Staff safety during emergency airway management for COVID-19 in Hong Kong

Medical professionals caring for patients with coronavirus disease 2019 (COVID-19) are at high risk of contracting the infection.[1] Aerosol-generating procedures, such as non-invasive ventilation (NIV), high-flow nasal cannula (HFNC), bag-mask ventilation, and intubation are of particularly high risk.[2] We hereby describe the approach of our local intensive care unit (North District Hospital, Sheung Shui, Hong Kong) to managing the risks to health-care staff, while maintaining optimal and high-quality care.

All medical personnel involved in the management of patients with suspected COVID-19 must adhere to airborne precautions, hand hygiene, and donning of personal protective equipment. All aerosol-generating procedures should be done in an airborne infection isolation room. Double-gloving, as a standard practice at our unit, might provide extra protection and minimise spreading via fomite contamination to the surrounding equipment after intubation.[3]

An experiment with a mannikin showed that NIV or HFNC, when well applied with an optimal fit, only lead to minimal dispersion of exhaled air.[4] However, the specific NIV and HFNC models and modes tested in the study are not universally used across all hospitals. Therefore, to avoid confusion and potential harm, we do not recommend using NIV or HFNC until the patient is cleared of COVID-19. Airway devices providing 6 L/min or more of oxygen are considered high-flow[5] and we discourage their use if an airborne infection isolation room is unavailable.

We recommend that endotracheal intubation is done by an expert specialised in the procedure, and early intubation should be considered in a patient with deteriorating respiratory condition. For all cases, backup airway plans should be ready.

We recommend avoiding bag mask ventilation for as long as possible; and optimising preoxygenation with non-aerosol-generating means. Methods include the bed-up-head-elevated position, airway manoeuvres, use of a positive end expiratory pressure valve, and airway adjuncts. If manual bagging is required, we suggest gentle ventilation via a supraglottic device instead of bag mask ventilation. Although no robust evidence is available to show that the use of supraglottic devices are less aerosol-generating than BMV, the devices are easy to insert and can achieve sufficient seal pressure. They also help to spare manpower and thus reduce staff exposure. Furthermore, many newer generation supraglottic devices provide a conduit for unassisted intubation.

To monitor the pattern of ventilation, a continuous waveform capnography monitoring device should be used; an advantage of this being that a correct waveform accurately reflects correct endotracheal tube placement. Furthermore, physiologically, it might give clues on the adequacy of the seal when using supraglottic devices.

Rapid sequence induction is the technique of choice for emergency intubation. Some operators prefer rocuronium over suxamethonium for its longer half-life, which effectively prevents coughing or vomiting that might occur when the shorter acting muscle relaxant subsides after an unsuccessful first attempt. When rocuronium is used, a full 1·2 mg/kg intravenous dose should be administered to achieve a similar onset time to suxamethonium.

Once an endotracheal tube is inserted, its cuff should be inflated immediately to avoid leakage. The endotracheal tube should be connected to the ventilator via a filter and a waveform capnography monitoring device, with ventilation only started after pilot balloon inflation is confirmed. The capnography monitoring device waveform can subsequently confirm the correct positioning of the endotracheal tube. Only then should the physician exclude bronchial intubation by five-point auscultation.

We declare no competing interests.

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1 Chang D, Xu H, Rebaza A, Sharma L, Cruz CSD. Protecting health-care workers from subclinical coronavirus infection. *Lancet Respir Med* 2020; published online Feb 13. https://doi.org/10.1016/S2213-2600(20)30066-7.

2 Tran K, Cimon K, Severn M, Pessoa-Silva CL, Conly J. Aerosol generating procedures and risk of transmission of acute respiratory infections to healthcare workers: a systematic review. *PLoS One* 2012; **7:** e35797.

3 Casanova LM, Rutala WA, Weber DJ, Sobsey MD. Effect of single- versus double-gloving on virus transfer to health care workers' skin and clothing during removal of personal protective equipment. *Am J Infect Control* 2012; **40:** 369–74.

4 Hui DS, Chow BK, Lo T, et al. Exhaled air dispersion during high flow nasal cannula therapy versus CPAP via different masks. *Eur Respir J* 2019; **53:** 1802339.

5 Yu IT, Xie ZH, Tsoi KK, et al. Why did outbreaks of severe acute respiratory syndrome occur in some hospital wards but not in others? *Clin Infect Dis* 2007; **44:** 1017–25.

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