018 Jan 9;8(1):198
11) Exhaled air dispersion during high-flow nasal cannula therapy *versus* CPAP *via* different masks. Eur Respir J. 2019 Apr 11;53(4).