Title

Guidelines for High Flow Nasal Oxygen Therapy (HFNO) on General Wards

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- Therapy respiratory specialist group.
- Senior nurse forum.
- EBME.
- Respiratory consultants
- ICU clinical nurse educator

Approval and Review Process
- Therapy respiratory specialist group.
- Respiratory Consultants
- ICU clinical nurse specialist
- Final approval by Therapy Service Leads Meeting

Local Path
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Guidelines for High Flow Oxygen Therapy (HFNO) on the Wards v1.0

Policy categories for Trust’s internal Tags for Trust’s internal website (Bob)
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<th>website (Bob)</th>
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1. **Purpose**

1.1. The purpose of this document is to detail the delivery of high flow nasal oxygen therapy. It encompasses the level of care required and the equipment needed to set it up.

1.2. The policy applies to Physiotherapists, Nurses, Doctors and nursing associates and advance clinical practitioners.

1.3. Implementation of this policy will support:

- Correct patient selection
- Safe use of High Flow oxygen

2. **Definitions**

2.1. **High Flow Nasal Therapy system**

System which delivers heated, humidified high flow oxygen therapy via nasal cannula or tracheostomy attachment.

3. **Responsibilities**

3.1. **Physiotherapists** - physiotherapists with appropriate knowledge and training can select patients for this therapy, set up the equipment, establish patients on the therapy, make adjustments to the settings and wean the patient from the therapy.

3.2. **Nursing Staff** - all trained nurses (including nursing associates) responsible for a patient on this therapy should have appropriate training to manage the machine, monitor patient and respond to any issues. Nursing staff should be aware of patients National Early Warning Score (NEWS) and any escalation plans for that patient.

3.3. **Doctors** – the medical registrar or consultant on call is responsible for prescribing oxygen and setting target saturations. They are also responsible for ensuring appropriate patient selection and that an up to date TEP form is in place

3.4. **Role of Advanced Practitioner Respiratory Physiotherapist**

The advanced practitioner respiratory specialist physiotherapist is responsible for:

- Ensuring correct patient selection
- Ensuring adequate training for all physiotherapists that participate on the on-call rota
- Providing training to ward nurses

3.5. **Role of Respiratory Consultants and Registrar**

The Respiratory Consultants and Registrars:
• Can be contacted in working hours for advice about the appropriate use of HFNO for medical patients

3.6. Role of Ward Manager

The ward manager is responsible for:

• Ensuring that nursing staff receive training on the use of HFNO and monitoring of the patient whilst on the therapy.
• Ensuring only registered practitioners who have undergone specific training and achieved competency to operate HFNO.

4. Use of High Flow oxygen on the wards

4.1. Introduction

HFNO has become increasingly used for management of patients with type 1 respiratory failure. It delivers high inspiratory gas flow (up to 60 litres per minute), which is warmed and humidified. Oxygen can be titrated from 21-95%. If oxygen exceeds 95%, the oxygen reading will pulse red and the device will alarm.

Benefits include:

• Reversal of hypoxaemia
• Reduced work of breathing
• Improved secretion clearance
• Improved patient tolerance/ comfort

4.2. Indications

Patient selection

**Use of HFNO in patients with COVID or Suspected COVID infection is contraindicated. This is because it is a high risk aerosol generating treatment and poses high risks to staff.**

Patients fall into 3 broad categories:

1. The Patient is a neck breather and is either requiring oxygen or not managing secretions with normal routine

2. The Patient is requiring >60% oxygen via venturi mask or non-rebreath mask.
   - Patients suitable for escalation to ITU/HDU should be transferred **before** HFNO is initiated. It is not appropriate or safe to use HFNO on the general wards as a bridging measure whilst waiting for an ITU bed
   - Patients not suitable for ITU/HDU **must** have a TEP reflecting this before HFNO is initiated

3. The patient is requiring >35% oxygen and has increased sputum viscosity with impaired ability to clear.
   - These patients can receive HFNO on the general wards even if they are suitable for escalation to HDU. However, they are at high risk of deterioration
and must be nursed on a Ward with a full complement of trained staff. If their Oxygen requirements increases to >60% they should be referred to ITU/HDU

- Patients not suitable for ITU/HDU must have a TEP reflecting this before HFNO is initiated

Rarely, HFNO can be used for symptom relief in patients for end of life care. However, this should only be started with discussion with the Respiratory team. A discussion must be had by the respiratory consultant/registrar with the patient about end of life prior to commencing the HFNO.

4.3. **Absolute Contra-indications (if in doubt seek medical advice) to ward use of HFNO**

- Patients with type 2 respiratory failure requiring Non-invasive ventilation (NIV)
- COVID or suspected COVID infections
- Nasal passage abnormalities or recent nasal surgery
- Cerebro-spinal fluid leaks
- Basal skull fractures
- Severe epistaxis

4.4. **Relative contraindications**

- Elderly and frail patients with multiple comorbidities who are unlikely to prognostically benefit from the use of HFNO.
- Patients in whom HFNO is simply likely to prolong the dying phase of the patients illness
- Patients in whom there is no identifiable reversible cause (e.g. progression of pulmonary fibrosis)

For these patients a discussion with the Respiratory team in hours (or Medical Registrar out of hours) should be had BEFORE HFNO is initiated

4.5. **Patient Management**

**Medical wards:**

- All patients on medical wards must be managed on Capener or MAU where trained nurses are available on each shift. If these are COVID areas then patients should be managed in a medical ward with appropriately trained nursing staff
- Patients on HFNO have a similar mortality to NIV patients. They require close observations and monitoring.
- To ensure safe nursing levels on Capener Ward the following must apply:
  - 3 NIV &/or HFNO patients - minimum of 4 trained nurses:
  - 6 NIV&/or HFNO patients - minimum of 5 trained nurses
  - If more than 6 NIV/HFNO patients on the ward then increased nursing capacity is required
If there is less than the required number of nurses, the Ward coordinator on Capener Ward has the right to refuse further admissions to the ward of these high acuity patients and the use of HDU/ITU beds should be explored. The Ward coordinator of Capener will take into account the acuity of each patient and will take extra NIV/HFNO patients if they deem the ward to be appropriately staffed for the current and following shift.

**Surgical Wards:**

The Surgical wards do not have the training or facilities to provide HFNO

Any patient on the surgical wards who require HFNO should be referred to HDU/ITU

### 4.6. Precautions (if in doubt seek medical advice)

- Patients at risk of type 2 respiratory failure secondary to oxygen delivery
- Low platelets

### 4.7. Equipment

- Fisher & Paykel AIRVO²™ humidifier
- Opti-flow nasal cannula (small, medium or large) or Tracheostomy Direct Connection. A mask could be used if other options are not appropriate
- Heated breathing circuit and water chamber
- 1l bag of sterile water
- Bubble oxygen tubing

### 4.8. Setting patient up on the HFNO

- Please refer to appendix A before commencement of HFNT and establish escalation strategy for patient.
- During day time hours the AIRVO² can be set up by the ward physiotherapist. If the AIRVO² is required outside of these hours and the on-call physiotherapist is not required to provide chest physiotherapy, liaise with ICU. If they have the capacity they are able to set the AIRVO² up. If ICU do not have capacity the on-call physiotherapist can be contacted.
- Explain procedure to patient/ carer and gain consent.
- Wash hands and wear appropriate Personal Protection Equipment (PPE) in line with infection control policy.
- Assemble equipment as per manufacturer’s instructions. Label equipment with date for tubing change (according to manufacturer’s instructions). All disposable components are single patient use. Select appropriate patient interface. Switch equipment on, connect oxygen supply if required and check it is ready for use (check disinfection status).
- Perform sounding alarm test by disconnecting tube from top of machine to check that alarm sounds.

### 4.9. Adjusting settings
Press any button to enter the summary screen. Select temperature using the arrow right button. Press and hold down both the up and down arrows at the same time to unlock the screen. Use up and down arrows to select desired temperature. Ideally should be set at 37°C as this will provide optimum humidification but this may not be comfortable so either 34 or 31°C may be selected, if a mask is used then temperature should be set at 31°C.

Press the arrow right button to select flow rate screen. Unlock screen as above. Use up and down buttons to select required flow rate. Most patients with type 1 respiratory failure would commence with at least 40 lpm flow.

Press the arrow right screen to access oxygen percentage and use the attached flow meter to adjust the percentage of oxygen until required patient saturations are reached. The screen does not require unlocking to adjust the oxygen percentage.

It is important to note that if the flow rate is adjusted then the oxygen percentage will also change and will therefore need adjusting at the oxygen flow meter.

Patients with a laryngectomy or tracheostomy that require humidification but not oxygen can receive humidified air. In this instance it is not necessary to connect the oxygen supply. Follow the guidelines for setting of temp and flow rate as above.

4.10. Monitoring patient

Oxygen delivery should be recorded in patients notes and on the NEWS chart as both percentage, flow rate and delivery device.

The equipment should be checked at least 4 x daily and this recorded on chart, appendix B. The machine should be visually inspected. The settings should be noted and recorded on the chart.

The settings of the machine can easily be checked by pressing any button on the machine and it will then display temp/flow rate and oxygen percentage. Oxygen percentage can be adjusted with the flow meter without the need to unlock the screen.

Any increases in oxygen requirement from those set should be performed by a trained member of staff and an increasing need for oxygen should be escalated to the medical team.

As patient's condition improves the oxygen percentage should be decreased first before decreasing the flow rate. For weaning please refer to the trusts oxygen policy.

4.11. Cleaning of equipment

Once therapy has been discontinued discard all disposables in appropriate waste.

Clean as per manufacturer’s instructions including a disinfectant cycle.

4.12. Trouble shooting
If the alarm sounds the display screen will give pictorial representation of the potential fault. Once the problem has been resolved the screen will show a tick in a circle and beep to demonstrate that the fault has been resolved. If you are unable to resolve the fault please discuss with the ward physiotherapist during day time hours. If the fault arises outside of this time and you still require help, please speak to ICU, and if they have the capacity they will help to resolve the problem. If ICU are unable to help contact the on-call physio.

5. Transferring of patients on the HFNO

Patients cannot currently be transported on the HFNO as there is no internal battery. When the patient is deemed stable for transfer to MAU or Capener ward the patient should be placed on a non-rebreathe mask, and the HFNO re-commenced once they arrive on the ward. If possible the machine the patient has been established on should go with the patient as the settings will already be saved and consumables in place (this will prevent unnecessary use of consumables and calls to the on-call physiotherapist). If the ED HFNO is in use on the ward, and a machine is required in ED, there are currently 4 other HFNO’s within the trust, 2 on ICU and 2 within Physiotherapy, which can be utilised as required. Contact either ICU or medical physio on bleep 315.

6. Oxygen Enriched Environments and Fire Safety Risks

6.1. Introduction

High flow nasal therapy systems which deliver heated, humidified high flow oxygen via nasal cannula or tracheostomy attachment (such as but not necessarily limited to the Fisher and Paykel AIRVO² humidification system) can deliver oxygen at flow rates of up to 60 litres per minute.

Such flow rates are significant and present risks associated with oxygen enriched environments and potential for ignition, fire and explosion should a source of ignition (e.g. heat or spark) be present.

6.2. Fire Safety Risks

There is an increased fire safety risk associated with oxygen enriched environments. In an oxygen or nitrous-oxide enriched atmosphere, materials not normally considered to be flammable may become flammable (flammable materials are those that ignite and burn more vigorously).

6.3. Oxygen Enrichment

Clothing and bedding are likely to become saturated with oxygen and present an increased fire risk. Whilst saturated the same controls should be employed as when oxygen therapy is being undertaken. Blankets and similar articles should be turned over several times in normal ambient air following oxygen enrichment. Clothing takes about five minutes to be free from saturation of the gas after enrichment.

6.4. Contaminants
Oil and grease, even in minute quantities, are liable to ignite spontaneously in the presence of high pressure oxygen or nitrous oxide. It is therefore very important that hands are thoroughly clean when setting up the equipment.

6.5. **Oxygen Therapy**

When oxygen therapy equipment is in use, fire and safety warning signs/labels should be conspicuously displayed at the site of administration to alert the patient, clinical staff and visitors that oxygen is being used, and of the need to take precautions. Please see Appendix D for signage. Consideration may need to be given to signs of other languages.

6.6. **Controls to manage fire and explosion risks**

Additional controls should be employed to reduce the risk to as low as is reasonably practical, principle amongst which is that ignition sources must be strictly controlled:

- Open flames, burning tobacco and cigarettes – consideration must be given to the risk presented by other occupants of the bay.
- Sparks and electrical sparks (including those that may be produced by some children’s toys)
- High frequency, short-wave and laser equipment – all produce sufficient energy to cause ignition e.g.
  - Surgical diathermy - use of diathermy machines creating high frequency alternating current to produce heat.
- Electrical arcing e.g.
  - No charging of electronic or electrical devices in the bed space or bay.
  - Use of personal electronic devices by the patient should be kept to an absolute minimum.
- Excessive temperatures in electrical equipment such as hair-dryers or portable heaters.
- Cardiac defibrillator discharge;
- Caution must be exercised by staff prone to static electric shocks.

Further control measures include:

- Careful control of all flammable materials, solutions and preparations including alcohol wipes and hand gel, ensure that they are fully dried before handling or using equipment.
- A level of ventilation must be established in the local area to ensure an adequate dilution rate to return the oxygen level to below critical concentrations. This may be in the form of mechanical ventilation/extraction or open window.

7. **Monitoring Compliance with and the Effectiveness of the Guideline**

7.1. **Standards/ Key Performance Indicators**

Key performance indicators comprise:

- Compliance with the guidelines
• Number of incident reports relating to high flow oxygen therapy on the wards.

7.2. **Process for Implementation and Monitoring Compliance and Effectiveness**

After approval, the author will provide a copy of the policy to the Corporate Affairs Manager to have it placed on the Trust’s intranet. The policy will be referred to on the home page as a latest news release.

Information will also be included in the weekly Chief Executive’s Bulletin which is circulated electronically to all staff.

An email will be sent to senior management to make them aware of the policy and they will be responsible for cascading the information to their staff.

Staff will be made aware of the policy at all local training workshops.

Line managers are responsible for ensuring this policy is implemented across their area of work.

7.3. **Monitoring compliance with guidelines**

• For the first 3 months that these guidelines are in use the respiratory specialist physiotherapists will audit the use of the HFNO. This will include reason for use, length of time in use, outcome and whether guidelines were used appropriately. The outcomes will then be reviewed alongside the respiratory consultants.

• Any non-compliance noted must be immediately reported to the ward manager and the specialist respiratory physiotherapist on the ward.

8. **References**


9. **Associated Documentation**

• Oxygen policy

• Medicines policy

• Associated SOP

• Management of the patient at risk of deterioration policy
10. Appendix D – Oxygen Use Signage