



## COLLEGE OF ANAESTHESIOLOGISTS & INTENSIVISTS OF SRI LANKA

### INTERIM GUIDELINES ON INTUBATION OF A SUSPECTED OR POSITIVE PATIENT WITH COVID-19

(03<sup>rd</sup> April 2020)

Protecting healthcare workers is a major priority, as they are the primary line of defence during management of patients diagnosed or suspected with novel corona virus (COVID-19).

Indications for intubation and outcome, following ventilation should be assessed before escalating treatment. Intubation should be planned and performed by the most experienced personnel, with a clear post- intubation strategy.

Due to the recent pandemic and its rapidly evolving nature there might be a scarcity of direct evidence and most recommendations are based on consensus. We will update the guidelines accordingly with emerging evidence and recommendations where appropriate.

Advice and recommendations stated in this guideline should be used in conjunction with local workplace policies.

#### 1. Aerosol-generating procedures (AGP)

Endotracheal intubation, tracheal extubation, open suctioning, nebulization, mask ventilation, providing ventilation breaths before inflation of an endotracheal cuff, tracheostomy and providing non-invasive positive pressure ventilation are procedures related to airway manipulation, which are prone to generate aerosols.

Therefore, all health care workers (HCW) involved in performing intubation should wear full personal protective equipment (PPE).<sup>1</sup> Your safety is priority.

**Intubation is an AGP. Full personal protective equipment (PPE) is recommended.** This includes fit tested respirator mask (N95, FFP2 equivalent)<sup>1</sup> along with long sleeved water proof gown, eye protection (face shields or goggles, ideally full protective head gear which includes both), double gloves<sup>2</sup> and foot protection.

Wearing double gloves may prevent fomite contamination of the surroundings and equipment after the intubation procedure. HCW must be familiar and trained in infection control and prevention strategies and in donning and doffing of personal protective equipment.

Ensure all personal belongings (stethoscope, watch, wallet, jewellery etc) are kept outside the intubation room. **Ideally the procedure should be carried out in a negative pressure room** where the number of air changes should be >12 exchanges per hour or in an isolation room. However, most places where intubation is carried out would be either positive pressure or normal pressure rooms. Ensure that the doors are closed in such instances to avoid spread of aerosols to the environment.

## 2. Patient Safety

Intubation of COVID suspected or positive patients can be challenging to the anaesthesiologist as well as to the patient. Therefore, safety of both the operator and the patient is of paramount importance.<sup>3</sup>

These patients will present with underlying myocardial injury resulting in haemodynamic instability, low oxygen reserves and multi-organ failure. Based on world-wide experience most centres recommend a rapid sequence induction (RSI) and intubation by the most experienced person in the team.<sup>2 3 4</sup>

**RSI** is recommended during intubation as it avoids assisted ventilation. Muscle relaxants (suxamethonium/rocuronium) are highly recommended.

Intubation should be performed **by the most experienced person** in the respective unit.

If positive pressure ventilation breaths are required in the presence of a high alveolar to arterial (A-a) gradient and where rapid desaturation is anticipated, small tidal volume breaths can be given using the 2-person 2-hand technique (vice grip or the V-E technique)<sup>2</sup>. It has been suggested by some centres to use a wet gauze around the patients' mouth or nose during this manoeuvre to limit aerosol generation.<sup>2</sup>

During an unanticipated difficult airway or in a non-perioperative setting the challenges faced by the operator will be compounded by multiple factors. Therefore, an airway trolley for COVID patients and a care plan should be in place.<sup>3</sup> It would be useful to have the Difficult Airway Society 2018 (DAS) algorithm available in all designated areas as a cognitive aid.

## 3. Communication

This is a key component before, during and after the procedure. Prior preparation and planning are mandatory. Minimum number of personnel should be involved (limit to a 3- member team) in intubation. The airway operator should be the most skilled person in intubation in the respective unit and there should be an experienced assistant and a team leader, who could administer drugs and monitor the patient. The runner must remain away or outside the intubation room at all times and should summon help and assist the team while maintaining the distance.

Verbal communication during the procedure is a challenging task as the team members will be in the coveralls. Plan how to communicate before entering the intubation room/bay. Names of the team members should be clearly written by pen or marker on the gown before the team enters the room for intubation. Body language can be helpful during the procedure.<sup>5</sup>

Discussion with patient and obtaining verbal consent for intubation will also be a challenging task in this situation.<sup>5</sup>

**Elective intubation is preferred** over a crash intubation. Communicate the primary “plan of action” and the rescue plan before the procedure and allocate tasks. Maintain **closed-loop communication**. (Annexure 1)

Inform the transfer team and destination (ICU). Minimize the number of personnel in the room.<sup>6</sup>

**Maintain a checklist during preparation.** Plan the intubation technique. During a difficult airway follow the Difficult Airway Society (DAS) algorithm

#### 4. COVID-airway trolley and drugs during intubation

All necessary airway equipment and medication must be available at the time of intubation.<sup>6</sup> A checklist will help as an aide-memoire. (Annexure 1: Intubation Checklist by the College of Anaesthesiologists & Intensivists of Sri Lanka). There is a possibility of scarcity of drugs during a pandemic of this nature therefore, try and minimize waste and closely liaise with the pharmacist in your hospital. Ensure that the minimum number of equipment (e.g. front-of-neck access kit (FONA) can be kept outside with the runner) and drugs are taken in to the intubation bay to prevent contamination.

It is recommended to have a COVID-19 trolley in the ICU and elsewhere.<sup>7</sup> Where ever possible single use-disposable equipment should be used.<sup>8</sup> The operator should be familiar with the equipment used during airway management. If re-usable equipment is used it should adhere to strict decontamination procedures as per manufacturers recommendation.<sup>9</sup>

COVID patients may require intubation in unplanned areas and outside ICU. **Tracheal intubation trolley and packs for COVID patients** can be helpful in this situation.

**Cognitive aids** which may be helpful during rescue techniques (DAS 2018 guidelines) and the **intubation checklist** should be available with the airway trolley.<sup>9</sup>

## 5. Fundamental principles of airway management and steps in intubating a suspected or positive patient with COVID-19<sup>9</sup>

The first pass attempt at intubation in the critically ill patient is <80% and based on evidence in 20% it would take 2 attempts for a successful intubation.<sup>10</sup>

Therefore, it is imperative that when intubating a COVID patient it should be safe for both operator and patient, swift to avoid further deterioration and accurate.<sup>9</sup>

In a hospital where the case load can be sufficiently managed, a dedicated tracheal intubation team<sup>9</sup> can be assigned on rotation.

The following steps have been recommended based on recent evidence from high-volume centres which have been managing COVID patients.

- Intubate early than late. **Avoid crash intubations**
- Use techniques which are reliable and that will work among a wide range of patients
- Use techniques you are familiar with and avoid any new techniques
- **Prepare, plan, perform and de-brief post procedure**
- **Use checklists** to perform optimally
- Obtain intravenous access, ensure its' patency and establish standard monitoring
- Avoid high flow devices/ CPAP during intubation<sup>12</sup>
- **Assessment** of patient's airway is vital for first-pass success
- **Ramp** the patient (reverse Trendelenburg position) to optimize the safe period of apnoea
- Use rapid sequence induction (**RSI**). Use of cricoid pressure is controversial<sup>11</sup> therefore use only, in the presence of a trained assistant
- Use a combined **HME viral-bacterial filter** between the face mask and circuit
- **Pre-oxygenate** with a **well-fitting face mask** using the vice grip (V-E technique) for 3-5 minutes. **Mapleson C ('Waters') circuit is desirable** to a self-inflating bag-valve-mask (BVM)
- **Avoid mask ventilation** (unless it is absolutely essential as it generates aerosols). If indicated use small tidal volumes
- Following induction of anaesthesia (recommend ketamine 1-2mg/kg in the haemodynamically unstable patient, provided there is no contraindication) and an **adequate dose of muscle relaxant** (suxamethonium 1.5mg/kg) to achieve complete muscle paralysis
- Avoid coughing and bucking during intubation
- Consider a video laryngoscope (VL) if available and sheath all equipment
- In the absence of a VL use the standard Macintosh blade
- Maintain sufficient distance from the airway as practical as possible
- Make the first attempt at intubation the best attempt
- Intubate with an endotracheal tube (ETT) preferably with a sub-glottic suction port (2 different sizes should be available) and secure the tube
- **Inflate the cuff before, providing mechanical ventilation**
- Ensure the **viral filter** is placed between the ETT and circuit interface
- Confirm ETT placement by waveform capnography and by visual inspection. **Avoid auscultation and circuit disconnections** (use clamps if required)
- Insert a nasogastric tube

Using a disposable clear plastic sheet close to the face of the patient is less intrusive than most other methods<sup>13</sup> which have been advocated, to reduce the droplet spread.

If sugammadex is available, rocuronium can be used during RSI. A dose of 1.2mg/kg is recommended to achieve similar intubating conditions to suxamethonium.<sup>14</sup>

Antiemetic medication should be administered if time permits to avoid vomiting during intubation. All emergency drugs including a vasopressor should be available. A checklist with the required drugs and doses can be a useful cognitive aid.

A video laryngoscope with a Macintosh blade and bougie is desirable<sup>9</sup> for rapid intubation and confirmation of the ETT while it maintaining the distance from the patients' airway. It also eliminates the difficulty of visualization of the glottis due to protective head-gear.<sup>7</sup>

It is best to avoid auscultation as virus can be transmitted by objects such as stethoscope which has been used on an infected person.<sup>15</sup>

In the event of an accidental disconnection apply a clamp before re-connecting the circuit to the ETT.<sup>9</sup> If circuit disconnection is required to perform an intervention ensure the patient has been given an adequate dose of muscle relaxants and pause the ventilator to stop the gas flow.

A clear rescue plan should be followed during unanticipated difficult airway. A second generation supra-glottic airway device should only be used as a rescue technique under "Plan B" of the algorithm. An awake fiberoptic intubation is best avoided. DAS difficult airway algorithm should be followed with emphasis on the following.<sup>9</sup>

- Reduce the number of attempts at each technique. Summon help if required
- Declare a "Difficult Airway" to the team
- Try to avoid mask ventilation and proceed to "step B" of the DAS algorithm and ventilate with a second- generation laryngeal mask airway to reduce aerosol generation. Maintain oxygenation.
- During front-of-neck access (FONA) use a scalpel-bougie-tube (SBT) technique instead of the cannula technique

Where ever possible closed in-line suctioning should be used.<sup>16</sup> If not, the double- gloved technique can be used to safely dispose the used Yankauer sucker handle. All re-usable contaminated equipment should be safely disposed and decontaminated adhering to local policies.

Once the airway has been secured and if the patient requires insertion of invasive lines, such as an arterial cannula, a central venous catheter and a urinary catheter it should be performed by the same team who are already donned and competent in the procedure.

## **6. Use of high-flow nasal oxygen (HFNO) and CPAP**

Hypoxemic patients might be receiving high flow nasal oxygen therapy. Flow rates >25L/minute may cause aerosol generation.<sup>17</sup> However, there is no strong evidence to disregard its' use but one should be cautious.

Patients receiving HFNO and CPAP are likely to be nursed in an intensive care unit and it is important the decision to intubate this cohort of patients is made case-by-case and early rather than late which could end up in a crash intubation.

## 7. Tracheal extubation

Extubation workflow should follow the basic steps of planning, preparation, performing and post procedure care. This is an aerosol generating procedure. Therefore, full PPE s are required and it should be performed by minimum number of staff.

Aim should be to minimize exposure to infected secretions.<sup>9</sup>

An extubation checklist can be a useful aide-memoire. Ensure all necessary equipment related to airway, nasal cannula, oxygen mask and drugs are readily available.

The following steps should be undertaken during tracheal extubation.<sup>9</sup>

- Donning with full PPE
- Tracheal suctioning (preferably in-line/closed system) and physiotherapy as indicated
- Minimize or avoid coughing at extubation. Drugs such as opioids, alpha agonists and lignocaine have been used during emergence from anaesthesia to obtund the cough reflex<sup>18</sup> however, the routine use of these drugs in this setting, cannot be recommended due their side effects<sup>9</sup> which can be detrimental in a critically ill patient.
- A clear plastic cover can be placed over the patients face during extubation to minimize aerosol spread and contamination of the staff and surrounding
- Following extubation, a surgical mask should be placed over the patient and oxygen through a nasal cannula can be administered beneath the mask
- Following tracheal extubation adhere to strict decontamination procedures and ensure safe disposal of used equipment

## 8. Post-procedure and doffing

All equipment should be disposed appropriately and decontaminated according to local guidelines. Use designated bins for safe disposal.

Doffing should be performed outside the intubation room or bay. Errors in doffing are not uncommon<sup>9</sup>.

Ensure strict **adherence to proper de-gowning and discard reusable equipment safely** after use.

**Decontaminate reusable equipment** according to the manufacturer's instructions. Remove the outer gloves before touching any surface to prevent contamination. Avoid touching face and hair before washing hands for 20-30 seconds.

Ensure **documentation** is performed with attention to detail (depth of tracheal tube, view at laryngoscopy etc) and handover to the receiving team. **Team debrief** should follow each episode of airway management.

## Conclusion

Intubation should be pre-planned and it should be safe, accurate and swift. Crash intubations should be avoided in a deteriorating patient, therefore plan for intubation early. Airway management should be aimed at minimizing exposure to aerosolization, minimizing disconnections and reducing exposure of staff to a viral load.

Closed-loop communication, checklists and preparation can mitigate problems at intubation. Extubation carries similar risks and it should follow the same fundamental principles as intubation.

Adherence to strict infection control policies, donning with appropriate personal protective equipment and following the standard steps in doffing can minimize exposure to aerosolization and contamination.

## References

1. Surviving Sepsis Campaign: Guidelines on the Management of Critically Ill Adults with Coronavirus Disease 2019 (COVID-19). Waleed Alhazzani, Morten Hylander Møller, Yaseen M. Arabi, Mark Loeb, et al
2. Coronavirus - guidance for anaesthesia and perioperative care. From: <https://www.wfsahq.org/resources/coronavirus#airway>
3. Mengqiang Luo, Shumei Cao, Liquan Wei, Rundong Tang, Shu Hong, Renyu Liu, Yingwei Wang; Precautions for Intubating Patients with COVID-19. *Anesthesiology* 2020; No Pagination Specified. doi: <https://doi.org/10.1097/ALN.0000000000003288>
4. Kamming D, Gardam M, Chung F. Editorial I. Anaesthesia and SARS. *Br J Anaesth*. 2003;90(6):715-718. doi:10.1093/bja/aeg17
5. Chen, X, Shang, Y, Yao, S, Liu, R, Liu, H. Perioperative care provider's considerations in managing patients with the COVID-19 Infections *Transl Perioper & Pain Med* 2020; 7:216–23
6. Wax, RS, Christian, MD. Practical recommendations for critical care and anesthesiology teams caring for novel coronavirus (2019-nCoV) patients. *Can J Anaesth* 2020 10.1007/s12630-020-01591-x
7. Brewster DJ, Chrimes NC, Do TB, Fraser K, Groombridge CJ, Higgs A, Humar MJ, Leeuwenburg TJ, McGloughlin S, Newman FG, Nickson CP. 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*. 2020 Mar 16;212(10):1
8. Public Health England. Environmental decontamination, in COVID-19: infection prevention and control guidance. 2020. <https://www.gov.uk/government/publications/wuhan-novel-coronavirus-infection-prevention-and-control/wuhan-novel-coronavirus-wn-cov-infection-prevention-and-control-guidance#decon>
9. Cook TM, El-Boghdady K, McGuire B, McNarry AF, Patel A, Higgs A. Consensus guidelines for managing the airway in patients with COVID-19. *Anaesthesia*. 2020 Mar 27
10. Nolan JP, Kelly FE. Airway challenges in critical care. *Anaesthesia*. 2011 Dec; 66:81-92.

11. Cook TM. The cricoid debate—balancing risks and benefits. *Anaesthesia*. 2016 Jun;71(6):721-2.
12. Anaesthetic Management of Patients During a COVID-19 Outbreak. From: <https://anaesthetists.org/Home/Resources-publications/Anaesthetic-Management-of-Patients-During-a-COVID-19-Outbreak>
13. Anaesthesia and caring for patients during the COVID-19 outbreak. From: [https://www.asa.org.au/wordpress/wp-content/uploads/News/eNews/covid-19/ASA\\_airway\\_management.pdf](https://www.asa.org.au/wordpress/wp-content/uploads/News/eNews/covid-19/ASA_airway_management.pdf)
14. Cheung JC, Ho LT, Cheng JV, Cham EY, Lam KN. Staff safety during emergency airway management for COVID-19 in Hong Kong. *The Lancet Respiratory Medicine*. 2020 Feb 24
15. Modes of transmission of virus causing COVID-19: implications for IPC precaution recommendations. From: <https://www.who.int/news-room/commentaries/detail/modes-of-transmission-of-virus-causing-covid-19-implications-for-ipc-precaution-recommendations>
16. Guidance for Surgical Tracheostomy and Tracheostomy Tube Change during the COVID-19 Pandemic. From: <https://www.entuk.org/tracheostomy-guidance-during-covid-19-pandemic>
17. UCSF Inpatient Adult COVID-19 Interim Management Guidelines. From: <https://infectioncontrol.ucsfmedicalcenter.org/sites/g/files/tkssra4681/f/UCSF%20Adult%20COVID%20draft%20management%20guidelines.pdf>
18. Tung A, Fergusson NA, Ng N, Hu V, Dormuth C, Griesdale DE. Medications to reduce emergence coughing after general anaesthesia with tracheal intubation: a systematic review and network meta-analysis. *British Journal of Anaesthesia*. 2020 Feb 22.

## **Annexure 1**

### **INTUBATION CHECKLIST**

#### **FOR**

#### **A SUSPECTED OR POSITIVE PATIENT WITH COVID-19**

(by the College of Anaesthesiologists & Intensivists of Sri Lanka)



## INTUBATION CHECKLIST

### FOR

### A SUSPECTED OR POSITIVE PATIENT WITH COVID-19

#### Pre-procedure: outside the intubation bay

##### Team allocation & Preparation

Your safety is priority: Donning with **full PPE**

1. Airway operator
2. Airway assistant
3. Team leader
4. Runner (remains outside at all times & calls for help)

Communicate to the receiving team (ITU) before procedure

Equipment (see overleaf) & drugs

##### Pre-briefing

Cognitive aids displayed (airway equipment & drugs)?

Agreed plan of action for airway management: follow Difficult Airway Society (DAS) guidelines

**Plan A:** RSI with laryngoscopy (Video-laryngoscope or Macintosh blade)

**Plan B:** Second-generation supraglottic airway with HME: maintain oxygenation

**Plan C:** 2 person-2-hand technique using a vice V-E grip (see overleaf) +/- oropharyngeal airway

**Plan D:** Front of neck access (FONA)

#### Procedure: Inside the intubation bay

##### Assessment of Airway

- Anticipated difficult airway
- Can feel the cricoid cartilage

##### Position

- 45 degrees head-up (ramped)

##### Monitoring

- NIBP
- ECG
- Pulse oximetry
- Capnography (side stream analyser)

##### Intravenous line

- Patent
- Fluids connected

##### Drugs

- Induction agents
- Muscle paralyzing agents
- Flush/ Fluids
- Vasopressor
- Anticholinergic agent
- Adrenaline

##### Preoxygenation

- Adequate source of oxygen supply
- 3-5 minutes of preoxygenation with oxygen using V-E technique (use lowest gas flows possible)
- HME between patient and the circuit interface (see overleaf)

##### Post-intubation

- Cuff inflated before ventilation
- Confirm placement by capnography/visual inspection
- ETT secured
- Clamp ETT before any disconnection
- Nasogastric tube inserted

#### Post-procedure: outside the intubation bay

- Careful disposal of equipment
- Laryngoscope bagged & sealed for sterilization (if reusable)
- Doffing outside the intubation bay
- Hand hygiene for 20-30 seconds
- Documentation

## COVID INTUBATION

### TROLLEY

- Mapelson C circuit
- Bag Valve Mask (BVM)  
Macintosh  
videolaryngoscope
- (VL) blade  
Macintosh (blade)
- direct laryngoscope
- Bougie
- Lubricant
- Yankauer sucker  
handle with suction
- apparatus +catheters  
Endotracheal tubes  
(preferably with a sub-  
glottic suction port)
- Oropharyngeal airway
- (OPA) \*2 sizes
- Second generation  
supraglottic airway  
device
- Tube tie
- 10ml syringe
- Scalpel & bougie: CICO
- (Emergency FONA kit)
- Nasogastric tube
- Clamps for ETT
- Viral filters
- Magill Forceps

### Vice V-E technique



Placing the thumbs & thenar eminences longitudinally along each side of the mask to create a seal

### Circuit set up

