The Newcastle upon Tyne Hospitals NHS Foundation Trust

The Prescription and Administration of Oxygen in Adult Hospital In-Patients

<table>
<thead>
<tr>
<th>Version No.:</th>
<th>1</th>
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<tbody>
<tr>
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</tbody>
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1 Introduction

The administration of supplemental oxygen to correct arterial hypoxaemia is an essential element of the management of a wide range of clinical conditions. Mild levels of hypoxaemia are generally well tolerated: arterial oxygen saturation falls to around 90% during air travel, many healthy individuals have transient dips to 85% or lower during sleep, and SpO2 <92% can be normal in those over 70. Severe hypoxaemia reduces cerebral function, increases the risk of cardiac arrhythmia and can cause death.

Oxygen is carried in the blood bound to haemoglobin which is almost fully saturated (around 98%) in most healthy individuals though there is a slight fall with age. Once haemoglobin is fully saturated administering additional oxygen has only a trivial effect on the amount contained in the blood and delivered to tissues.

Traditionally, the use of oxygen in hospitals has been poorly regulated. It has not been regarded as a drug and generally has been administered on an ad hoc basis rather than prescribed. That has led to problems, particularly related to its overuse.

The problems are most often seen in those with chronic obstructive pulmonary disease (COPD) but affect other individuals who have depressed ventilation. This includes patients with obesity and patients with neuromuscular diseases such as Muscular Dystrophy and Motor Neuron Disease. For reasons that are poorly understood, administering oxygen to these patients can cause a rise in the blood Carbon Dioxide (CO₂) levels. When PaCO₂ rises above about 10 kPa it causes further respiratory depression that can initiate a vicious cycle leading to death.

Recent publications have also shown that uncontrolled administration of high flow Oxygen can be detrimental to patient outcome in multiple clinical situations including: myocardial infarction, stroke, post-resuscitation, sepsis and general intensive care patients. There may be potential harm in over oxygenation in patients prone to seizures and with fibrotic lung disease.

Given the significant harm of both under and over-oxygenation, it is particularly important to ensure that patients receive the correct amount of Oxygen when necessary to prevent the harmful effects of hypoxaemia but also to recognise that over-oxygenation is not helpful and can be harmful.
It is now generally accepted that oxygen should be prescribed in a manner similar to other medications. Longstanding BTS guidelines also recommend a fundamental change in the way oxygen is used in hospitals with the prescription of target oxygen saturations rather than a particular amount of oxygen, and the establishment of an upper limit for an individual’s target saturation in addition to a lower limit.

The National Patient Safety Alert 2009-006 highlighted the problems and established a timescale for the implementation of the BTS guidelines together with additional measures related to the regulation of oxygen therapy in hospitals. At NUTH these guidelines were implemented with the introduction of the medicines management module of the electronic patient record in 2009. The introduction of the standard NEWS chart in 2015 allowed a means of prescribing oxygen on paper and closer integration of prescription and monitoring of oxygen saturations. It is anticipated that with the introduction of an electronic NEWS 2 recording in 2018 there will be full integration of the prescription and monitoring.

2 Aim

The aim of this guideline is to ensure that:

- All adult patients who require supplementary oxygen receive therapy that is appropriate to their clinical condition and in line with national guidance from the British Thoracic Society. https://www.brit-thoracic.org.uk/document-library/clinical-information/oxygen/2017-emergency-oxygen-guideline/bts-guideline-for-oxygen-use-in-adults-in-healthcare-and-emergency-settings/

- Oxygen is prescribed according to a target saturation range that takes account of the risks and benefits to the patient rather than by specifying an oxygen delivery method or the amount of oxygen alone.

- Those who administer oxygen monitor the patient and make appropriate adjustments to treatment to maintain the oxygen saturation within the target range.

- Patients are not given inappropriately high amounts of oxygen that might cause respiratory depression, mask a deterioration in their condition or worsen outcomes in certain clinical conditions (see section 1 above).

3 Scope of the guideline

This guideline applies to all adults to whom supplemental oxygen is administered in hospital with the exception of:

- Oxygen administered to those in shock in whom a reliable oxygen saturation may not be obtainable by pulse oximetry
- Oxygen administered during general anaesthesia and the immediate post-operative period
- Oxygen administered for diagnostic purposes, e.g. in sleep studies or assessment for domiciliary therapy.
• Oxygen administered as part of a palliative care pathway in patients who are hypoxaemic

In emergencies, patients should be given oxygen according to targeted saturations without a prescription until the prescription can be written.

4 Overview

An Oxygen saturation target should be documented using eRecord. The prescription should be for a target oxygen saturation: 94-98% in most patients and 88-92% when there is a risk of respiratory depression and type 2 respiratory failure (see below). The person dispensing the oxygen will choose the most appropriate device and flow rate. Generally this will follow the algorithm outlined in appendices 1-2.

Pulse oximetry must be available wherever supplemental oxygen is used, and the frequency of monitoring must be specified. A minimum of 4 hourly observations is recommended.

5 Prescribing, administering and monitoring oxygen therapy

5.1 Identifying the need for supplemental oxygen

Oxygen saturation should be measured in all breathless and acutely ill patients presenting to or inpatient in the Trust using a pulse oximeter. Supplemental oxygen should generally be given to those who are found to be hypoxaemic. It should generally not be given to those who are not hypoxaemic. Breathlessness per se is not an indication for oxygen - there are many situations such as acute hyperventilation or diabetic ketoacidosis where breathless or tachypnoeic patients will not benefit from oxygen therapy. Unnecessary oxygen can cause physical harm and psychological dependence.

5.2 Emergency use of oxygen in near cardiac arrest situations

Patients in cardiac arrest or similar situations should also be given oxygen according to a saturation target. Consider High Flow Nasal cannulae in acutely unwell patients.

• Oxygen treatment can be initiated by the primary responder in a cardiac arrest or near-arrest situation without a prescription. The oxygen therapy must be documented as part of a full set of observations on the electronic system documented as soon as is practical.

Reliable oximetry signals often cannot be obtained in some patients due to poor peripheral circulation. Care may need to be taken with patients at risk of hypercapnic respiratory failure but in general the need for supplemental oxygen will override other concerns.
5.3 Identifying an appropriate target oxygen saturation in other situations

The use of personalised target oxygen saturations in patients with chronic respiratory disease or hypoventilation is encouraged. Many patients will present to hospital with a personalised target oxygen saturation recorded on an oxygen alert card. When available that should guide the initial oxygen saturation prescription.

For all other patients the prescriber should consider whether or not there is a risk of type 2 respiratory failure.

Criteria that indicate an increased risk of type 2 respiratory failure are:
- COPD
- Obesity with BMI > 40 or known Obesity Hypoventilation Syndrome
- Severe kyphoscoliosis or other marked chest wall deformity
- Neurological disease with respiratory muscle weakness eg. MND or Muscular Dystrophy
- Overdose with respiratory depressant drugs e.g. benzodiazepines or opiates.

Oxygen should then be prescribed to achieve an appropriate target saturation:
- No risk of type 2 respiratory failure, no established target saturation
- At risk of type 2 respiratory failure
- Previously established target saturation

5.4 Prescribing and administering oxygen

Oxygen will normally be prescribed by a doctor or non-medical prescriber.

After establishing the target oxygen saturation the prescriber should determine the optimum initial oxygen flow rate and administration device, and record both of these on the electronic prescription sheet.

The person designated to administer the oxygen should check the prescription and commence treatment with the appropriate device and flow rate. They should check that connections with the oxygen source are secure. They should minimise the risk of inadvertent discontinuation of supply for example by removing flow meters from adjacent medical air supplies.
Guidance on the initial choice of device and flow rate is given in appendices 1-2.

5.5 Monitoring and recording oxygen saturation

A pulse oximeter should be available in all areas where oxygen is administered.

All acutely ill patients on supplemental oxygen should have regular pulse oximetry measurements. Their frequency will depend on the severity of the illness, the condition being treated and the patient’s stability. They should be specified by the prescriber. A minimum of 4 hourly observations is recommended.

Critically ill patients should have their oxygen saturations monitored continuously with a device that has an alarm set to an appropriate level. The alarm setting will be determined by the clinical condition of the patient. An initial setting of 3%-4% below the lower limit of the target range is suggested.

The oxygen saturation should be used to calculate the NEWS 2 and if appropriate should trigger additional action. Actions specified in these guidelines do not override other actions that may be indicated by an abnormal NEWS 2.

Oxygen saturations should be recorded on electronic NEWS 2 chart.

Oxygen therapy should be increased if the saturation is below the desired range and decreased if the saturation is above the desired range (and eventually discontinued as the patient recovers).

Suggested schedules for increasing and decreasing oxygen are set out in appendix 3.

Any fall in oxygen saturation of 3% or more that is not explained by changes to the oxygen prescription should lead to a clinical evaluation of the patient and, often, to measurement of blood gases.

When Arterial Blood Gases are measured, it is critical that the \( \text{FiO}_2 \) that the patient is receiving should be clearly documented. Previous practice of removing oxygen from patients prior to Arterial Blood Gas analysis is potentially unsafe and should not be undertaken outside of the specific situation of assessment for suitability for domiciliary Oxygen.

6 Common uses of supplemental oxygen to which these guidelines apply

These guidelines apply to most situations in which supplemental oxygen is administered in hospital including:
- Acute onset hypoxaemia of unknown cause
- Asthma
- Pneumonia
• Lung cancer
• Diffuse fibrotic lung disease
• Pneumothorax
• Pleural effusion
• Pulmonary embolism
• Cardiac failure
• Post-operative care on surgical wards
• Anaemia
• Sickle cell crisis

The guidelines also apply to a number of situations in which in the past oxygen has often been administered in the absence of arterial hypoxaemia:
• Acute myocardial infarction
• Acute stroke and other neurological disease
• Labour and obstetric emergencies
• Anxiety and hyperventilation
• Drug overdose
• Metabolic disease
• Sepsis and shock
• Post-resuscitation care
• Traumatic Brain Injury

7 Special situations

7.1 Patients using nebulisers

Most patients are able to tolerate short periods of hyperoxaemia whilst receiving nebulised therapy and the nebuliser can be driven using the bedside oxygen supply and the flow rate specified for the device.

Nebulisers should be removed as soon as the medication has been administered. Patients should not be left on high flow oxygen through a nebuliser for prolonged periods.

When nebulised therapy is administered to patients who are known to be oxygen-sensitive it should be driven by compressed air. If necessary, supplementary oxygen should be given concurrently by nasal prongs at 1-4 litres per minute to maintain an oxygen saturation of 88-92% or other specified target range. If observations are taken whilst on Nebulised therapy, the administration of Oxygen should be documented with the patient’s saturations.

7.2 Nasal ventilation/ CPAP

Oxygen prescription in association with non-invasive ventilatory support should be under the direct supervision of a practitioner with appropriate training and experience in using the device. Target oxygen saturations should be prescribed in the normal manner and oxygen entrained into the device and adjusted to meet the target saturation.
7.3 **Peri-operative care**

Oxygen during general anaesthesia is administered under the direct supervision of an anaesthetist with continuous monitoring of oxygen saturation. Observations should be recorded on the anaesthetic sheet. Oxygen during recovery from general anaesthesia should be prescribed by the anaesthetist and the intensity of observation specified.

On transfer to a general surgical ward, oxygen prescription and monitoring should continue as in section 5.

7.4 **Intensive care and other mechanically ventilated patients**

It is likely that individualised schedules will be necessary for patients under close observation in intensive care units. These should follow the principles of the guideline, i.e. the oxygen should be prescribed, a target range should be specified and the patient should be monitored to maintain oxygen saturation within the target range.

7.5 **Hyperbaric oxygen**

Hyperbaric oxygen is not currently used in the Trust. Its use requires a specific protocol that is outside the scope of this guideline.

7.6 **Oxygen prescribed for reasons other than to correct arterial hypoxaemia.**

Occasionally oxygen is used to speed the resolution of pneumothoraces and possibly for other reasons not directly related to the correction of arterial hypoxaemia such as cluster headache.

Prescription should follow the principles of this guideline though different target saturations might need to be specified.

7.7 **Potential oxygen toxicity in association with drug reactions and other situations**

Patients suffering from toxicity from paraquat, bleomycin, amiodarone and some other agents are particularly susceptible to the effects of supplemental oxygen on the lung. Prescription should follow the principles of this guideline though different target saturations might need to be specified.

7.8 **Carbon monoxide poisoning**

Conventional pulse oximetry cannot distinguish between oxyhaemoglobin and carboxyhaemoglobin. Arterial blood gas measurement is therefore necessary in cases of suspected CO poisoning to gauge oxygen content. High flow oxygen should be administered as in 5.2 and pulse oximetry should not be used. Early referral to critical care and high flow oxygen therapy should also be considered and the target oxygen saturation adjusted if necessary.
7.9 Other special situations

If oxygen administration is required in specialist areas not catered for in this guideline, separate approval should be obtained. It should reflect wherever possible the principles within this policy.

8 Transfer and transportation of patients receiving oxygen

All areas where patients are likely to require oxygen away from the bedside should have access to portable oxygen supplies. In general piped oxygen supplies are preferred and the use of portable oxygen should be minimised.

Many patients will tolerate short periods of mild hypoxaemia and the need for supplemental oxygen away from the bedside should be assessed before moving the patient. The need for monitoring of oxygen saturation away from the bedside should also be assessed.

In general, patients who require oxygen during transfer from one area to another should be accompanied by a trained member of the nursing staff though this may not be necessary in patients who are clinically stable. The need for trained supervision should be assessed prior to transfer. If the patient is not accompanied by a nurse clear instructions must be provided for personnel involved in the transfer. These should include the oxygen delivery device and flow rate. The target Oxygen saturation should not change during transfer and there is no indication for administration of a higher FiO₂ during transfers.

9 Staff training

All staff prescribing, dispensing and monitoring oxygen therapy should undergo suitable training and demonstrate their competence.
Appendix 1

Starting oxygen therapy (1)
Patients at no risk of hypoventilation - target SpO2 94-98%

Assessing the need for supplementary oxygen should take place in parallel with normal initial management steps.

SpO2 on air

94-100%  
Do not administer supplementary oxygen.

90%-93%  
1. Use nasal cannulae at 2 L/min
2. Observe for 1 minute
3. Adjust flow rate up or down (1-6 L/min) to maintain SpO2 94-98%
4. Initiate at least 6 hourly monitoring of oxygen saturation

5. If target saturation (94-98%) not achieved  
   a. Reassess clinically
   b. Obtain arterial blood gas
   c. Calculate NEWS 2 score
   d. Consider hypoventilation/ respiratory depression
   e. Consider alternative oxygen delivery method
   f. Or revise target saturation and document

86%-90%  
1. Use nasal cannulae at 4 L/min or variable flow face mask at 4 L/min
2. Observe for 1 minute
3. Adjust flow rate up or down (1-6 L/min) to maintain SpO2 94-98%
4. Initiate at least 6 hourly monitoring of oxygen saturation

5. If target saturation (94-98%) not achieved  
   a. Reassess clinically
   b. Obtain arterial blood gas
   c. Calculate NEWS 2 score
   d. Consider hypoventilation/ respiratory depression
   e. Consider alternative oxygen delivery method
   f. Or revise target saturation and document

<86%  
1. Use any Oxygen delivery device which achieves saturations of 94-98%. Consider High Flow Nasal cannulae
2. Observe for 1 minute
3. Review the NEWS 2 score
4. Adjust flow rate up or down to maintain SpO2 94-98%
5. Check arterial blood gas
6. Initiate continuous monitoring of oxygen saturation

7. If target saturation not achieved  
   a. Clinical review, consider ITU referral
   b. Recalculate NEWS 2 score
   c. Consider alternative oxygen delivery method
   d. Or revise target saturation and document

1. Acceptable flow rates 4-6 L/min for variable flow face mask; 1-4 L/min for nasal cannulae
Appendix 2

Starting oxygen therapy (2)

Patients at risk of hypoventilation\(^1\) - target SpO2 88-92%

For those with no pre-specified target saturation\(^2\)
Assessing the need for supplementary oxygen should take place in parallel with normal initial management steps.

SpO2 on air

88%-100%  Do not administer oxygen

87%-88%
1. Start using a blue (24%) Venturi mask at correct flow rate\(^3\)
2. Arterial blood gas as soon as possible
   
   If pH < 7.35  NIV, consider ITU referral
   If pH > 7.35  continue
3. Review SpO2 after 30 minutes and then hourly
   
   If SpO2 > 92%  Consider stopping oxygen therapy or change to low flow nasal cannulae
   
   If SpO2 88-92%  Continue 24% mask consider change to nasal cannulae
If SpO2 <88% change to 28% mask
clinical reassessment
calculate NEWS 2,
consider ITU referral
or revise and document target Spo2

84%-86%

1. Start using a white (28%) Venturi mask at correct flow rate³
2. Arterial blood gas as soon as possible
   If pH <7.35 NIV, consider ITU referral
   If pH >7.35 continue
   Monitor SpO2 continuously
   Repeat blood gases after 30-60 minutes
3. Review SpO2 after 10 and 30 minutes and then hourly
   If SpO2 >92% change to 24% mask
   consider change to nasal cannulae
   If SpO2 88-92% continue oxygen
   If SpO2 <88% increase oxygen to 35%
   clinical reassessment
   calculate NEWS 2,
   consider ITU referral
   or revise and document target SpO2

<84%

1. Yellow (35%) Venturi mask at correct flow rate
2. Calculate NEWS 2 score, consider ITU
3. Arterial blood gas as soon as possible
   If pH <7.35 NIV, consider ITU referral
   If pH >7.35 continue
   Monitor SpO2 continuously
   Repeat blood gases after 30-60 minutes
4. Review SpO2 after 10 and 30 minutes and then hourly
   If SpO2 > 92% change to 28% mask
   consider change to nasal cannulae
If SpO2 88 - 92% continue oxygen

If SpO2 < 88% increase oxygen to 40% (red)
clinical reassessment
calculate NEWS 2,
consider ITU referral
or revise and document target SpO2

1. Patients with COPD
   Obesity BMI > 40
   Severe kyphoscoliosis/ other chest wall deformity
   Respiratory muscle weakness
   Overdose of sedative drugs

2. Patients with previous hypercapnic respiratory failure should have a personalised oxygen alert card and this information should be available to primary care staff, ambulance staff and hospital staff

3. Normal flow rates
   White 24% 2 L/min
   Blue 28% 4 L/min
   Yellow 35% 8 L/min
   Red 40% 10 L/min
These should be increased by 50% for patients with respiratory rate > 30/min
i.e. White 24% 3 L/min
     Blue 28% 6 L/min
     Yellow 35% 12 L/min
     Red 40% 15 L/min
Appendix 3

Review of patients stabilised on supplemental oxygen (not at risk of hypoventilation)

a. On nasal cannulae / variable flow face mask

**SpO2 on air**

<table>
<thead>
<tr>
<th>SpO2 Range</th>
<th>Instructions</th>
</tr>
</thead>
</table>
| 99%-100%   | Reduce flow rate by 1-2 L/min  
Stop if using 2 L/min  
Continue 6 hourly monitoring of SpO2 |
| 94%-98%    | Continue current oxygen  
Consider stopping if clinical condition stable  
Continue 4 hourly monitoring of SpO2 |
| 85%-94%    | Repeat observation after 5 minutes with patient resting  
Increase flow rate by 1-2 L/min  
Observe for 1 minute  
Repeat step 2 until SpO2 94-98% achieved  
Review clinical condition  
Urgent review if fall is > 3% from previous observation |
| <85%       | Repeat after 5 minutes if clinical condition allows  
Switch to any Oxygen delivery device which achieves target saturations  
Consider High Flow Nasal cannulae  
Calculate NEWS 2 score  
Start continuous monitoring of SpO2  
Urgent clinical review  
Arterial blood gas  
Consider ITU referral |
b. On fixed flow Venturi mask (Patients at risk of hypoventilation)

**SpO2 on air**

**92%-100%**
1. Stop oxygen  
2. Repeat SpO2 after 5 minutes  
3. Keep off supplemental oxygen if SpO2 >88%  
4. Change to lower FiO2 mask if SpO2 <88%  
5. Continue SpO2 monitoring at least 6 hourly

**88%-92 %**
1. Continue current oxygen  
2. Consider stopping or reducing if clinical condition allows  
3. Continue SpO2 monitoring at least 6 hourly

**84%-88%**
1. Repeat observation after 5 minutes with patient resting  
2. Switch to higher flow venturi mask  
3. Review clinical condition  
   - Consider ABG  
   - Consider ITU referral  
4. Urgent review if fall is > 3% from previous observation

**<84%**
1. Review after 5 minutes if clinical condition allows  
2. Switch to higher flow venturi mask  
3. Calculate NEWS 2 score  
4. Start continuous monitoring of SpO2  
5. Urgent clinical review  
   - Arterial blood gas  
   - Consider ITU referral
A) Nasal cannula

**DEVICE**

Nasal Cannulae

**DESCRIPTION**

Nasal cannulae consist of pair of tubes about 2cm long, each projecting into the nostril and stemming from a tube which passes over the ears and which is thus self-retaining.

**PURPOSE**

Cannulae are preferred to masks by most patients. They have the advantage of not interfering with feeding and are not as inconvenient as masks during coughing and sneezing. It is not advisable to assume what percent oxygen (FiO2) the patient is receiving according to the Litres delivered but this is not important if the patient is in the correct target range.

**ACTION**

1. (When using nasal cannula). Position the tips of the cannula in the patient’s nose so that the tips do not extend more than 1.5cm into the nose.

   **RATIONALE**

   Overlong tubing is uncomfortable, which may make the patient reject the procedure. Sore nasal mucosa can result from pressure or friction of tubing that is too long.

2. Place tubing over the ears and under the chin as shown above. Educate patient re prevention of pressure areas on the back of the ear.

   **RATIONALE**

   To allow optimum comfort for the patient. To prevent pressure sores.

3. Adjust flow rate, usually 2-4 l/min but may vary from 1-6 l/min in some circumstances.

   **RATIONALE**

   Set the flow rate to achieve the desired target oxygen saturation.
### B) Fixed performance mask (Venturi mask and valve)

<table>
<thead>
<tr>
<th>DEVICE</th>
<th>DESCRIPTION</th>
<th>PURPOSE</th>
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</thead>
<tbody>
<tr>
<td>Venturi mask</td>
<td>A mask incorporating a device to enable a fixed concentration of oxygen to be delivered independent of patient factors or fit to the face or flow rate. Oxygen is forced out through a small hole causing a Venturi effect which enables air to mix with oxygen.</td>
<td>This is a high performance oxygen mask designed to deliver a specified oxygen concentration regardless of breathing rate or tidal volume. Venturi devices come in different colours for % Blue = 24% White = 28% Yellow = 35% Red = 40% Green = 60%</td>
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### ACTION

1. **(When using Venturi mask)**
   - Connect the mask to the appropriate Venturi barrel attached firmly into the mask inlet.  
   **RATIONALE**
   - To ensure that patient receives the correct concentration of oxygen.

2. Fasten oxygen tubing securely.  
   **RATIONALE**
   - Correctly secured tubing is comfortable and prevents displacement of mask/cannulae.

3. Assess the patient's condition and functioning of equipment at regular intervals according to care plan.  
   **RATIONALE**
   - To ensure patient’s safety and that oxygen is being administered as prescribed.

4. Adjust flow rate. The minimum flow rate is indicated on the mask or packet. The flow should be increased by 50% if the patient has a respiratory rate above 30 per minute.  
   **RATIONALE**
   - Higher flows are required for patients with rapid respiration and high inspiratory flow rates. This does not affect the concentration of oxygen but allows the gas flow rate to match the patient’s breathing pattern.
### C) Simple face mask (variable flow)

<table>
<thead>
<tr>
<th>DEVICE</th>
<th>DESCRIPTION</th>
<th>PURPOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mask has a soft plastic face piece, vent holes are provided to allow air to escape. Maximum 50%-60% at 15ltrs/minute flow.</td>
<td>This is a variable performance device. The oxygen concentration delivered will be influenced by:</td>
<td></td>
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<tr>
<th>ACTION</th>
<th>RATIONALE</th>
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<tbody>
<tr>
<td>(If using simple face mask) Gently place mask over the patient’s face, position the strap behind the head or the loops over the ears then carefully pull both ends through the front of the mask until secure. Check that strap is not across ears and if necessary insert padding between the strap and head. Adjust the oxygen flow rate. Must never be below 5L/min</td>
<td>Ensure a comfortable fit and delivery of prescribed oxygen is maintained. To prevent irritation. Flows below 5L/m do not give enough oxygen and may cause increased resistance to breathing and may also cause CO2 re-breathing due to the small mask size.</td>
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Nasal cannulae should be used for most patients who require medium dose oxygen but a simple face mask may be used due to patient preference or if the nose is blocked.
### D) Reservoir mask

<table>
<thead>
<tr>
<th>DEVICE</th>
<th>DESCRIPTION</th>
<th>PURPOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reservoir Mask</td>
<td>Mask has a soft plastic face piece with flap-valve exhalation ports which may be removed for emergency air-intake. There is also a one-way valve between the face mask and reservoir bag.</td>
<td>In non re-breathing systems the oxygen may be stored in the reservoir bag during exhalation by means of a one-way valve. High concentrations of oxygen 80-90% can be achieved at relatively low flow rates.</td>
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**Uncontrolled oxygen therapy**

<table>
<thead>
<tr>
<th>ACTION</th>
<th>RATIONALE</th>
</tr>
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<tbody>
<tr>
<td>1. (Non Rebreath Reservoir Mask) Ensure the reservoir bag is inflated before placing mask on patient, this can be maintained by using 10-15 litres of oxygen per min.</td>
<td>To ensure the optimal flow of oxygen to the patient.</td>
</tr>
<tr>
<td>2. Adjust the oxygen flow to the prescribed rate.</td>
<td>Inadequate flow rates may result in administration of inadequate oxygen concentration to the patient.</td>
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In disposable reservoir, oxygen flows directly into the mask during inspiration and into the reservoir bag during exhalation. All exhaled air is vented through a port in the mask and a one-way valve between the bag and mask, which prevents re-breathing.

### D) High Flow Nasal Cannulae

<table>
<thead>
<tr>
<th>DEVICE</th>
<th>DESCRIPTION</th>
<th>PURPOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Flow Nasal Cannulae</td>
<td>Nasal Cannulae attached to a wet humidifier through which high flow fully humidified Oxygen can be administered at a</td>
<td>To improve Oxygenation and reduce the work of breathing in acutely hypoxaemic patients. A</td>
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</table>
guaranteed FiO₂ small amount of CPAP (2-4 cmH₂O) is delivered due to the high flows.

**ACTION**

1. This is a complex treatment which requires specific training for use. Contact Critical Care Outreach to help with set-up.

2. Adjust the oxygen flow and FiO₂ to the prescribed rate.

**RATIONALE**

To ensure the optimal flow and humidification of oxygen to the patient.

Inadequate FiO₂ may result in administration of inadequate oxygen concentration to the patient.
Oxygen Therapy
Patients at risk of Hypoventilation

SpO2 on Air → Initial Choice → Subsequent Action

Criteria that indicate an increased risk of type 2 respiratory failure are:
- COPD
- Obesity with BMI > 40 or known Obesity Hypoventilation Syndrome
- Severe kyphoscoliosis or other marked chest wall deformity
- Neurological disease with respiratory muscle weakness, e.g., MND or Muscular Dystrophy
- Overdose with respiratory depressant drugs, e.g., benzodiazepines or opiates.

88-100%
- No Oxygen

87-88%
- Blue Mask 24%

84-86%
- White Mask 28%

<84%
- Yellow Mask 35%

Adjust up or down to maintain SpO2 88-92%

Reassess at 30 minutes

If Stable
- Continue O2
- Monitor Sats as per NEWS 2

No
- Reassess clinically and with NEWS 2
- Consider repeat Arterial Blood Gas
- Consider NIV/Critical Care referral
- Consider changing Sats target

Yes
- NIV
- Consider Critical Care referral

Arterial Blood Gas pH < 7.35 and CO2 > 6.5 kPa

Increasing O2 requirement
Oxygen Therapy
Patients not at risk of Hypoventilation

SpO2 on Air → Initial Choice → Subsequent Action

94-100%
- No Oxygen

90-93%
- 2L/Min Nasal Cannulae

87%-89%
- 4L/Min Nasal Cannulae or Mask

<86%
- High Flow Oxygen Consider High Flow Nasal Cannulae
  - Arterial Blood Gas Review NEWS 2 2
  - Consider NIV if Hypercapnic Consider Critical Care referral

Adjust up or down to maintain SpO2 94-98%

SpO2 94-98% Achieved?
- Yes
  - Continue O2 Monitor Sats as per NEWS 2 2

- No
  - Increasing O2 requirement
  - Reassess clinically and with NEWS 2 2
  - Consider repeat Arterial Blood Gas
  - Consider NIV/Critical Care referral
  - Consider changing Sats target
This form must be completed and attached to any procedural document when submitted to the appropriate committee for consideration and approval.

PART 1

1. **Assessment Date:** __Jan 2019

2. **Name of policy / guidance / strategy / service development / Investment plan / Board Paper:**
   The Prescription and Administration of Oxygen in Adult Hospital In-Patients

3. **Name and designation of author:**
   P B Messer Consultant in Critical Care Medicine and Home Ventilation

4. **Names & Designations of those involved in the impact analysis screening process:**
   As above. PG Laws Consultant in Critical Care Medicine and Clinical Director for Quality and Patient Safety

5. **Is this a:** Policy
   **Is this:** Revised □

   **Who is affected:** Employees □ Service Users □

6. **What are the main aims, objectives of the document you are reviewing and what are the intended outcomes?**
   *(These can be cut and pasted from your policy)*
   To ensure that Oxygen is safely prescribed and administered within the Trust.
7. Does this policy, strategy, or service have any equality implications? **No**

If No, state reasons and the information used to make this decision, please refer to paragraph 2.3 of the Equality Analysis Guidance before providing reasons:

| Applicable equally to all patient groups. |

8. Summary of evidence related to protected characteristics

<table>
<thead>
<tr>
<th>Protected Characteristic</th>
<th>Evidence</th>
<th>Does evidence/engagement highlight areas of direct or indirect discrimination?</th>
<th>Are there any opportunities to advance equality of opportunity or foster good relations? If yes what steps will be taken? (by whom, completion date and review date)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race / Ethnic origin (including gypsies and travellers)</td>
<td>What evidence do you have that the Trust is meeting the needs of people in all protected Groups related to the document you are reviewing— please refer to the Equality Evidence within the resources section at the link below: <a href="http://nuth-vintranet1:8080/cms/SupportServices/EqualityDiversityHumanRights.aspx">http://nuth-vintranet1:8080/cms/SupportServices/EqualityDiversityHumanRights.aspx</a></td>
<td>Ask for professional evidence of differences in access or outcomes for people with protected characteristics</td>
<td>Please note general examples of things we could do to advance equality of opportunity or foster good relations have been included in this column. Delete and add to as appropriate Include issues related to equality in training related to this document. Improve Equality Monitoring and Review access and DNA data by protected characteristic. Review interpreting bookings. Would it help to directly link with voluntary sector organisations?</td>
</tr>
<tr>
<td>Sex (male/ female)</td>
<td>Single Sex accommodation policy Mandatory EDHR Training Women’s Health and Sexual Health Services available for advice and support</td>
<td></td>
<td>Include issues related to equality in training related to this document. Is it possible to offer out of</td>
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<tr>
<td>Topic</td>
<td>Details</td>
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<tr>
<td>Trust partnership work with 3rd sector organisations</td>
<td>Include issues related to equality in training related to this document. Are there opportunities to promote Dementia or Children and Young people friendly spaces? Would it help to directly link with voluntary sector organisations? Review access and DNA data by protected characteristic.</td>
<td></td>
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<tr>
<td>Religion and Belief</td>
<td>Chaplaincy Team available for advice and support. Religion, Belief and Cultural Practices Policy and Guidance Include issues related to equality in training related to this document. Are there any opportunities to meet spiritual needs such as a quiet/prayer space, food and personal hygiene needs?</td>
<td></td>
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<tr>
<td>Sexual orientation including lesbian, gay and bisexual people</td>
<td>Mandatory EDHR Training Trust partnership work with 3rd sector organisations Trust support of Northern Pride LBGBT Staff Network Include issues related to equality in training related to this document. Are there opportunities to promote an LGB friendly space- posters that let people know they are welcome? Would it help to directly link with voluntary sector organisations?</td>
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<tr>
<td>Age</td>
<td>Children and Young People’s Services and Elderly Medicine Services Trust work in relation to Dementia Care Your’re Welcome Accreditation for Children and Young People’s Services Services for teenagers for example Cancer Services Mandatory EDHR Training Trust partnership work with 3rd sector organisations Include issues related to equality in training related to this document. Are there opportunities to promote Dementia or Children and Young people friendly spaces? Would it help to directly link with voluntary sector organisations? Review access and DNA data by protected characteristic.</td>
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<tr>
<td>Disability – learning</td>
<td>Psychological and Mental Health Services Rehabilitation Services Include issues related to equality in training related to this document. Are there opportunities to promote Disability learning friendly spaces? Would it help to directly link with voluntary sector organisations? Review access and DNA data by protected characteristic.</td>
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<tr>
<td><strong>difficulties, physical disability, sensory impairment and mental health. Consider the needs of carers in this section</strong></td>
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<td>Professions Allied to Medicine services</td>
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<td>Accessible Information Standard</td>
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<td>Provision of BSL Signers and Deaf Blind Guides</td>
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<td>LD Liaison Nurse, flagging of learning disability and patient passport.</td>
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<td>Trust work to support Carers</td>
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<tr>
<td>Mandatory EDHR Training</td>
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<tr>
<td>Trust partnership work with 3rd sector organisations</td>
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<tr>
<td>Disability Staff Network</td>
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<tr>
<td>this document. Have you considered accessible spaces and information? Can you promote inclusion of Carers? Would it help to directly link with voluntary sector organisations?</td>
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<thead>
<tr>
<th><strong>Gender Re-assignment</strong></th>
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<tbody>
<tr>
<td>Trust Gender Identity Working Group</td>
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<tr>
<td>Mandatory EDHR Training</td>
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<tr>
<td>Trust partnership work with 3rd sector organisations</td>
</tr>
<tr>
<td>Include issues related to equality in training related to this document. Would it help to directly link with voluntary sector organisations? Is there an opportunity for single cubicle toilets with male and female signs on the door? Is there an opportunity to reach out to transgender people?</td>
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</tbody>
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<thead>
<tr>
<th><strong>Marriage and Civil Partnership</strong></th>
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<tbody>
<tr>
<td>Mandatory EDHR Training</td>
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<tr>
<td>Include issues related to equality in training related to this document.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Maternity / Pregnancy</strong></th>
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<tr>
<td>Maternity Services available for advice and support.</td>
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<tr>
<td>Breast Feeding Policy and signage</td>
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<tr>
<td>Mandatory EDHR Training</td>
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<tr>
<td>Trust partnership work with 3rd sector organisations</td>
</tr>
<tr>
<td>Include issues related to equality in training related to this document. Are there any specific issues for pregnant and post natal mothers and families?</td>
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</tbody>
</table>

9. Are there any gaps in the evidence outlined above? If ‘yes’ how will these be rectified?
10. Engagement has taken place with people who have protected characteristics and will continue through the Equality Delivery System and the Equality Diversity and Human Rights Group. Please note you may require further engagement in respect of any significant changes to policies, new developments and or changes to service delivery. In such circumstances please contact the Equality and Diversity Lead or the Involvement and Equalities Officer.

Do you require further engagement

No

11. Could the policy, strategy or service have a negative impact on human rights? (E.g. the right to respect for private and family life, the right to a fair hearing and the right to education?)

No

PART 2

Name of author:
P B Messer

Date of completion
10/12/2018

(If any reader of this procedural document identifies a potential discriminatory impact that has not been identified, please refer to the Policy Author identified above, together with any suggestions for action required to avoid/reduce the impact.)