4. Schulte JH: Sealed environments in relation to health and disease. Arch Environ Health 1964; 8:438–52
5. Álvarez-Herms J, Julià-Sánchez S, Corbi F, Odriozola-Martínez A, Burtscher M: Putative role of respiratory muscle training to improve endurance performance in hypoxia: A review. Front Physiol 2018; 9:1970
6. Convertino VA: Mechanisms of inspiration that modulate cardiovascular control: The other side of breathing. J Appl Physiol (1985) 2019; 127:1187–96
7. Skytioti M, Søvik S, Elstad M: Respiratory pump maintains cardiac stroke volume during hypovolemia in young, healthy volunteers. J Appl Physiol (1985) 2018; 124:1319–25

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Easy and Accessible Protection against Aerosol Contagion during Airway Management

To the Editor:

The coronavirus disease 2019 (COVID-19) outbreak began in northern Italy in early February and quickly spread to the rest of the peninsula. It has been a major public health issue highlighting the challenges for the health system to quickly ramp up capacity in the face of a pandemic and in particular in accident and emergency departments, intensive care, and insufficient supply of critical equipment such as ventilators but also personal protective equipment. The shortage of personal protective equipment not only puts medical professionals' lives at risk (at the time of writing more than 60 Italian doctors have died as a result of COVID-19) but also increases the risk of contagion within the hospital. Although elective surgery has been reduced, emergency surgery has continued and thus so has general anesthesia, without availability of the necessary protection. The inability to know which patients have COVID-19 in an emergency setting where tests kits are scarce, response times to test are slow, and with shortages or rationing of personal protective equipment requires the medical team to act as though the patient is positive unless proven otherwise, even though asymptomatic. In this scenario our team has trialed an easy and accessible technique to protect the operator/anesthetist from predictable aerosol during oxygen mask ventilation, intubation, and extubation. Our patients arrived in the operating room wearing a surgical mask. The primary anesthetist has always strictly followed the correct doffing and donning procedures before and after intubation with surgical mask, goggle/visor, double gloves, and gown, not the appropriate personal protective equipment because of the shortage we faced at the beginning. After anesthesia induction, 3 min breathing 100% oxygen, propofol 2 mg/kg was given to put the patients asleep to avoid the sensation of being smothered. Once the patient was asleep we positioned the transparent plastic sheet over the chest and head fixed with a tape to the abdomen (fig. 1). Fentanyl 2 mcg/kg and

Fig. 1. Mask ventilation.

rocuronium 0.6 mg/kg were given. Patients were ventilated in oxygen mask under the transparent plastic sheet while the anesthetist was above, away and protected from any aerosol coming from the patient. Only the operator hands with double disposable gloves were under the transparent sheet. The intubation was performed with a video laryngoscope (King Vision, Ambu, Denmark) under the transparent plastic sheet stuck to the king vision screen with the operator moving his hands under the plastic cover. Once the intubation was assessed, the plastic sheet was removed by rolling it inward from the head to the abdomen, keeping the contaminated part inside, and then disposed in an appropriate biohazard container. A meticulous disinfection of the contaminated body parts (head, neck, and torso) was performed after intubation, and the drape underneath the head was replaced with a clean one.[1] During the extubation a new transparent plastic sheet was positioned again as per the intubation phase, and endotracheal aspiration was performed without difficulty followed by extubation. Oxygen mask spontaneous ventilation was then delivered under the plastic cover until the coughing risk had passed and full posteanesthesia recovery and oxygenation was assessed. To date we have used this technique in eight cases without difficulty and no doctor contagion. In one of these cases the patient was diagnosed as COVID-19–positive three days after surgery despite the fact that two previous nasopharyngeal swabs were negative. When the result of the third swab came back positive, the anesthetist and the entire surgical and nursing team underwent nasopharyngeal swabs which were negative to the COVID-19, even though they were not wearing the appropriate personal protective equipment had the patient been positive before entering surgery. Despite further investigations needed to understand and assess the benefits of this simple, easy, accessible, and cost-effective technique to prevent any kind of aerosol risk during mask ventilation, intubation, and extubation maneuvers, we suggest it to prevent contagion during airway management in all patients throughout the COVID-19 outbreak if personal protective equipment are not available.

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Competing Interests

The authors declare no competing interests.

Marzia Giampalmo, M.D., Raffaella Pasquesi, M.D., Emanuela Solinas, M.D. Azienda Ospedaliero Universitaria Sant'Andrea, Rome, Italy. marzia. giampalmo@me.com

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References

1. Matava CT, Yu J, Denning S: Clear plastic drapes may be effective at limiting aerosolization and droplets spray during extubation: Implication for COVID-19. Can J Anaesth 2020; [Epub ahead of print]

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Closed-suction System for Intubated COVID-19 Patients with the Use of an Ultrasound Probe Cover

To the Editor:

Endotracheal suctioning is an important component of tracheobronchial hygiene therapy in mechanically ventilated patients.[1] In the perioperative settings, the aspiration of pulmonary secretions from a patient with an artificial airway is carried out with a suction catheter using an open system.[2] Suctioning an intubated patient with coronavirus disease 2019 (COVID-19) is an aerosol-generating procedure and is therefore at high risk of spreading infection.[2,3] Although the clinicians performing the suctioning of tracheal secretions are equipped with level III protection; a closed-suction system is desirable and likely adds extra protection.[2] However, a closed system for tracheal suction is often not provided in an operating room and its availability is extremely limited in the pandemic era.[4] Therefore, we created a closed-suction system functionally comparable with that routinely used in the critical care unit (fig. 1A). Figure 1B illustrates its work principle. Readers are encouraged to watch the Supplemental Digital Content, video 1 (http://links.lww.com/ALN/C419) for a more comprehensive understanding of the closed suctioning system. We also tested it with smoke and found that the system works in the way expected (Supplemental Digital Content, video 2, http://links.lww.com/ALN/C418). The system can be used multiple

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