

CORRESPONDENCE

Administration of Supplemental Oxygen

TO THE EDITOR: Rengasamy et al. address the administration of supplemental oxygen in their video and the associated print supplement (July 15 issue).¹ We would like to emphasize the use of two techniques that allow improved oxygenation in nonintubated patients with hypoxemia.

Initially described by Farias et al.,² the double-trunk mask consists of a regular aerosol mask in which corrugated tubes (the trunks) are inserted into two lateral holes. The mask acts as a reservoir for oxygen during expiration, as it is continuously filled by oxygen from the oxygen blender.



Figure 1. Face Masks Used in the Administration of High-Flow and Low-Flow Oxygen.

Shown in Panel A is an unassembled aerosol mask with 22-mm corrugated tubing that is 15 cm in length. The tubing is inserted into the two lateral holes of the mask. Shown in Panel B is a double-trunk mask, consisting of the components shown in Panel A, ready for use by a patient. Shown in Panel C is a patient equipped with a double-trunk mask and a high-flow nasal cannula. Shown in Panel D is a patient equipped with a double-trunk mask and a low-flow nasal cannula. Note that in Panels C and D, the mask is placed just above the nasal prongs. The choice of each of these masks depends on the severity of the hypoxemic respiratory failure.

We reported an increase in the partial pressure of arterial oxygen (P_{aO_2}) in patients with hypoxemia when a double-trunk mask was used during the administration of oxygen with a low-flow³ or high-flow⁴ nasal cannula (Fig. 1). The increase in the partial pressure of carbon dioxide (P_{aCO_2}) either was not clinically significant or was clinically irrelevant.

In patients with coronavirus disease 2019 (Covid-19) who received treatment for hypoxemic respiratory failure, the addition of a surgical mask on top of the nasal prongs of the high-flow nasal cannula allowed for substantial improvement in various measures of oxygenation. The effects on P_{aCO_2} were not clinically relevant.⁵ The addition of this mask may also prevent airborne transmission of the pathogen, which was a concern with regard to the use of high-flow nasal cannulas early in the Covid-19 pandemic.

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No potential conflict of interest relevant to this letter was reported.

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THE AUTHORS REPLY: Wittebole et al. provide valuable information regarding the importance

of reservoirs when supplemental oxygen is administered. Nonrebreather masks provide a large reservoir but are typically equipped with only one unidirectional side valve, which allows the entrainment of ambient air through a valve-free side vent if the flow of fresh gas is insufficient. The addition of corrugated tubing to the two side vents in a double-trunk mask can also reduce air entrainment by increasing the reservoir.¹

During the administration of supplemental oxygen with a face mask, the concentration of inspired carbon dioxide (CO_2) is influenced by the flow of fresh gas and the minute ventilation. Although the risk of hypercapnia may be low when using a double-trunk mask with adequate oxygen flow, it is advisable to monitor the patient's oxygenation and P_{aCO_2} .

The use of a surgical mask in patients receiving supplemental oxygen can reduce droplet deposition and particulate contamination.² Although larger studies are needed to confirm the effects of the mask on the patient's oxygenation, retention of CO_2 , and comfort, the report by Montiel et al.³ is promising and suggests improved oxygenation, which may be the result of the creation of an oxygen reservoir under the mask and the decline in the entrainment of ambient air.

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Since publication of their article, the authors report no further potential conflict of interest.

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