Directorate of Critical Care

High Flow Nasal Oxygen for adults
Guidelines for use

Fisher and Paykel produces the **Optiflow™ High Flow Nasal Oxygen** (HFNO) delivery system. It comprises 4 parts

- The disposable single patient use ***nasal cannulae*** set, 3 sizes (S, M, L).
- Heated wire tubing system breathing ***circuit***, ***humidification chamber*** and ***HME***.
- The ***heater humidifier device*** (Currently we use the F&P MR850)
- The ***oxygen flow meter*** with flows up to 100lpm (or can be run via the Draeger V500 ventilator).

Introduction

- HFNO systems provide two key elements – ***humidification*** and ***flow***.
- ***Heated humidification*** provides better tolerance and mucociliary clearance (37°C, 44mg/l)
- ***High flows*** deliver accurate levels of oxygen, washout anatomical deadspace and may provide very small levels of positive airway pressure

The evidence

PROs	HFNO is tolerated well and comfortable compared with facemask or other CPAP (1)
	HFNO may improve survival by reducing total time of invasive ventilation (3)
	HFNO may be helpful post-extubation in critical care patients (5)
CONs	HFNO may delay the decision to intubate which may increase mortality (2)
	HFNO does not improve pre-oxygenation in critical care patients (4)

We do not know if prolonged (>48hrs) of HFNO with very high FiO_2 (>0.6) is harmful

Indications for use

- ***Hypoxaemia that requires high FiO_2 (alternative to humidified oxygen via face mask)***
- ***Need for very low pressure CPAP as an alternative to facemask or hood CPAP***

Cautions

- Given the above evidence we advocate HFNO use only in appropriately staffed and trained areas (ie HDU and ICU)
- Escalation plans ***MUST*** be made in advance of starting HFNO therapy
- The use of HFNO therapy ***MUST*** be reviewed at least twice daily by a consultant

Contraindications

- Patients with Type 2 respiratory failure who need ventilatory support
- Post oesophagectomy or gastrectomy
- Pneumothorax or bronchopulmonary fistula
- Recent lobectomy or pneumonectomy
- Depressed conscious level and at high risk of aspiration
- Base of skull fracture or CSF leak

References

1. Schwabbauer N, et al. Nasal high-flow oxygen therapy in patients with hypoxic respiratory failure: effect on functional and subjective respiratory parameters compared to conventional oxygen therapy and non-invasive ventilation (NIV). BMC Anesthesiology 2014;14(1):1–7.
2. Kang BJ, et al. Failure of high-flow nasal cannula therapy may delay intubation and increase mortality. Intensive Care Med. 2015;41(4):623–32.
3. Frat J-P, et al. High-Flow Oxygen through Nasal Cannula in Acute Hypoxemic Respiratory Failure. N Engl J Med. 2015 May;372(23):2185-96.
4. Vourc'h M, et al. High-flow nasal cannula oxygen during endotracheal intubation in hypoxemic patients: a randomized controlled clinical trial. Intensive Care Med. 2015. Epub
5. Maggiore SM, et al. Nasal High-Flow versus Venturi Mask Oxygen Therapy after Extubation. Effects on Oxygenation, Comfort, and Clinical Outcome. American Journal of Respiratory and Critical Care Medicine. 2014;190(3):282–8.

Title: High Flow Nasal Oxygen for adults. Guidelines for Use	
ID: HFNOv1	**Authors:** M Dunn, P Clarke, F Pollock
Category:	**Document Version:** 1
Status Draft/Final: Final	**Review Date:** Jul 2017
Authoriser: QIT	**Date Authorisation:** Jul 2015
Date added to Intranet:	
Key words: HFNO	

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High Flow Nasal Oxygen Algorithm

ESCALATION PLAN
Must be discussed with ITU
The appropriateness and plan for intubation or ceiling of therapy must be clearly documented in notes prior to or upon initiation of treatment

Initial settings
CONSULT WITH MEDICAL STAFF AND ESTABLISH TARGETS AND PARAMETERS OF THERAPY

Flow **rate 30 l/min**
FiO_2 21-100% to achieve initial SaO_2 88-92% unless otherwise stated
Switch humidifier to invasive setting
Ensure prongs are ½ the size of patients nares for comfort

Continuously monitor and document: $Sa0_2$, resp rate and heart rate.
ABG within 30 mins if possible and after every change

Has the work of breathing eased?

i.e. Resp rate improved? Less use of accessory muscles?

NO

INFORM MEDICAL STAFF

Increase flow rate in 10 l/min increments to max 60 l/min

YES

SaO_2 or PaO_2 at target levels?

NO

Increase FiO_2 to achieve target SaO_2 or PaO_2

YES

If clinical improvement maintained for **at least 2 hours**

1) Decrease FiO_2 gradually to minimum of 40%
THEN
2) Decrease flow rate in 10l/min steps to 30l/min

Once on 40% and 30l/min flow, can try alternative oxygen delivery system for weaning periods

If tolerated, extend weaning periods off HFNO till completely weaned from HFNO

IN CASE OF DETERIORATION

Inform ITU/HDU Consultant or Registrar immediately

Increase FiO2 to 100% and flow rate to 60 l/min

Consider reversible causes (CXR?)

Follow documented escalation plan
Set up for intubation if appropriate

Troubleshooting

Persistent hypoxaemia:
Consider pneumothorax or lobar collapse (CXR?)
Check **correct O_2 connections** into the circuit
Increase FiO_2
Increase flow rate
Deteriorating clinical condition with hypoxaemia should lead to **urgent clinical re-evaluation** with reference to the agreed **escalation plan**

Increasing $PaCO_2$:
Seek medical review. Refer to escalation plan and consider NIV or intubation as appropriate.

Nasal problems:
Ensure prongs sit well into the nares
Prongs should not totally occlude nares
Assist with reposition of prongs frequently to prevent pressure sores

Patient position:
Patient should be positioned sitting upright with head up
Consider additional support (soft collar/rolled up towel) if necessary

Non cooperative/aggressive behaviour:
Maybe due to **hypoxaemia**. Exclude reversible causes (see above)
Sedation must be discussed ONLY with Senior Medical Staff.

Humidification temperature
If the patient is unable to tolerate the invasive setting temperature adjust the setting to mask temperature but **do not** turn the humidification off.

Weaning Considerations

Patients should feel a clinical improvement within 2 hours of starting therapy. If this improvement is maintained (i.e. correction of hypoxemia maintained and reduced work of breathing evident) it is appropriate to start a weaning plan.

Recommendations

Weaning periods off NFNO will occur ideally during the day
There are 2 elements to weaning

1. Weaning the HFNO (weaning FiO_2 and flow rate) – See Algorithm
2. Weaning off HFNO – See below
    a. When the $Fi0_2$ is at 40% and flow rate 30L/min for at least 2 hours
    THEN:
    b. Change to 0_2 therapy via mask at same FiO_2. Humidify O_2 if required. Continuously monitor and document SaO_2, resp rate and heart rate.
    IF TOLERATED:
    c. Gradually increase intervals off HFNO till fully weaned

Always closely monitor patients during weaning and if signs of deterioration develop, consider recommencing therapy and seek medical advice.

Always consider the indications for nasal high flow therapy and if patient develops signs of respiratory failure treat immediately.