



## Safer intubation and extubation of patients with COVID-19

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Received: 3 April 2020 / Revised: 7 April 2020 / Accepted: 13 April 2020  
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### To the Editor,

As of 2 April 2020, the worldwide pandemic of coronavirus disease (COVID-19) has affected more than 1,000,000 people and taken the lives of more than 50,000.<sup>1</sup> Thousands of infected patients require intubation for prolonged mechanical ventilation as well as emergency surgical procedures under general anesthesia. Because the infection is transmitted through droplets (and possibly aerosols), optimal precautions must be used to prevent the spread of the virus when managing the airway,<sup>2</sup> particularly during intubation and extubation. Herein, we describe a technique to potentially reduce contamination from secretions (droplets) and aerosols during intubation and extubation. It assumes that the operator is wearing the recommended personal protective equipment to reduce the risk of contamination, and that the patient is fully paralyzed.

Before starting the intubation process, an endotracheal tube (ETT) is prepared with the black plunger-end of a standard 20 mL syringe (Figure, panel A) attached to the distal connector as a covering cap. Using a large bore

needle, a hole is made in the plunger end to allowing an intubating stylet to pass through it (Figure, panels B and C) thus preventing the spread of particles as the ETT enters the airway. During intubation, the covering cap remains in place (Figure, panel D). After inflating the ETT cuff, the stylet is partially removed while ensuring that the cap again remains in place (Figure, panel E). The ETT is then clamped and the stylet is fully removed along with the cap (Figure, panel F). Before connecting the HEPA N100 filter and the ventilatory circuit, the ETT connector is removed and a regular anesthesia face mask is placed over the ETT in preparation for extubation after emergence from anesthesia (Figure, panel G). The ETT connector is then reconnected (through a 2-cm hole in a clear plastic cover that is placed over the face) to the ETT, which is then connected to the ventilator circuit (with a filter). The ETT clamp is then removed before starting ventilation. In the ICU setting, this can be done in a similar fashion, but just hours before weaning when the patient is not triggering or is still paralyzed. In that case, one must remember to clamp the ETT prior to disconnecting from the ICU ventilator.

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◀ **Figure** A step-by-step description of a method for safer intubation/extubation in COVID-19 patients. An endotracheal tube (ETT) is prepared (A) with the black plunger-end of a 20-mL syringe serving as a cap through which a 14G needle (B) is used to make a hole to allow a stylet (C) to be placed during intubation. The intubation process keeps the black cap in place until the ETT cuff is inflated and the ETT is clamped after removing the stylet halfway while keeping the cap in place (D–F). The ETT is then reconnected through the anesthesia mask (G). Prior to extubation, a suction catheter is placed in the mouth (depicted in a simulation mannequin) in preparation for extubation (H). Before connecting to the ventilator circuit, the anesthesia mask with a clear plastic drape placed over it is positioned (I). The plastic drape provides protection from contaminating particles coming out of the mouth on extubation. After extubation (J), the sealing action of the mask around the mouth and the suction catheter inside the mask prevents further contamination risk. The patient is then extubated and hand-assisted with the mask while the nasal prongs are already providing oxygen in preparation for transfer (K). A surgical mask is placed on the patient prior to transfer (L)

Before extubation, and while the patient is still deeply anesthetized/paralyzed, the mouth can be suctioned of secretions as seen in the Figure, panel H. A regular surgical mask should then be placed on the patient's chin and nasal prongs with low-flow oxygen should be applied for use after extubation. As the patient emerges, the anesthesia mask should be tightly sealing around the mouth (Figure, panel I) and a suction tube placed inside the mask on the side of the tube to aspirate any secretions and the air coming out of the airway while removing the ETT. When the patient is ready to extubate, the ETT is removed (Figure, panel J) while keeping the mask firmly on the face to protect from infection due to coughing. The plastic cover (Figure, panel K) can then be removed as needed when the patient is breathing and not coughing anymore, after which the circuit can be re-connected to the mask. As the patient

further awakens and is ready to be transferred, the lower part of the face mask can be slightly lifted to allow a regular surgical mask to be slid in place prior to leaving the operating room (Figure, panel L).

The increased risk of healthcare provider infection must be addressed to keep the workforce intact during the fight against COVID-19.<sup>3</sup> Airway manipulation is among the principal reasons anesthesiologists, nurses, and respiratory therapists are infected by the virus; however, these refinements in our intubating and extubating sequences may help in reducing the incidence of infection among them.

**Editorial responsibility** This submission was handled by Dr. Hilary P. Grocott, Editor-in-Chief, *Canadian Journal of Anesthesia*.

**Conflict of interest:** None.

**Funding statement:** None.

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