1. INTRODUCTION

1.1 Endotracheal Intubation is an invasive procedure, which is frequently performed, in the critically ill patient. This procedure, which is lifesaving, most of the times is done in urgent or emergent situation.

1.2 It is challenging procedure and causes a significant risk of morbidity & mortality.

1.3 Endotracheal intubation in COVID19 patient adds additional challenge because it is an aerosol generating procedure that increases the risk of virus transmission to the health care workers.

1.4 This guidelines for endotracheal intubation in COVID19 patients aim to make this challenging procedure safe for staff and patient, accurate-avoiding unreliable, unfamiliar or repeated techniques, and swift-timely, without rush or delay.

2. PURPOSE

2.1 To provide the ICS staff with the guideline for endotracheal intubation in COVID19 patient.

2.2 To maximize the first attempt intubation success.

2.3 To maintain the patient safety.

2.4 To reduce personnel exposure and improve staff safety.

3. APPLICABILITY

3.1 It is applicable to all the ICS healthcare workers involved in the care of COVID19 patients.

4. RESPONSIBILITIES

4.1 Director & his designee along with the Head of Respiratory Care Division of ICS is responsible for the implantation and compliance of this policy.

5. POLICY

5.1 The ICS staff should obtain patient/relative consent for the procedure of intubation except in emergent or life-threatening situation.

5.2 All intubations for COVID19 patients, in the ICS coverage areas should be done by the most appropriate or expert physician. As minimum he/she is either a senior resident who completed three years in critical care residency program, or a fellow in the second year of the ICU fellowship program other than Registrar & Senior Registrar of ICS.

5.3 The decision of intubation should be made by a Team Leader/Senior Registrar/Consultant ICS.

5.4 The intubation in COVID19 patient is an aerosol generating procedure and should be done only in negative pressure room or in the presence of portable HEPA filter at least, as recommended by PSMMC infection control committee.

5.5 The number of team should be minimized to 4-5 staff including the inside and outside the room team as the following: the physician intubator, a trained/ICU nurse, and an expert RT inside the room; an ICU nurse and/or Respiratory Therapist (RT) as a runner outside the room.

5.6 All equipment should be prepared outside the room before entering the room using preparation checklist in the COVID19 patient intubation trolley (Appendix I).

5.7 The Bag Valve Mask (BVM or Ambu) device circuit should be prepared outside the room. (Appendix II).

5.8 The team leader should define the method of communication between outside and inside room teams before entering the room.

5.9 All the inside room assigned team should do hand hygiene before entering the room and don the appropriate PPE that recommended by PSMMC infection control committee including: (1) A particulate respirator N95 (or equivalents)/ PAPR/CAPR, (2) Eye protection (goggles, face shield), (3) A clean, nonsterile, long-sleeved, fluid-resistant gown and (4) Non-sterile double gloves.

5.10 The patient's airway always should be assessed for difficulty of intubation.

5.11 If the patient is known/expected difficult airway, the physician operator should inform his/her Senior Registrar/Consultant for back-up plan, prepare for difficult airway, and prepare for the front of neck access.

5.12 Difficult Airway Society (DAS) algorithm in critical COVID19 patient will be followed in case of unexpected difficult airway. (Appendix III).

5.13 RT is responsible for COVID19 patient intubation trolley equipment and preparation, and any other equipment for expected difficult airway as requested by the physician including: hyper-angulated video laryngoscope, intubating LMA or bronchoscope.

5.14 ICU/expert nurse is responsible for preparation of adjunct medications that facilitate intubation as per physician request.

5.15 COVID19 patient intubation form must be completed by the physician including the airway difficulties (Appendix IV)

6. PROCEDURES

6.1 Indications of endotracheal intubation in COVID19 patient are:

6.1.1 Hypoxemic Respiratory failure that is refractory to HFNO/NIV therapy.

6.1.2 Severe respiratory distress that is refractory to HFNO/NIV therapy.

6.1.3 Hypercapnic respiratory failure not responding to NIV.

6.1.4 Decreased level of consciousness.

6.1.5 Unable to protect the airway.

6.1.6 Hemodynamic shock.

6.1.7 Multi-organ failure unless DNR

6.2 Airway Assessment:

6.2.1 The patient should be assessed for airway difficulty before the procedure.

6.2.2 MACOCHA Score is recommended for critical and COVID19 patient (Appendix V).

6.2.3 If MACOCHA score is <3, difficult intubation is unlikely, and it is considered as regular preparation and DAS guidelines are to be followed.

6.2.4 If MACOCHA score is ≥3, difficult intubation is anticipated, and special preparation and back-up plan are recommended.

6.2.5 Mallampati classification can be done in supine position if sitting position is not possible.

6.2.6 Check and define the cricothyroid membrane.

6.3 Preparation:

6.3.1 Use COVID19 patient intubation trolley preparation checklist.

6.3.2 The Bag Valve Mask (BVM or Ambu) device circuit should be prepared outside the room in the following manner: The Ambu + $ETCO_2$ + HME/Viral filter + mask ± PEEP valve (Appendix II).

6.3.3 The equipment for difficult airway including hyper-angulated video laryngoscope, intubating LMA or bronchoscope, should be kept ready and outside the room if requested by the physician.

6.3.4 Prepare the adjunct medications for induction (Hypnotic, NMBA), and a vasopressor (phenylephrine or ephedrine) to prevent/treat hypotension.

6.3.5 Cover the patient with clear plastic drape or transparent aerosol box to increase protection if available.

6.4 Preoxygenation:

6.4.1 All patients should be pre-oxygenated using the Ambu device circuit with a well-fitting mask for 3-5 minutes.

6.4.2 Do not use NRFM, HFNO or NIV for pre-oxygenation (risks of virus aerosolization).

6.4.3 In case of uncooperative patient, a low sedating dose of ketamine (<1 mg/kg) can be used to facilitate pre-oxygenation.

6.5 Induction and intubation method:

6.5.1 Head-up position 25-45° is recommended in all critical COVID19 patients once possible.

6.5.2 Modified rapid sequence induction is recommended using a hypnotic agent followed by a rapid acting muscle relaxant (NMBA).

6.5.3 Awake intubation technique is not preferred for COVID19 critical patient, due to the risk of virus aerosolization. But it should be performed by a Senior/Consultant physician if it is planned.

6.5.4 Adjunct medications for intubation (especially hypnotics) should be used cautiously and in low doses in critical unstable patients. Ketamine is the preferred hypnotic agent in case of hemodynamic instability. For medication options look at (Appendix VI).

6.5.5 ICU/expert nurse administers the medications on the order of physician.

6.5.6 Manual BVM ventilation may cause aerosolization of the virus and should be minimized unless the patient develops hypoxia before introducing the ETT, then 2-person2-handed mask gentle ventilation with V-E grip technique (not C-E) is recommended to improve seal and minimize gas leak after induction.

6.5.7 Cricoid pressure is optional, but if used it should be aborted once there is problem in ventilation or intubation.

6.5.8 Put the patient in appropriate position for laryngoscopy, sniffing position (or RAMP position in morbidly obese), to increase the success rate.

6.5.9 Video laryngoscope is preferred to be used as the first laryngoscopy method in COVID19 patient for high successful trial and staff protection.

6.5.10 Difficult intubation should be considered after the first failed attempt, and the physician operator should inform his/her Senior/Consultant for back-up plan, prepare for difficult airway and prepare for front of neck access.

6.5.11 As DAS guidelines for intubation in COVID19 patient, 3 attempts as maximum are allowed for the operator and fourth attempt should be left for the senior physician.

6.5.12 Do not use techniques you have not used before or are not trained in, and use vortex cognitive aid in case of failure (Appendix VII).

6.5.13 ETT size 7-8 for women or size 8-9 for men with a subglottic suction port is recommended to be used to decrease the risk of VAP. Pass the ETT cuff 1-2 cm below the vocal cords, note and record the depth.

6.5.14 In case of can't intubate can't oxygenate (CICO) scenario, supra-glottic airway as rescue oxygenation device should be tried. If fails, front of neck access is a lifesaving procedure; surgical scalpel cricothyroidotomy technique is recommended to be used, and cricothyroidotomy kit is a second option.

6.6 ETT confirmation:

6.6.1 ETT confirmation is mandatory before securing the tube.

6.6.2 ETT should be confirmed by physician using wave capnography as the gold standard if available, or CO2 colorimetric detector.

6.6.3 Watching the chest rising with ventilation is recommended.

6.6.4 Ultrasound can be used to confirm ETT and appropriate level in expert hand.

6.7 Post-intubation care:

6.7.1 Once ETT position is confirmed, it should be secured and tied by RT at the level of the lips.

6.7.2 Check vital sings immediately after intubation.

6.7.3 Connect the ETT to the ventilator circuit with HME quickly. Avoid circuit disconnection (push twist all connections), and clump tube for any disconnection.

6.7.4 NGT/OGT should be inserted immediately after securing the ETT.

6.7.5 CXR should be requested to confirm the level of ETT and NGT/OGT.

6.7.6 If COVID-19 patient is not yet confirmed take a deep tracheal aspirate using closed suction and send it for the SARS-COV2 PCR test.

6.7.7 Complete the COVID19 patient intubation form, including difficult airway plan.

6.7.8 Order to discard the disposable equipment safely and to decontaminate reusable equipment accordingly.

6.8 Complications:

6.8.1 Upper airway trauma.

6.8.2 Trauma to teeth.

6.8.3 Bleeding.

6.8.4 Pneumothorax / surgical emphysema.

6.8.5 Hypoxia.

6.8.6 Hypotension.

6.8.7 Arrhythmias.

6.8.8 Infection.

6.8.9 Aspiration pneumonitis.

6.8.10 Oesophageal intubation.

6.8.11 Failed intubation.

6.9 Documentation:

6.9.1 The procedure should be documented by the physician in the COVID19 intubation form including the type of intubation difficulty and complications.

7. REFERENCES

7.1 Consensus guidelines for managing the airway in patients with COVID-19, Guidelines from the Difficult Airway Society, the Association of Anesthetists, the Intensive Care Society, the Faculty of Intensive Care Medicine, and the Royal College of Anesthetists, T. M. Cook, K. El-Boghdadly et al , March 2020.

7.2 Consensus statement: Safe Airway Society principles of airway management and tracheal intubation specific to the COVID-19 adult patient group, David J Brewster, Nicholas C

Chrimes et al, 1Safe Airway Society (SAS), ANZICS, the Medical Journal of Australia preprint 17March, 2020.

7.3 Airway management COVID 19, Società Italiana di Anestesia Analgesia Rianimazione e Terapia Intensiva (SIAARTI) Feb-March 2020.

7.4 Principles of airway management in Coronavirus COVID-19, department of Anesthesia and Intensive care, Prince of Wales, Hong Kong, Feb 2020.

7.5 Interim Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed Coronavirus Disease 2019 (COVID-19) in Healthcare Settings, March 2020.

7.6 Severe Acute Respiratory Infections (SARI) Treatment Centre Practical manual to set up and manage a SARI treatment center and a SARI screening facility in health care facilities, WHO March 2020.

7.7 Clinical management of severe acute respiratory infection (SARI) when COVID-19 disease is suspected, interim guidance, WHO 13 March 2020.

7.8 Guidance on rapid sequence induction in patient with proven or suspected COVID-19, simulation video on YouTube, King's College Hospital, London, NHS foundation trust March13, 2020.

7.9 Chinese Clinical Guidance for COVID-19 Pneumonia Diagnosis and Treatment (7th edition), National health commission, March4 2020.

7.10 Airway Management in COVID 19 Patients Guidelines, MOH, KSA, May13,2020.

8. APPENDICES

8.1 Appendix I (Preparation checklist in the COVID19 intubation trolley).

8.2 Appendix II (BVM "Ambu" device circuit).

8.3 Appendix III (DAS tracheal intubation algorithm of critically ill COVID-19 adults).

8.4 Appendix IV (COVID19 intubation form).

8.5 Appendix V (MACOCHA score).

8.6 Appendix VI (Medication adjuncts for endotracheal intubation).

8.7 Appendix VII (Vortex cognitive aid).

9. CONTRIBUTING DEPARTMENT

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