

Safety comparison between high-flow nasal cannula and noninvasive positive pressure ventilation for coronavirus disease 2019 patients

Dear Editor,

We have read with great interest the surviving sepsis campaign: Guidelines on the management of critically ill adults with coronavirus disease 2019 (COVID-19).^[1] There is still long debate on the recommendation to use high-flow nasal cannula (HFNC) over noninvasive positive pressure ventilation (NIPPV). We agree that HFNC has demonstrated reduced 90-day mortality compared to NIPPV in patients with acute hypoxemic respiratory failure.^[2] This lower mortality observed in the HFNC may have resulted from the cumulative effects of less intubation, particularly in patients with severe hypoxemia ($\text{PaO}_2:\text{FiO}_2 \leq 200$ mm Hg), as compared with other patients. Various studies have shown NIPPV has been demonstrated to have increased risk of aerosolized transmission to health care workers.^[3] Presently, it is known that COVID-19 (SARS-CoV-2) compared to SARS-CoV-1 remains viable in aerosols for at least 3 h with a marginal reduction in infectious titer from 103.5 to 102.7 TCID₅₀ per liter of air.^[4] Similarly, it showed higher stability on plastic and stainless steel than on copper and cardboard, with virus viability seen up to 72 h on these surfaces.^[4] This provides a concerning phenomenon for both HFNC and NIPPV as both plastic interface (plastic cannula in HFNC and plastic disposable mask in NIPPV) with potential for aerosolization. An important difference is that the NIPPV interface provides a potential closed system (which may be advantageous), whereas HFNC allows patients to frequently touch their faces, eyes with continuous exposure to droplets, potentially increasing transmission to inanimate surfaces and hospital workers. However, Leung *et al.*, in 2019, found that HFNC use was not associated with increased air or contact surface for bacterial contamination compared to simple oxygen masks in critically ill patients.^[5] Unfortunately, viruses were not included in this study. Likewise, the term “aerosol” is a misnomer as it is well described that larger particle droplets can remain longer in circulation if ambient airflows (as in HFNC) sustain the infectious suspension for a longer duration. In addition, there are various other advantages of HFNC as many studies reported that early application of prone position with HFNC therapy, especially in patients with moderate acute respiratory distress syndrome (ARDS), may help avoid intubation

but not in the several ARDS group.^[6] The only known retrospective study evaluating SARS development in hospital workers conducted before the widespread use of HFNC showing that development of SARS occurred in tracheal intubation (35%), 38% (NIPPV) and HFNC 8%,^[3] this suggests that both noninvasive (including HFNC) and invasive ventilation approaches carry significant risk. Undeniably, in these patients, HFNC provides more comfort and likely improved compliance. However, since the data regarding transmission are unclear, we suggest, in addition to a negative pressure room, reverse isolation protection efforts with patients on HFNC wearing an N-95 mask over the nasal interface or a contained respiratory hood will further decrease the aerosol production and provide better fitting of nasal cannula.

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Conflicts of interest
There are no conflicts of interest.

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