A breath of relief: High-flow nasal oxygen in a resource-limited setting

The COVID-19 pandemic is renowned for the unprecedented burden of patients with hypoxic respiratory failure attending healthcare facilities. To date, there have been over ~500 000 COVID-19 admissions in South Africa (SA).[1] The mainstay of management for COVID-19-related respiratory distress is oxygen therapy, with more than 182 000 patients requiring supplemental oxygen and up to 27 000 requiring mechanical ventilatory support in intensive care units (ICUs).[1] In a resource-constrained setting, the demand for ICU beds far outweighs the supply during the wave peaks. Between March 2020 and February 2022 there were 58 774 ICU admissions[2] in a health system with just over 3 300 ICU beds.[3] Bearing in mind that only a third of these beds were in the public sector, which serves the majority of the population, the paucity of ICU resources is glaring. Reserving this precious resource for those who need it most can save lives. The medical community has been able to adapt by employing available oxygenation methods in innovative ways. The use of high-flow nasal cannula (HFNC) outside the ICU setting has played a pivotal role in our response to the pandemic, and in decreasing the need for invasive ventilation.[4]

In the context of the COVID-19 pandemic, and compared with non-invasive ventilation (NIV), HFNC proved useful as a relatively simple and effective mode of oxygen delivery in both supine- and prone-positioned patients, and it also allows for self-proning in the well-orientated patient. It has also been used as a step-down modality during weaning, to prevent post-extubation respiratory failure.[5] The initial fears of increased bio-aerosol dispersion through HFNC were allayed when it was shown to be equivalent to other oxygenation methods, and even less significant when the patient wears a surgical facemask during therapy.[6-8] However, there are limited prospective data about the efficacy of HFNC, and as already outlined, hardly any in resource-poor settings. In this issue of the journal, Nazir and Saxena[9] address this anomaly and report the results of a randomised control trial (RCT) to evaluate the effectiveness of HFNC compared with the standard non-rebreathing mask (NRM) in moderately severe COVID-19 pneumonia. They found that the HFNC group obtained a significantly better successful outcome and greater patient satisfaction compared with the NRM group. Although the effectiveness of HFNC in COVID-19 is supported by prior research from across the world,[10-12] this is one of the first RCTs comparing NRM and HFNC. Nevertheless, comparing HFNC with NIV such as continuous positive airway pressure would have been more appropriate in this study.

HFNC is a relatively cost-effective and efficacious oxygenation strategy[13] that requires fewer resources for set-up and less intensive monitoring than mechanical ventilation. A British study by Turner and Jenks[13] assessed cost differences between different modes of oxygen delivery in ICU, and found that HFNC lowered cost of care substantially compared with NIV and mechanical ventilation. It was also easier to train healthcare providers and patients to use HFNC compared with NIV, and as such it is a scalable and a feasible option when the demand for ICU beds cannot be met.[14] Having a unit implementation plan and algorithm for the use of HFNC can offer clear guidelines for less experienced staff on the ground.[12] In the SA setting, HFNC played a significant role in the pandemic response, as it was provided at field hospitals and secondary level hospitals, which relieved significant burden on tertiary-level ICU facilities.[15,16] The main limiting factor is that of reliable oxygen supply and its associated costs. Furthermore, when scaling up HFNC services outside the ICU setting, it is important to ensure that the oxygen delivery infrastructure is adequate to meet the demands imposed upon it.

Although HFNC is a viable treatment in the context of the COVID-19 pandemic, it is unclear if its judicious use could delay intubation,[17] and whether this delay has an impact on patient outcomes. It would be helpful for frontline clinicians, most without an intensive care background, to have a clear set of criteria to guide the use of HFNC and to predict the need for escalation of ventilatory support.[17] The respiratory rate-oxygenation (ROX) index is the most frequently used metric to monitor respiratory failure.[10] The utility of the ROX index in predicting the need for intubation is slightly different in COVID-19 respiratory failure than other pathologies, and careful monitoring is needed at 2, 6 and 12 hours to effectively triage patients who are likely to fail HFNC.[18] A multicentre prospective study by Calligaro *et al.*[18] showed that patients with a higher ROX score (≥3.7) at 6 hours after initiating HFNC (ROX-6 score) had a better chance of successful weaning. This could be a useful assessment for secondary centres and field hospitals when deciding which patients to refer for tertiary-level ICU care.

Although HFNC has been available for several years, its mainstream use globally was ushered in by the unprecedented demand driven by patients with COVID-19-associated hypoxic respiratory failure. It is, however, crucial for clinicians and policy-makers to understand the limitations of HFNC, and that it should not be used as an alternative to strengthening the under-resourced ICU system. The lessons learnt in scaling up this service outside ICUs during the pandemic have better prepared us to face the next wave of COVID-19 or the next pandemic. Indeed, this brings a breath of relief!

L Kühn, MB ChB; **A Esmail,** MD, Cert Pulm (SA);
S Oelofse, MB ChB
Centre for Lung Infection and Immunity, Division of Pulmonology, Department of Medicine and UCT Lung Institute, University of Cape Town, South Africa
louie.kuhn@uct.ac.za

K Dheda, MB BCh, PhD
Centre for Lung Infection and Immunity, Division of Pulmonology, Department of Medicine and UCT Lung Institute, University of Cape Town, South Africa; South African MRC/UCT Centre for the Study of Antimicrobial Resistance, University of Cape Town, South Africa; Faculty of Infectious and Tropical Diseases, Department of Infection Biology, London School of Hygiene and Tropical Medicine, UK

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