

# High flow nasal cannula in extubated patients: is it advantageous over conventional oxygen therapy?

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Submitted Nov 20, 2016. Accepted for publication Dec 22, 2016.

doi: 10.21037/jtd.2016.12.105

View this article at: <http://dx.doi.org/10.21037/jtd.2016.12.105>

Following successful ventilator weaning and extubation, patients off invasive ventilation frequently suffer respiratory insufficiency, hypoxemia in particular, usually necessitating oxygen therapy via non-rebreather mask, Venturi mask or subsequent use of non-invasive ventilation (1). High-flow nasal cannula (HFNC) is a new device of oxygen therapy which comprises an air/oxygen blender, an active humidifier, a single heated circuit, and a large-diameter nasal cannula. HFNC delivers medical gas that was adequately heated and humidified, and may reduce upper airway dead space and resistance, PEEP impacts and re-expansion pulmonary alveoli (2). However, it remains undetermined whether HFNC is advantageous over conventional oxygen therapy in prevention and treatment of post-extubation respiratory failure.

There are six published studies on the effect of HFNC in adults after extubation, with four favoring the advantage of HFNC over conventional oxygen therapy (3-8). Parke *et al.* reported no statistically significant difference in improving dyspnea scores and respiratory functions between the two treatment options (3). However, HFNC was associated with better patients comfort scores, improved oxygenation within two days of extubation, and less need for respiratory support within three days. A randomized crossover study conducted by Rittayamai *et al.* showed that HFNC may improve dyspnea, reduce breathing frequency and heart rate, in extubated subjects compared with non-rebreather mask (4). Brotfain *et al.* also reached a similar conclusion that HFNC resulted in more satisfactory oxygenation and lower rate of reintubation (5). Compared with the Venturi mask, HFNC also led to better oxygenation for the same fraction of

inspired oxygen after extubation (6). The other two studies, however, suggested that HFNC offered similar effect to conventional therapy. Stéphan *et al.* found that the use of HFNC compared with noninvasive positive airway pressure did not result in a worse rate of treatment failure (7). In the study conducted by Corley *et al.*, prophylactic extubation onto HFNC post-cardiac surgery in obese patients did not lead to improvements in atelectasis score, dyspnea index, and oxygenation index compared with conventional oxygen therapy (8). A large-scale multi-center study is currently underway; whatever the findings, further studies are still required to determine and validate the efficacy of HFNC (9).

Although current evidences tend to support HFNC as an alternative or partial replacement for conventional oxygen therapy in extubated patients, two aspects across the studies have been noted and do warrant further studies. One is the selection of patients. Three of the six studies were conducted in patients with or at risk of respiratory failure after cardiothoracic surgery. Only three studies included patients with medical disorders. Therefore, future studies need to focus on whether HFNC can be routinely used for most extubated patients, especially in those having difficulty weaning ventilator. In addition, the timing of HFNC and the setting of flow parameters also need to be further investigated. For AECOPD patients with a high risk of reintubation, sequential strategy is superior to a remedy strategy. Noninvasive ventilation should be used immediately after extubation rather than be delayed until the patient has developed respiratory failure (10). Therefore, noninvasive ventilation with HFNC after extubation appears to be more efficient when given

sequentially rather than continuously. While experience with HFNC in children after extubation suggested that flow size is likely to influence efficacy (11), studies in adults should be inspired regarding the flow velocity settings.

### Acknowledgements

None.

### Footnote

*Conflicts of Interest:* The authors have no conflicts of interest to declare.

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**Cite this article as:** Zhang JJ, Dai B. High flow nasal cannula in extubated patients: is it advantageous over conventional oxygen therapy? *J Thorac Dis* 2016;8(12):3494-3495. doi: 10.21037/jtd.2016.12.105