



## Correspondence

## High-flow nasal oxygen decrease mortality in patients with severe SARS-CoV-2 pneumonia? Issues and controversies

## ARTICLE INFO

## Keywords

COVID-19

High-flow nasal oxygen therapy

Non-invasive ventilation

Acute respiratory failure

Intensive care unit

## To editor.

We have read with great interest this study [1] that analyzes the impact obtained with the use of nasal high flow oxygen (HFNO) compared with non-invasive ventilation (NIV) for the treatment of patients with COVID-19 and shows a better survival with the use of HFNO. Although the study has a retrospective design, we consider that there are some points that would be better explained.

Firstly, we observed that the PaO<sub>2</sub> of group A was significantly lower at admission than that of group B ( $53.03 \pm 17.03$  vs  $81.48 \pm 7.96$ ) while the peripheral oxygen saturation (SpO<sub>2</sub> in %) at admission was comparable between the two groups ( $82.34 \pm 7.07$  vs  $81.48 \pm 7.96$ ). It could be interesting to analyze the plausible reason for these unique findings of initial PaO<sub>2</sub> and SpO<sub>2</sub> (mean PaO<sub>2</sub> of 53.03 with mean SpO<sub>2</sub> of 82.34 in group A versus mean PaO<sub>2</sub> of 81.48 with mean SpO<sub>2</sub> of 81.48 in group B). In this regard, different parameters can be used for an accurate evaluation of the levels of severity, such as gas exchange values (PaO<sub>2</sub>/FiO<sub>2</sub>) or the ROX index (SO<sub>2</sub>/FiO<sub>2</sub>: respiratory rate). A higher ROX index (cut-off point of 5.35) on serial measurement within the first 24 hours of HFNO initiation, predicts the success of therapy in patients suffering from SARS-CoV-2-based pneumonia [2] while patients with low ROX index are more likely to experience HFNO failure in COVID-19-related respiratory failure [3].

Secondly, the criteria for initiating both modalities of treatment are unclear and there is poor mention in methodology about aspects of monitoring during therapy that could explain the reason for switching from other modes of oxygen therapy to either HFNO or NIV or the escalation of therapy such as invasive mechanical ventilation (IMV); moreover, the causes of failure of both therapies are not evident.

During HFNO or NIV clinical monitoring is important to detect improvement of parameters such as oxygenation status (rise of PaO<sub>2</sub>: FiO<sub>2</sub> ratio), pH (improvement of acidosis) and heart rate (reduction of tachycardia) [4]. Particularly, tachycardia noted as early as 1 hour after initiation of HFNC therapy has been found to be associated with HFNC failure and its incorporation into the ROX index (ROX-HR) may improve

the diagnostic accuracy in patients with acute hypoxemic respiratory failure [5]. For these reasons, we think that these aspects are important for an adequate analysis.

Moreover, authors didn't mention, in methodology section, the median flow used with patient on HFNC, though they declare the capacity of generating PEEP using this device. The flow amount, together with FiO<sub>2</sub>, can affect the outcome and can contribute to demonstrate the efficacy of such device in term of intubation rate or NIV use rate.

Thirdly, the authors interestingly found neither NIV nor HFNO decreased the rate of invasive mechanical ventilation in these patients (49.7% in the ONHD group versus 46.5% in the NIV group;  $p = 0.08$ ). However, as said previously, authors did not clarify criteria for endotracheal intubation and whether they were maintained during the observation period of the study: this is an important aspect for an adequate comparison of two therapy and evaluation of decrease in IMV rate.

Lastly, the data of higher mortality in the NIV group appears to be very interesting (98.6% in the HFNO group versus 100% in the NIV group;  $p < 0.0001$ ) compared with other studies in the relevant field. However, it appears unclear whether total mortality is calculated on total patients number (intubated and not) for both groups or just considering intubated patients: a) in group A 162 patients underwent HFNO, of which 80 patients were intubated and 63 intubated patient died; total mortality reported is 79 (98.6%); b) in group "B with NIV" 71 patients underwent NIV, of which 33 were intubated and 27 intubated patients died; total mortality reported is 34 (100%).

In conclusion, although this study contributes to enlightens positive experiences with the use of HFNO, we think that a wider presentation of data in this regard would be appreciated and might be helpful for the readers to better understand the matter.

## Ethical approval

N/A.

Abbreviations: HFNO, nasal high flow oxygen; NIV, non-invasive ventilation; IMV, invasive mechanical ventilation.

<https://doi.org/10.1016/j.amsu.2022.103543>

Received 3 March 2022; Accepted 25 March 2022

Available online 8 April 2022

2049-0801/© 2022 The Authors. Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

**Sources of funding**

None.

**Author contribution**

**Domenica Di Costanzo:** data interpretation, writing the paper.  
**Mohanchandra Mandal:** data interpretation, writing the paper.  
**Mariano Mazza:** writing the paper. **Antonio Esquinas:** study concept, data interpretation.

**Registration of research studies**

N/A.

Name of the registry:

Unique Identifying number or registration ID:

Hyperlink to your specific registration (must be publicly accessible and will be checked):

**Consent**

N/A.

**Guarantor**

N/A.

**Declaration of competing interest**

None.

**References**

- [1] R. Alkough, A. El Rhalet, M. Manal, E.A. Ghizlane, B. Samia, T. Salma, et al., High-flow nasal oxygen therapy decrease the risk of mortality and the use of invasive

- mechanical ventilation in patients with severe SARS-CoV-2 pneumonia? A retrospective and comparative study of 265 cases, *Ann Med Surg (Lond)* 74 (2022 Feb), 103230, <https://doi.org/10.1016/j.amsu.2021.103230>. Epub 2022 Jan 4.
- [2] S. Ferrer, J. Sancho, I. Bocigas, E. Bures, H. Mora, E. Monclou, A. Mulet, A. Quezada, P. Royo, J. Signes-Costa, ROX index as predictor of high flow nasal cannula therapy success in acute respiratory failure due to SARS-CoV-2, *Respir. Med.* 189 (2021 Nov-Dec), 106638, <https://doi.org/10.1016/j.rmed.2021.106638>.
- [3] M.S. Alshahrani, H.M. Alshaqaaq, J. Alhumaid, A.A. Binammar, K.H. AlSalem, A. Alghamdi, et al., High-flow nasal cannula treatment in patients with COVID-19 acute hypoxemic respiratory failure: a prospective cohort study, *Saudi J Med Med Sci* 9 (3) (2021 Sep-Dec) 215–222, <https://doi.org/10.4103/sjmm.sjmm.316.21>.
- [4] B. Ergan, J. Nasilowski, J.C. Winck, How should we monitor patients with acute respiratory failure treated with noninvasive ventilation? *Eur. Respir. Rev.* 27 (148) (2018 Apr 13), 170101 <https://doi.org/10.1183/16000617.0101-2017>.
- [5] K.J. Goh, H.Z. Chai, T.H. Ong, D.W. Sewa, G.C. Phua, Q.L. Tan, Early prediction of high flow nasal cannula therapy outcomes using a modified ROX index incorporating heart rate, *J Intensive Care* 8 (2020 Jun 22) 41, <https://doi.org/10.1186/s40560-020-00458-z>.

Domenica Di Costanzo\*

*Department of Respiratory Disease, AORN "Sant'Anna e San Sebastiano",  
via Ferdinando Palasciano, 81100, Caserta, CE, Italy*

Mohanchandra Mandal

*Department of Anaesthesiology, Institute of Post Graduate Medical  
Education & Research, 244, Acharya Jagadish Chandra Bose Road,  
Kolkata, 700 020, India*

Mariano Mazza

*Department of Respiratory Disease, AORN "Sant'Anna e San Sebastiano",  
via Ferdinando Palasciano, 81100, Caserta, CE, Italy*

Antonio Esquinas

*Intensive Care Unit, Hospital Morales Meseguer, Av. Marqués de Los Vélez,  
s/n, 30008, Murcia, Spain*

\* Corresponding author. Department of Respiratory Disease, AORN  
"Sant'Anna e San Sebastiano", via Ferdinando Palasciano, 81100,  
Caserta, CE, Italy.

*E-mail address:* [domenica.dicostanzo@libero.it](mailto:domenica.dicostanzo@libero.it) (D. Di Costanzo).