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Intubation of the patient with a suspected or confirmed COVID-19 infection



ABSTRACT

Keywords:
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We propose a set of recommendations from our clinical practice for intubation of the patient with a suspected or confirmed COVID-19 infection, with a goal to safely securing the airway while optimizing infection prevention practices to reduce the risk to healthcare personnel.

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Dear Editor,

COVID-19 has changed medical practice globally. Singapore has seen over 35000 COVID-19 patients, with the majority being cared for in medical facilities. There have been no documented cases of any staff in our departments who have contracted COVID-19 after intubating a COVID-19 patient.

COVID-19 is transmitted via respiratory droplets and close contact [1]. Procedures such as tracheal intubation increase the risk of generating infectious aerosols [2]. Up to 10% of infected patients require mechanical ventilation, and some may require intubation for emergency surgery [3]. The goals of intubation in suspected or confirmed COVID-19 infection are to safely secure the airway and to optimize infection prevention practices to reduce the risk to healthcare personnel. We propose a set of intubation recommendations in line with these goals (Table 1).

Firstly, the patient should be identified early as elective intubation allows more time for preparation [4]. Intubation should ideally take place within an airborne infection isolation room if available [2]. Staff should be kept to a minimum and don personal protective equipment (PPE) including N95 mask, eye protection, gown and gloves [1,2]. A common practice is to use a powered, air-purifying respirator (PAPR); however, this takes up to 10 min to don and may pose significant delays to response time especially in a cardiac arrest scenario.

Equipment should be single-use where possible. Only the essentials are brought into the room to reduce contamination, but back-up equipment is immediately available just outside the room. A high-efficiency particulate air (HEPA) filter should be placed between the primary airway devices (such as face mask or tracheal tube [TT]) and the breathing circuit, as well as between the expiratory limb of the circuit and the ventilator [5,6]. The intubating team should communicate the airway plan prior to induction to coordinate team performance and minimize delays during airway control [7]. Greater effort is required to overcome difficulties in communication once the PPE and PAPR (if used) are worn.

Three to 5 min of pre-oxygenation reduces the need for positive-

pressure face-mask ventilation which can cause viral aerosolisation. Apnoeic oxygenation may be delivered with nasal cannulae but high-flow oxygen therapy should be avoided. Rapid sequence induction is performed to achieve optimal intubating conditions with minimal face-mask ventilation. If the latter is unavoidable, ventilate with small tidal volumes, and ensure a good seal with a two-person bag-mask technique [7]. Intubation is performed by the most experienced operator and after full muscle paralysis with either rocuronium or succinylcholine; however, the latter may wear off early leading to patient coughing. TT position is confirmed with a carbon dioxide detector as auscultation of breath sounds may be challenging if a hooded PAPR is used. In-line tracheal suction is preferred to open suction [5]. Circuit disconnections should be minimized, but if unavoidable, decrease the risk of patient coughing and consider clamping the TT with Spencer-Wells forceps until the circuit is reconnected.

A video-laryngoscope is preferred over a direct laryngoscope for intubation, as it allows the intubator to be further away from the patient, reducing the risk of exposure to airway secretions and contamination [8]. It may also aid in visualization, mitigating the difficulty generated by wearing PPE. For rescue ventilation, a disposable, second-generation supraglottic airway device that allows direct fibreoptic intubation using a disposable bronchoscope is recommended. The bronchoscope should be connected to a large monitor as viewing through its eyepiece is difficult whilst wearing PPE [8].

Awake techniques should be avoided as both atomized local anaesthetic and patient coughing could potentially aerosolize the virus [6]. “Aerosol boxes” have been described as having possible utility in preventing dispersion of contaminated droplets on the intubator [9]. However, we have found these to be more of a hindrance than a help as they hamper visualization, laryngoscopy, manipulation of a bougie and railroading of a TT. In a difficult airway situation, it impedes subsequent airway management.

Adherence to infection control measures is important. Following intubation, local protocols on safe removal of the PPE and proper disposal of contaminated equipment should be followed.

Table 1
Recommendations for intubation of the patient with a suspected or confirmed COVID-19 infection.

- 1 Identify the patient early
- 2 Preparation
 - a Environment: Airborne infection isolation room where available.
 - b Personnel: Kept to a minimum, don PPE. Communicate airway plan before starting.
 - c Equipment: Single-use. HEPA filter between breathing device and circuit.
 - d Drugs: rapid onset.
- 3 Rapid sequence induction
 - a Three to 5 min of pre-oxygenation.
 - b Use nasal prongs instead of high-flow oxygen therapy for apnoeic oxygenation.
 - c If apnoea not tolerable, ventilate with small tidal volumes via a face mask with a good seal.
 - d Ensure full paralysis before intubation attempt.
 - e Experienced operator to intubate.
- 4 Circuit management
 - a Use in-line rather than open suction.
 - b Circuit disconnections should be kept to a minimum.
 - c Consider clamping the TT before disconnection.
- 5 Difficult airway management
 - a A video-laryngoscope is preferred if familiar with its use.
 - b Use a supraglottic airway device for ventilation.
 - c Consider supraglottic airway device guided direct fiberoptic intubation.
- 6 Post-procedure management
 - a Safe removal of PPE per hospital protocol.
 - b Contaminated equipment must be disposed of or cleaned per protocol.
 - c Surfaces should be decontaminated.

Finally, we recommend team-based simulation of these high-risk procedures to familiarize staff to the challenges of intubating Covid-19 patients [10]. In particular, we found PAPR failure drills to be crucial in preparing staff for the distress that one may encounter [11,12]. Despite pre-use checks, we have experienced PAPR failure in our institutions; fortunately, staff were able to react appropriately having been trained in this crisis situation.

These recommendations should be modified to the local context. In Singapore, several hospitals have instituted conservation measures for certain drugs and consumables due to supply chain disruptions. For example, reduced availability of disposable video-laryngoscope accessories have led some hospitals to use reusable video-laryngoscopes. Stock levels of drugs such as rocuronium and remifentanyl are low, hence suxamethonium is used where appropriate, and alternative methods are employed to ensure smooth extubation.

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Declaration of competing interestCOI

The authors declare no conflict of interest.

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