

Airway Management in COVID 19 Patients Guidelines

I. Introduction:

A. Background:

Severe acute respiratory syndrome-corona virus-2 (SARS-CoV-2), which causes COVID-19, is a single-stranded ribonucleic acid -encapsulated corona virus and is highly contagious.

Transmission is thought to be predominantly by droplet spread (i.e. relatively large particles that settle from the air), and direct contact with the patient or contaminated surfaces (fomites), rather than airborne spread, in which smaller particles remain in the air longer.

Initial airway management procedures in Emergency & Intensive Care Departments may generate aerosols which will increase risk of transmission. Healthcare workers (HCW) treating patients with COVID-19 are at increased risk of contracting the illness.

B. Aim of the Scope:

The aim of this guidelines is to provide HCWs with a well-organized approach to manage airway for the COVID 19 patients in Emergency & Intensive Care Departments, to protect them and optimize and increase the chances of successful first attempt intubation. The guideline was developed by doing a literature review by 3 reviewers and coming up with the written document. The next step was having a meeting with 20 ICU consultant to review the final version. Conflicts were solved by discussion and voting.

C. Purpose:

- (1) Reduce risk of a viral airborne spread.
- (2) Maximize first attempt success.
- (3) Encourage use of Indirect glottic visualization with video laryngoscopy (VL).
- (4) Reduce personnel exposure.

D. Targeted Population:

All adult COVID 19 patients who are requiring airway management in the ED, hospital wards, and ICUs.

E. Targeted End User:

- (1) Adult Emergency Medicine physicians
- (2) Adult Critical Care Medicine physicians
- (3) Adult Anesthetist physicians.

F. Conflict of interest:

No conflict of interest.

G. Funding:

None.

II. Airway Management:

A. Tracheal intubation in Critically ill Patients:

This is a high-risk procedure with physiological difficulty. Around 10% of patients in this setting develop severe hypoxemia (SpO₂) and 2% experience cardiac arrest. The increased risk of HCW infection during multiple airway manipulations necessitates the use of airway techniques which are reliable and maximize first-time success. This applies equally to rescue techniques if tracheal intubation fails at first attempt. All COVID 19 patients requiring airway management should be considered as a difficult airway and all preparation should take into consideration this point.

B. Aerosol Generating Procedure:

Aerosol-generating procedures (AGP) are procedures that stimulate coughing and promote the generation of aerosols. Additional infection prevention and control precautions are required for some AGP where an increased risk of infection has been identified. A systematic review of infection risk to HCWs, based on limited literature, ranked airway procedures in descending order of risk as:

- (1) Tracheal intubation.
- (2) Cricothyroidotomy.
- (3) Tracheostomy.
- (4) Non-invasive ventilation (NIV).
- (5) High Flow Nasal Cannula Oxygenation (HFNO).
- (6) Mask ventilation.

Other potentially AGPs include disconnection of ventilatory circuits during use; tracheal extubation; cardiopulmonary resuscitation (before tracheal intubation); bronchoscopy and tracheal suction without a closed in-line system.

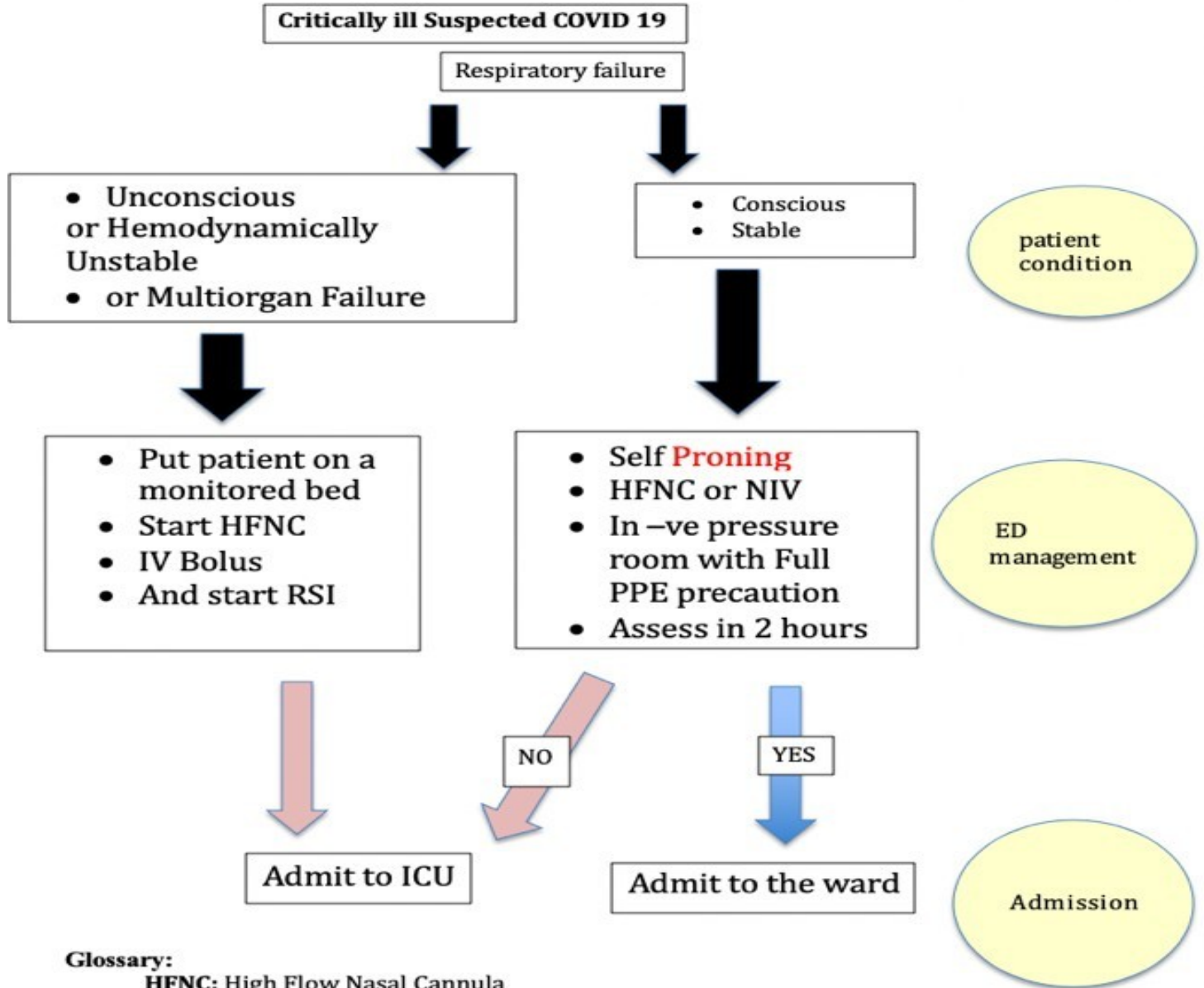
C. Indication for Intubation in COVID 19:

- (1) Increase work of breathing & signs of organ failure (e.g. altered mental status, low BP, increase lactate, signs of cardiac ischemia).
- (2) Acute hypoxic respiratory failure not responding to HFNO nor BiPAP for 2 hours.
- (3) Hypoxia with acute decrease level of conscious and cannot protect his airway.
- (4) Hypoxia with large copious secretions.
- (5) Hypercapnic respiratory failure not responding to HFNO nor BiPAP.
- (6) Hemodynamically unstable.
- (7) Consider in patient on HFNO or BiPAP therapy and for transfer by ambulance.

D. Patient who are in respiratory distress and need assistance, a trial of HFNO should be strongly considered prior to intubation if available (see figure in next page).

- E. If HFNO is not available, and oxygenation and ventilation support is needed, **intubation is recommended instead of attempts to primarily manage with noninvasive positive pressure ventilation (NIPPV).**
- F. NIPPV or HFNO (if used) should be performed in a negative pressure room. If negative pressure room is not available, then the room has to have at least a HEPA filter. Prior SARS experience showed that BiPAP and manual bagging both increase the risk of airborne viral particles and > 90% of patients ultimately failed trials of NIPPV.
- G. Intubate in a negative pressure room, and if not available, then HEPA filter should be available in the room while intubating.
- H. Avoid nebulized medication administration whenever possible.
- I. **Rapid sequence intubation (RSI) should be the method for intubation.**
- J. During RSI, use high-dose neuromuscular blocking agents (NMBA) for faster and complete apnea with no residual cough. It is preferred to use rocuronium 1mg/kg rather than succinylcholine as it has a longer duration and will prevent post intubation coughing on the mechanical ventilator until patient is well sedated.

Clinical pathway for COVID 19 suspected patients with respiratory failure:



Glossary:

- HFNC:** High Flow Nasal Cannula
- NIV:** Non invasiva ventilation
- RSI:** Rapid sequence intubation
- PPE:** Personal protective equipment

III. The 7 Ps approach should always be used in intubation:

A. Preparation:

- (1) 3 HCW should be available during the procedure: 1 to intubate, 1 to assist [respiratory care practitioner (RCP) or a nurse], 1 to give the medication (nurse).
- (2) Full PPE should be applied before intubating: (surgical or yellow gown, face shield, N95, double gloves, head cover, foot cover).
- (3) Procedure should be done in a negative pressure room. If not available, the room should have HEPA filter.
- (4) The minimal number of health care workers should be in the room.
- (5) The most expert person should be the one who intubate the patient (preferably anesthesia if available at time of intubation).
- (6) The patient should have 2 large bore peripheral IV cannulas (14-16 gauge) before intubation.
- (7) An intubation trolley should be always prepared and ready in the ICU or ED. This should include:
 1. Oral Airways different sizes.
 2. Nasal Airways different sizes.
 3. Malleable ETT stylets.
 4. Laryngoscope with size 3 and 4 Macintosh blade (preferable disposable).
 5. Different sized of ETT (from size 7.5-8.5).
 6. Ambo Bag Adult Size.
 7. Oxygen tubing.
 8. Elastic bougie.
 9. 10 or 15 cc syringe.
 10. Yanker suction.
 11. Suction tubing.
 12. ETCO2 detector.
 13. ETT securing device.
 14. Stethoscope (preferred disposable).
- (8) A difficult airway kit should be always ready on the ED or ICU and should include laryngeal mask airways (LMAs) with different sizes, elastic bougies, percutaneous cricothyroidotomy kit)
- (9) Video Assisted Laryngoscopy (e.g. Glidoscope, MAC) should be ready all the time with disposable blades.

B. Pre-Oxygenation:

- (1) Preoxygenation should be done by non-rebreather oxygen mask on 15L/min. Manual bagging and PPV should be avoided an only performed if clinically required.
- (2) Low volume and higher frequency approach if bagging is required.

C. Pre-Medication:

- (1) Atropine: if patient develops bradycardia secondary to intubation (dose 0.5-1mg IV).
- (2) Fentanyl: in case patient has high BP (SBP>180mmHg) before intubation (dose: 0.5-1mcg/kg IV).
- (3) Phenylephrine: in case of low BP (SBP< 90mmHg) during intubation (dose 50- 100mcg IV), OR
- (4) Ephedrine: in case of low BP (SBP<90 mmHg) during intubation (5-25mg IV).

D. Paralysis & Sedation:

- (1) **Sedation (see Appendix 1):**
 - Option 1: Etomidate.
 - Option 2: Propofol.
 - Option 3: Midazolam & Fentanyl.
 - Option 4: Ketamine.
- (2) **Paralysis agent (see Appendix 2):**
 1. Option 1: Rocuronium: 30-60 sec to have effect, longer duration, dose 1mg/kg IV (preferred).\
 2. Option 2: Succinylcholine: 5-15 sec to have effect, short duration, dose 1.5mg/kg IV. Should avoid in:
 - CRF patients.
 - Burn patients.
 - Neuromuscular disease patients.
 - Large stroke patients.
 - Malignant hyperthermia.

E. Put the tube (intubation):

- (1) The most expert Intubator around should do the intubation.
- (2) After assuring full PPEs, a cuffed ETT size 8-8.5 in male patients, and 7-7.5 in female patient should be placed with video assisted laryngoscopy (e.g. glidoscope).
- (3) 10-15 cc syringe full of air should be used to inflate the ETT balloon to secure it.
- (4) Once tube is inserted in the airway, viral filter (or if not available than HME filter) should be connected on the ETT before connecting to the Ambo bag.
- (5) ETCO2 should be connected to the Ambo bag to confirm placement of ETT.

F. Post Intubation Care:

- (1) Auscultation of the chest to confirm air entry in both lungs with disposable stethoscopes if available.
- (2) ETT should be immediately secured by ETT securing device.
- (3) Assess patient vital signs and saturation immediately post intubation.
- (4) Start patient on sedation infusion immediately.

- (5) Insert an NGT or OGT.
- (6) Connect the patient to the ventilator with appropriate setting and assure closed suctioning system.
- (7) Order a CXR to confirm placement.

G. Reduce Personnel Contamination:

- (1) Enhanced droplet PPE.
- (2) Bonnet, N95 or PAPR, goggles, face shield, gown, and gloves pulled over end of gown Sleeves.
- (3) Follow all donning and doffing procedures with observer-ensured compliance.
- (4) Only clinicians that have completed PPE training can intubate.
- (5) Minimize number of clinicians in the room needed to complete the intubation.
- (6) Limit to a 3-person intubation team when possible: Primary RN, RT and MD.
- (7) SARS experience revealed that cross contamination was highest when > 3 people were in the room.

IV. References

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APPENDIX 1 Sedative Medications for Induction During Intubation

Name	Dose (IV)	Advantages	Disadvantages
Etomidate	0.3mg/kg	Rapid onset, ultrashort duration, reduced ICP, no effect on hemodynamics	nausea and vomiting, adrenal insufficiency (rare)
Propofol	1-1.5mg/kg	Rapid onset, short duration, reduced ICP, anti-nausea, anti- seizure	Lower BP, pain at site of administration (use large bore cannula in large peripheral veins), allergy (very rare and in people with anaphylaxis secondary to Eggs)
Ketamine	1-1.5mg/kg	Rapid onset, duration 10-15 min, analgesic effect, bronchodilators, no effect on hemodynamics, improved CPP	Masseter muscle spasm, urgency hallucination.
Midazolam	0.05-0.1mg/kg	Rapid onset, short duration, antiseizure	Negative inotropic effect, variable effect
Fentanyl	1-2mcg/kg	Analgesic, fast onset, duration 30- 60 min, decrease sympathetic stimulation	Negative inotropic effect, acute chest rigidity syndrome

APPENDIX 2 Paralytic Agent for Intubation

Name	Dose (IV)	Advantage	Disadvantage	Antidote
Rocuronium	0.6-1mg/kg	No side effects	Longer action (30-60 sec). Duration (30-60 min).	Sugammadex (16mg/kg IV)
Succinylcholine	1-1.5mg/kg	Rapid Onset (10-15 sec) Short duration (6-10 min)	Hyperkalemia. Malignant hyperthermia. Cardiac dysrhythmias. Masseter muscle spasm. Increase IOP	None

*IOP: intraocular pressure