# Flow Matters

New evidence continues to emerge showing how Optiflow™ Nasal High Flow contributes to **improved patient care and outcomes.**

Focus: First published clinical protocol detailing the application of nasal high flow (NHF) therapy for adult patients with acute hypoxemic respiratory failure (AHRF).

**Nasal high flow therapy: a novel treatment rather than a more expensive oxygen device. Ischaki E, Pantazopoulos I, Zakynthinos S. Eur Respir Rev. 2017**

**In this issue of *Flow Matters,* we introduce the first published clinical protocol (algorithm, as referred to) detailing the application of NHF therapy for adult patients with AHRF.**

The development and application of evidence-based protocols within the ever-evolving global healthcare landscape serve to maximize efficiency and quality of care. Robust clinical protocols are supported by the best-available evidence. These protocols can also be regarded as clinical decision trees and/or algorithms.

The authors of this publication provide a narrative review of 99 NHF studies which were located through the use of a robust search strategy. They appraise and differentiate research findings that suggest a benefit from those that do not. The included studies compare NHF to conventional oxygen devices, and/or noninvasive ventilation (NIV). The narrative review then provides the foundation for a proposed algorithm for the application of NHF for adult patients with AHRF regardless of cause.

## What is unique about this protocol?

- It is the first peer-reviewed, published clinical protocol for this patient population.
- This protocol is currently in active use in clinical practice.
- It was developed using robust clinical evidence (including Frat et al. 2015 and Hernández et al. 2016), which we have outlined in previous editions of this newsletter.

Click here for the newsletter featuring Frat et al. 2015.

Click here for the newsletter featuring Hernández et al. 2016.

## Who does this protocol apply to?

- Adult patients with AHRF from almost any cause, defined as $PaO_2/FiO_2$ ratio < 300.
- Immunocompromised patients are included.
- Hypercapnic patients defined as $PaCO_2$ > 45 mmHg and pH < 7.35 were excluded.

## Why were hypercapnic patients excluded?

- The algorithm was developed to reflect its foundation trials in which, in the majority of cases, hypercapnic patients were excluded.

### Refresher:
### what's the $PaO_2/FiO_2$ ratio?

- It is the ratio of arterial oxygen partial pressure to the fraction of inspired oxygen.
- This may help to describe respiratory efficiency.
- For ARDS patients, a decreasing $PaO_2/FiO_2$ ratio may be associated with increased mortality.
- A normal ratio is > 500.

| ARDS Severity | $PaO_2/FiO_2$ | Mortality Risk |
|---|---|---|
| Mild | 200–300 | 27% |
| Moderate | 100–200 | 32% |
| Severe | < 100 | 45% |

- It is to be noted that NHF can be used effectively in patients with hypercapnia. NHF has been shown to decrease $PaCO_2$ in some populations, when compared to conventional low-flow oxygen, CPAP, and even BiPAP (Fraser et al. 2016, Braunlich et al. 2016, Biselli et al. 2016, and Fricke et al. 2016).

## What are the key points for this protocol?

- This protocol is designed for use on adults with AHRF.
- This protocol describes strategies for:
  - Initiation of NHF at 60 L/min, 37 °C, $FiO_2$ 100%
  - Use of NHF for pre-oxygenation and peri-laryngoscopy oxygenation
  - Monitoring whilst on NHF
  - Titration of NHF
  - Weaning from NHF


Ischaki E, Pantazopoulos I, Zakynthinos S. Nasal high flow therapy: a novel treatment rather than a more expensive oxygen device. Eur Respir Rev. 2017.

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Frat J, Thille A, Mercat A, Girault C, Ragot S, Perbet S et al. High-Flow Oxygen through Nasal Cannula in Acute Hypoxemic Respiratory Failure. N Engl J Med. 2015;372(23):2185-2196.

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Fraser J, Spooner A, Dunster K, Anstey C, & Corley A. Nasal high flow oxygen therapy in patients with COPD reduces respiratory rate and tissue carbon dioxide while increasing tidal and end-expiratory lung volumes: A randomised crossover trial. Thorax. 2016;71(8), 759–761.

Bräunlich J, Köhler M, Wirtz H. Nasal highflow improves ventilation in patients with COPD. International Journal of Chronic Obstructive Pulmonary Disease. 2016;1077-1085.

Biselli PJ, Kirkness JP, Grote L, Fricke K, Schwartz AR, Smith P, Schneider H. Nasal high-flow therapy reduces work of breathing compared with oxygen during sleep in COPD and smoking controls: a prospective observational study. J Appl Physiol (1985). 2017 Jan 1; 122(1):82-88.

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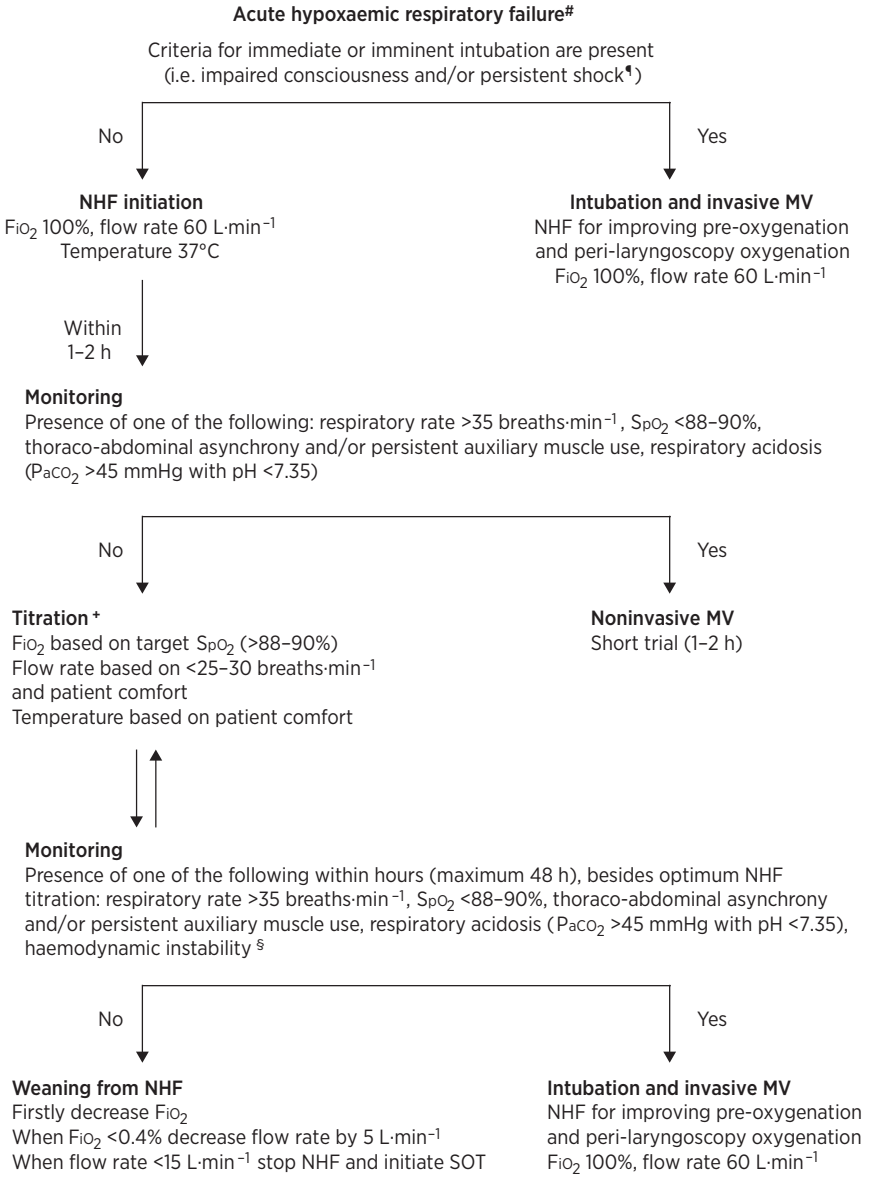


FIGURE 1 Recommended algorithm for high-flow nasal cannula use in acute hypoxaemic respiratory failure in immunocompetent or immunocompromised patients. #: arterial oxygen tension ($PaO_2$)/inspiratory oxygen fraction ($FiO_2$) <300 (patients with arterial carbon dioxide tension ($PaCO_2$) >45 mmHg and pH <7.35 are excluded); ¶: systolic arterial blood pressure <90 mmHg despite adequate fluid administration; +: the rationale for change in nasal high flow (NHF) settings are as follows. 1) Flow rate could be adjusted downwards by 5–10 L·min$^{-1}$ per 1 –2 h if none of the negative prognostic factors are present. However, if targets of arterial oxygen saturation measured by pulse oximetry ($SpO_2$) and respiratory rate are not achieved, while the flow rate is <60 L·min$^{-1}$, increase of flow rate by 5 –10 L·min$^{-1}$ is preferred to raising $FiO_2$; 2) increase in $FiO_2$ causes increases in $PaO_2$ and $SpO_2$; 3) temperature can be set at 37°C or lower (31 –34°C), based on the patient's comfort; §: haemodynamic instability is defined by heart rate >140 beats·min$^{-1}$ or change >20% from baseline and/or systolic arterial blood pressure >180 mmHg, <90 mmHg or decrease >40 mmHg from baseline. MV: mechanical ventilation; SOT: standard oxygen treatment.

Click here for more information about Ischaki et al. 2017.

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