OXYGEN POLICY – PRESCRIPTION, ADMINISTRATION and MONITORING OF OXYGEN THERAPY IN ADULTS

POLICY

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Approving Body	v4.0, Respiratory Clinical Governance v4.1, Formal approval not required		
Date Approved	v4.0, 17th June 2021 v4.1, Formal approval not required		
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	YES	**NO**	**N/A**
	X		
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Summary of Changes from Previous Version	• v4.1, Section 6f, page 8 – Transfer and transportation of patients receiving oxygen – information added regarding mobilising a patient within a clinical area away from wall-based oxygen supply (following an incident investigation). • v4.0, None, current BTS guidelines remain unchanged		
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Sponsor (Position)	Medical Director		
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Lead Division/ Directorate	Medicine		
Lead Specialty/ Service/ Department	Respiratory		
Position of Person able to provide Further Guidance/Information	Dr David Hodgson Consultant in Respiratory Medicine		
Associated Documents/ Information			**Date Associated Documents/ Information was reviewed**
Not Applicable			N/A
Template control			June 2020

CONTENTS

1.0 INTRODUCTION

The administration of supplemental oxygen is an essential element of appropriate management for a wide range of clinical conditions; however oxygen is a medication and therefore must be prescribed in all but emergency situations. Failure to administer oxygen appropriately can result in serious harm to the patient. The safe administration of oxygen therapy with appropriate monitoring is an integral component of the healthcare professional's role.

2.0 POLICY STATEMENT

The aim of this policy is to ensure that:

- All patients who require supplementary oxygen therapy receive therapy that is appropriate to their clinical condition and in line with national British Thoracic Society guidance (BTS June 2017).
- Oxygen will be prescribed according to a target saturation range. The system of prescribing target saturation aims to achieve a specified outcome, rather than specifying the oxygen dose and delivery method alone.
- Those who administer oxygen therapy must monitor the patient and keep within the target saturation range.

This clinical practice document applies to:

Staff groups

- All staff involved in prescribing, administering and monitoring oxygen therapy in adult/ maternity patients.

Clinical areas

- All areas where patients can be administered oxygen in King's Mill Hospital, Newark Hospital and Mansfield Community Hospital.

Patient groups

- Adults (including pregnant women) requiring oxygen therapy.

Exclusions

- Paediatric patients, covered by separate policy

3.0 DEFINITIONS/ ABBREVIATIONS

Trust:	Sherwood Forest Hospitals NHS Foundation Trust
Staff:	All employees of the Trust including those managed by a third party on behalf of the Trust
Adults:	Patients 18 years and over including pregnant women
BTS:	British Thoracic Society
CCOT:	Critical Care Outreach Team
COPD:	Chronic Obstructive Pulmonary Disease
FiO2:	Fraction of inspired oxygen
HCA:	Healthcare Assistant
NEWS:	National Early Warning Score
ODP:	Operating Department Practitioner
RM:	Registered Midwife
RN:	Registered Nurse

4.0 ROLES AND RESPONSIBILITIES

All staff who are involved in the prescription, administration or monitoring of oxygen:

- should be up to date with the current oxygen prescribing guidelines; and
- should ensure the correct lawful consent is gained prior to examining, treating and caring for patients.

Nurses (RNs and RMs) and ODPs are responsible for:

- Administering routine oxygen as prescribed
- Administering oxygen in an urgent situation without prescription
- Assessing a patient's oxygen requirement
- Monitoring the effect of oxygen administered
- Titrating oxygen to maintain oxygen saturations within the prescribed target range
- Reporting any abnormalities or concerns to the parent team doctor and CCOT (or equivalent) if appropriate

HCAs are responsible for:

- Recording saturation levels and reporting abnormalities to the RN/RM or parent team doctor

Doctors are responsible for:

- Assessing a patient's oxygen requirement
- Prescribing oxygen therapy to achieve a target oxygen saturation
- Deciding on an appropriate device for oxygen delivery
- Taking arterial blood gas samples when indicated
- Responding to patient deterioration (e.g. increasing oxygen requirements)
- Escalating care to level 2 or level 3 when appropriate

Physiotherapists are responsible for:

- Assessing a patient's oxygen requirement
- Titrating oxygen therapy to maintain oxygen saturations within the prescribed target range
- Monitoring the effect of oxygen administered
- Reporting any abnormalities or concerns to the parent team doctor

5.0 APPROVAL

This updated document was approved at the clinical governance meeting of the department of respiratory medicine.

6.0 DOCUMENT REQUIREMENTS

a) Prescribing, administering and monitoring oxygen and emergency situations
b) Exclusions
c) Indications
d) Contra indications
e) Cautions
f) Transfer and transportation of patients receiving oxygen therapy
g) Peri-operative oxygen therapy
h) Nebulised therapy and oxygen
i) Normal oxygen saturation ranges
j) Oxygen administration
k) Humidification

a) Prescribing, administering and monitoring oxygen and emergency situations

i) Appropriate target oxygen saturations

Oxygen should be prescribed to achieve a target saturation of 94-98% for acutely unwell patients, or 88-92% for patients at risk of hypercapnic respiratory failure. For further information please refer to the BTS Guideline for oxygen use in adults in healthcare and emergency settings (Thorax Volume 72 Supplement 1 June 2017)

ii) Prescribing oxygen on the medicine chart

An oxygen section on the medicine chart has been designed to assist prescription and administration. Oxygen must be prescribed in the designated section of the Trust's prescription chart including delivery device and initial flow rate, and the appropriate target saturation must be circled on the chart (or if target saturations are not indicated the relevant box should be ticked). See Appendix A – Oxygen section from the Trust's current prescription chart.

iii) Administering oxygen

Information regarding the most appropriate delivery system to reach and maintain the prescribed saturation is provided for those administering oxygen in Appendix B – Devices for the administration of oxygen.

Personnel who may administer oxygen include doctors, registered nurses (RN), registered midwives (RM), Operating Department Practitioners (ODP) and physiotherapists.

iv) Monitoring and recording oxygen

The patient's target oxygen saturation and oxygen delivery system must be recorded on Nervecentre or the bedside observation chart alongside other physiological variables as per the Trust's Observations Policy for Adult Patients.

All patients on oxygen therapy should have pulse oximetry measured every 12 hours as a minimum but the frequency of oximetry measurements will depend on the condition being treated and the stability of the patient. Any abnormality or sudden change in oxygen saturation must result in an increased frequency of observation as per the Trust's Observations Policy for Adult Patients. Critically ill patients should have their oxygen saturations monitored continuously and recorded hourly whereas patients with mild breathlessness, and whose condition remains stable, will need less frequent monitoring.

Oxygen therapy must 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). Any sudden fall in oxygen saturation (by 3% or more) must lead to clinical assessment and should lead to clinical evaluation of the patient and in most cases, measurement of blood gases and an increase in oxygen therapy. A score of 3 on one parameter alone should automatically trigger a call to the Ward Based Doctor for patient review. CCOT can also be contacted for further support.

Patients should be monitored accurately for signs of improvement or deterioration. Healthcare professionals should also monitor skin colour for peripheral and/or central cyanosis, respiratory rate and depth. Oxygen saturations of ≤91%, with or without oxygen, noisy or laboured breathing or respiratory rate of ≤8 or ≥25 per minute should be reported immediately to the medical or surgical team, and CCOT if indicated by the NEWS score. For further information please refer to Appendix C – Monitoring and recording of oxygen therapy.

v) Emergency situations

In the emergency situation a prescription for oxygen is not required; oxygen should be given to the patient immediately but documented as soon as practicable in the patient's record. All peri-arrest and critically ill patients should be given oxygen at 15 L/min via a reservoir mask whilst awaiting immediate medical review. Patients with chronic obstructive pulmonary disease (COPD) and other risk factors for hypercapnia who develop critical illness should have the same initial target saturations as other critically ill patients pending the results of urgent arterial blood gas results after which these patients may need controlled oxygen therapy or supported ventilation if there is severe hypoxaemia and/or hypercapnia with respiratory acidosis. ***Oxygen therapy must not be removed in order to carry out arterial blood gas analysis.***

All patients who have had a cardiac or respiratory arrest should have oxygen provided at 15 L/min along with basic/advanced life support. A subsequent written record must be made of what oxygen therapy has been given to every patient alongside the recording of all other emergency treatment. Any appropriately trained health professional can commence oxygen therapy in an emergency situation as indicated in the following guidance: NICE CG 50 (July 2007, reviewed March 2016) Acutely Ill patients in hospital.

b) Exclusions

Patients receiving oxygen as part of palliative care or patients on the end of life care pathway (in which case, the prescriber should tick the box 'target saturations not indicated' on the medicine chart). Patients attending outpatients who use long-term oxygen or ambulatory oxygen in the community do not require an additional prescription. They should use their oxygen as outlined in their Home Oxygen Order Form (HOOF).

c) Indications

The rationale for oxygen therapy is prevention of cellular hypoxia, caused by hypoxaemia (low partial pressure of oxygen, PaO_2), and thus prevention of irreversible damage to vital organs. Oxygen is occasionally used in the management of cluster headache, after initiation by a specialist.

d) Contra-indications

There are no absolute contraindications to oxygen therapy if indications are judged to be present. The goal of oxygen therapy is to achieve adequate tissue oxygenation using the lowest possible fraction of inspired oxygen (FiO_2). Supplemental oxygen should be administered with caution in patients suffering from paraquat poisoning (see most recent edition of the British National Formulary, BNF or eBNF available at www.bnf.org) and with acid inhalation or previous bleomycin lung injury.

e) Cautions

i) Oxygen administration and carbon dioxide retention

In patients with chronic carbon dioxide retention, oxygen administration may cause further increases in carbon dioxide and respiratory acidosis. Chronic carbon dioxide retention may occur in patients with COPD, neuromuscular disorders, morbid obesity or musculoskeletal disorders. There are several factors which lead to the rise in carbon dioxide with oxygen therapy in patients with hypercapnic respiratory failure. Further details can be found in the BTS (2017) guideline.

ii) Other precautions/ Hazards/ Complications of oxygen therapy

- Drying of nasal and pharyngeal mucosa
- Oxygen toxicity
- Absorption atelectasis
- Skin irritation

- Fire hazard
- Potentially inadequate flow resulting in a lower FiO_2 than intended, due to high inspiratory demand or inappropriate oxygen delivery device or equipment faults

For further information in relation to precautions, disposal, use of cylinders and firefighting measures see Appendix D – Health & Safety issues.

f) Transfer and transportation of patients receiving oxygen

Patients who are transferred from one area to another must have clear documentation of their ongoing oxygen requirements and documentation of their target oxygen saturation. If a patient transfers from an area not utilising the target saturation system their oxygen should be administered as per the transferring areas prescription until the patient is reviewed and transferred over to the target saturation scheme, which should occur as soon as possible.

For patients who require oxygen therapy whilst being transferred from one area to another please follow the guidance within the Trust's 'Escort and Transfer Policy for Adult Patients'. Where patients are being mobilised within a clinical area away from a wall-based oxygen supply using oxygen cylinders it should be ensured that there is adequate oxygen in the cylinder for the duration of the transfer. Patients requiring more than 4 litres/minute of oxygen should transfer with the supervision of an RN or cared for at the bedside.

Clear instructions must be provided for personnel involved in the transfer of the patient, which must include delivery device and flow rate to ensure that an adequate supply of cylinders is available throughout the transfer. Oxygen requirements must be reviewed whenever there is handover of a patient.

g) Peri-operative oxygen therapy

The usual procedure for prescribing oxygen therapy in these areas should be adhered to, utilising the target saturation. If a patient is transferred back to the ward on oxygen therapy and is not on the target saturation system, the need for ongoing oxygen therapy should be reviewed as soon as possible. If oxygen therapy is to be continued, it should be prescribed using the target saturation scheme unless there is an alternative time-limited instruction.

h) Nebulised therapy and oxygen

When nebulised therapy is administered to patients at risk of hypercapnic respiratory failure, particularly those with COPD, 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. All patients requiring 35% or greater oxygen therapy should have their nebulised therapy by oxygen at a flow rate of >6 litres/minute.

i) Normal Oxygen saturations

- In adults less than 70 years of age at rest, 96% - 98%
- Aged 70 and above at rest, greater than 94%
- Patients of all ages may have transient dips of saturation to 84% during sleep.

j) Oxygen Administration

ACTION	*RATIONALE*
All patients requiring oxygen therapy will have a prescription for oxygen therapy recorded on the patient's medicine prescription chart. N.B exceptions include emergency situations	Oxygen should be regarded as a medicine and should be prescribed (BTS 2017).
The prescription will incorporate a target saturation that will be identified by the clinician prescribing the oxygen.	Different groups of patients require different target ranges for their oxygen saturation. Some patients are at risk of hypercapnia.
The prescription will incorporate an initial starting dose (i.e. delivery device and flow rate) and target saturation.	To provide the healthcare professionals with guidance for the appropriate starting point for the oxygen delivery system and flow rate
The medicine chart should be signed at every medication round by the relevant healthcare professional.	To confirm that the patient is receiving oxygen if prescribed.
Once oxygen is in situ, the patient will be monitored in line with Trust policy. All patients should have their oxygen saturation observed for at least five minutes after starting oxygen therapy. If a patient is receiving intermittent therapy saturations must be monitored at least 8 hourly, and a minimum of 12 hourly as routine for all patients.	To identify if oxygen therapy is maintaining the target saturation or if an increase or decrease in oxygen therapy is required.
The oxygen delivery device and target saturations should be recorded alongside the oxygen saturation on Nervecentre or the bedside observation chart.	To provide an accurate record and allow trends in oxygen therapy and saturation levels to be identified.
Oxygen saturations must always be interpreted alongside the patient's clinical status incorporating the NEWS score.	To identify early signs of clinical deterioration, e.g. elevated respiratory rate
If the patient falls outside of the target saturation range, check accuracy of the reading then the oxygen therapy will be adjusted accordingly. The saturation should be monitored continuously for at least 5 minutes after any increase or decrease in oxygen dose to ensure that the patient achieves the desired saturation range. Asking the patient to take 2-3 deep breaths may temporarily increase oxygen saturations but is not good practice.	To maintain the saturation in the desired range.
Saturation higher than target specified or >98% for an extended period of time	
Step down oxygen therapy	The patient can be weaned down from current oxygen delivery system
Consider discontinuation of oxygen therapy	The patients clinical condition may have improved negating the need for supplementary oxygen

Saturation lower than target specified	
Check all elements of oxygen delivery system for faults or errors.	In most instances a fall in oxygen saturation is due to deterioration of the patient however equipment faults or accidental removal of the delivery device should be checked for.
Step up oxygen therapy as per associated guidelines (Appendix E). Any sudden fall in oxygen saturation should lead to clinical evaluation and in most cases measurement of blood gases	To assess the patient's response to oxygen increase, and ensure that $PaCO_2$ has not risen to an unacceptable level, or pH dropped to an unacceptable level and to screen for the cause of deteriorating oxygen level (e.g. pneumonia, heart failure etc.)
Monitor NEWS Score and for further clinical signs of deterioration	
Saturation within target specified	
Continue with oxygen therapy, and monitor patient to identify appropriate time for stepping down therapy, once clinical condition allows	
A change in delivery device (without a change in oxygen therapy) does not require review by the medical team.	See Appendix E
Oxygen delivery methods	
The Trust's recommended delivery devices will be utilised to ensure a standardised approach to oxygen delivery.	Previous audits have demonstrated wide variations in delivery devices across clinical areas, potentially increasing the risk of adverse incidents

k) Humidification

Humidification may be required for some patient groups, especially those who have difficulty in clearing airway secretions or mucus. For further information see Appendix F.

6.0 MONITORING COMPLIANCE AND EFFECTIVENESS

Compliance with this Policy will be monitored annually, using the National British Thoracic Society Oxygen Prescribing Audit Tool (BTS, 2017). Annual audit will be carried out in all clinical areas across the Trust. Audit forms will be used from the BTS website. In addition, the Trust will participate in additional national audits organised by the BTS.

Minimum Requirement to be Monitored **(WHAT – element of compliance or effectiveness within the document will be monitored)**	**Responsible Individual** **(WHO – is going to monitor this element)**	**Process for Monitoring e.g. Audit** **(HOW – will this element be monitored (method used))**	**Frequency of Monitoring** **(WHEN – will this element be monitored (frequency/ how often))**	**Responsible Individual or Committee/ Group for Review of Results** **(WHERE – Which individual/ committee or group will this be reported to, in what format (e.g. verbal, formal report etc.) and by who)**
Oxygen prescribing Oxygen assessment Patients with oxygen in target range	Audit lead and oxygen champion in the department of Respiratory Medicine	BTS national audit of emergency oxygen	Annually	Respiratory and Divisional Clinical Governance Meetings

8.0 TRAINING AND IMPLEMENTATION

All healthcare professionals involved in the prescribing, administration and monitoring of oxygen must familiarise themselves with the contents of this policy, including the attached appendices.

Staff already using oxygen as part of their routine practice will be assumed to be familiar with current guidelines and competent with the administration of oxygen, or take necessary action to update themselves.

Teaching slides on the "British Thoracic Society Emergency Oxygen Guideline" can be accessed from the relevant Appendices listed via the following link: https://www.brit-thoracic.org.uk/guidelines-and-quality-standards/emergency-oxygen-use-in-adult-patients-guideline/ or directly from these hyperlinks:

- Appendix 8 Lecture for doctors
- Appendix 9 Teaching aides for Nurses

Staff unfamiliar with the use of oxygen as outlined in this Policy and the British Thoracic Society Guideline should contact the Respiratory Nurse Specialist team for further training or advice.

Staff who complete a Preceptorship programme will complete a competency assessment for oxygen therapy, as part of their medicine administration competency assessments. This will take place in their clinical areas.

All Nurses entering Trust employment must complete the e-learning programme 'Adult Oxygen Therapy' prior to their Induction programme date.

9.0 IMPACT ASSESSMENTS

- This document has been subject to an Equality Impact Assessment, see completed form at Appendix G
- This document is not subject to an Environmental Impact Assessment

10.0 EVIDENCE BASE (Relevant Legislation/ National Guidance) AND RELATED SFHFT DOCUMENTS

Evidence Base:

- O'Driscoll B R, Howard L S, Davison A G. Thorax 2008; 63: Supplement VI. Available at: https://www.brit-thoracic.org.uk/guidelines-and-quality-standards/emergency-oxygen-use-in-adult-patients-guideline/
- British National Formulary available at http://www.bnf.org/bnf/index.htm
- Acutely ill patients in hospital. Recognition of and response to acute illness in adults in hospital. NICE CG 50 (July 2007) http://www.nice.org.uk/CG50
- Oxygen Safety in Hospitals: Rapid Response Report NPSA/2009/RRR006 http://www.nrls.npsa.nhs.uk/oxygen
- BOC Medical Gas Safety data sheet for medical oxygen (compressed gas) http://www.bocsds.com/uk/sds/
- Royal College of Physicians (2017) *National Early Warning Score (NEWS) 2. Standardising the assessment of acute-illness severity in the NHS.* Available at https://www.rcplondon.ac.uk/projects/outputs/national-early-warning-score-news-2 [Last accessed 21st June 2018]

Related SFHFT Documents:

- Observations and Escalation Policy for Adult in-Patients
- Escort and Transfer Policy for Adult Patients (including Quality & Safety Standards)
- Medicines Policy

11.0 KEYWORDS

O2; Saturation; Pulse oximetry; Hypoxia; Humidification; BTS

12.0 APPENDICES

- Appendix A – Oxygen section from the Trust's current prescription chart
- Appendix B – Devices for the administration of oxygen
- Appendix C – Monitoring and recording of oxygen therapy
- Appendix D – Health & Safety issues
- Appendix E – Flowchart for oxygen administration
- Appendix F – Humidification
- Appendix G – Equality Impact Assessment

APPENDIX A

Sherwood Forest Hospitals
NHS Foundation Trust

Oxygen section from the Trust's current prescription chart

OXYGEN PRESCRIPTION – Refer to Trust Oxygen Policy

Circle target oxygen saturation

88 – 92% **94 – 98%** Other (state): _____

Starting device (code): _____ Flow rate: _____

Change device/flow rate to reach target oxygen saturation (refer to Trust Oxygen Policy)

Circle: 'PRN' continuous

Saturation not indicated (tick)*: ☐

Signature: _____ Print Name: _____ Date: _____

Time	Date Administered															
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06																
09																
14																
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22																

***Codes for starting device and modes of delivery – See guideline for recommended flow rate**

A	Air (not requiring oxygen, or weaning or on 'PRN' oxygen			**H28**	Humidified oxygen at 28% (also H35, H40, H60 for humidified oxygen at 35%, 40%, 60%)
N	Nasal cannulae			**RM**	Reservoir mask
SM	Simple mask			**TM**	Tracheostomy mask
V24	Venturi 24%	**V28** Venturi 28%	**V35** Venturi 35%	**CP**	Patient on CPAP system
V40	Venturi 40%	**V60** Venturi 60%		**NIV**	Patient on NIV system
				Other	Other device (specify): _____

APPENDIX B

Sherwood Forest Hospitals NHS Foundation Trust

Devices for the administration of oxygen

Introduction

The following information has been summarised from the BTS Guideline for oxygen use in adults in healthcare and emergency settings (Thorax Volume 72 Supplement 1 June 2017).

The Process

Oxygen is a medication so please ensure that it has been prescribed (unless in an emergency, when prescription is not required). The doctor will need to prescribe the device, the flow rate and the % oxygen required. The healthcare professional administering and monitoring oxygen delivery must record the device, the flow rate and the % oxygen delivered.

Prepare the equipment:

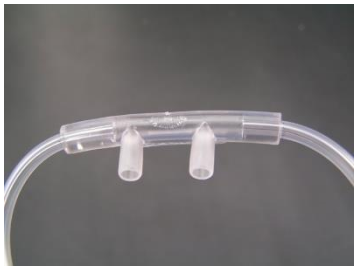
- Oxygen source (piped or cylinder)
- Flow meter
- Saturation monitor
- Oxygen delivery system
    - Nasal cannula (N)
    - Venturi mask and percentage (V)
    - Simple mask (SM)
    - Reservoir mask (RM)
    - Tracheostomy mask (TM)
    - None Invasive Ventilation system (NIV)
    - Continuous Positive Airway Pressures Mask (CP)
    - Humidified Oxygen (H)

The following sections describe oxygen devices currently available for use in Sherwood Forest Hospitals NHS Foundation Trust.

i) Nasal Cannula

Nasal cannula consist of a pair of tubes about 2cm long, each of which projects into a nostril, stemming from a tube which passes over the ears (as shown in the diagram below). Some patients prefer nasal cannula as they do not interfere with eating, drinking, communication, coughing and sneezing. Oxygen is delivered via this device in litres per minute (L/min) but % delivery can be *estimated* based on the formula below

1L/min = 4% above atmospheric oxygen (21%)



Approximate % delivery:

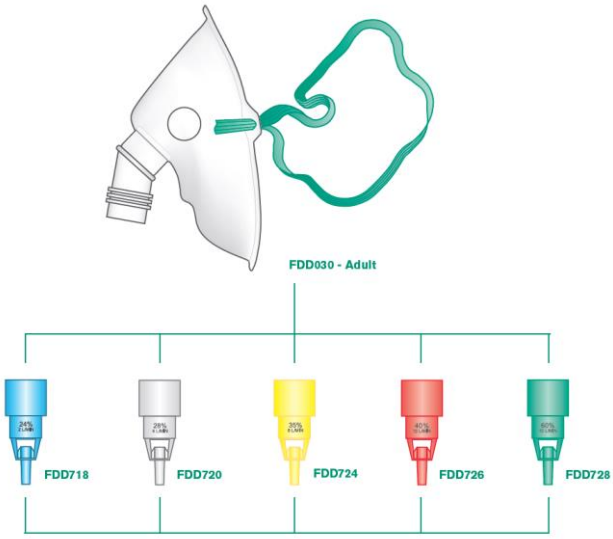
1L/min	25%
2L/min	29%
3L/min	32%
4L/min	37%

Nasal Cannula
Source: BTS (2008)

Action	Rationale
When using nasal cannula – position the tips of the cannula in the patient's nose so that they do not extend more than 1.5cm into the nostrils	Overlong tubing is uncomfortable and may reduce patient tolerance. Sore nasal mucosa may result from pressure or friction of tubing that is too long (BTS, 2008)
Place tubing over the ears and under the chin as shown in the picture above. Educate the patient regarding prevention of pressure to areas on the back of the ear. Make regular checks of these potential pressure areas.	To allow optimum comfort for the patient To prevent pressure ulcers
Adjust the flow rate, usually 2-4L/min	Set the flow rate to achieve the desired oxygen saturation. This is more important than considering the % delivery.

ii) Venturi mask

The Venturi mask incorporates a device to enable a fixed concentration of oxygen to be delivered independent of patient factors (respiratory rate and depth), fit to the face or flow rate. Oxygen is forced through a small hole at the bottom of the barrel causing the Venturi effect where air from the atmosphere is enabled to mix with oxygen in the device.



Blue	24%
White	28%
Yellow	35%
Red	40%
Green	60%

Action	Rationale
When using the venturi mask attach it to the appropriate barrel and connect the oxygen tubing firmly to the inlet.	To ensure the patient receives the correct concentration of oxygen.
Adjust the flow rate. The minimum flow rate is indicated on the barrel.	The minimum flow rate must be maintained in order to achieve the % oxygen delivery from the mask.
If the patient has a respiratory rate >30 breaths per minute then the flow rate should be doubled	Higher flows are required for patients with rapid respiration rates 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. A RR of 30bpm scores 3 on the NEWS the appropriate doctor. CCOT can also be contacted for further support
If you need to increase the % oxygen delivery you must change the barrel. Do not simply increase the flow rate.	Turning up the flow rate alone will not increase the % of oxygen delivered.
Educate the patient regarding prevention of pressure to areas on the back of the ear. Make regular checks of these potential pressure areas.	To allow optimum comfort for the patient To prevent pressure ulcers

iii) Simple Face Mask

The simple face mask provides oxygen therapy at variable percentage. It is a variable performance device and delivers unpredictable concentrations that vary with flow rate, the patient's tidal volume, respiratory rate and any leakage between the mask and the face. The mask has a soft plastic face piece with vent holes to allow air to escape. At 15L /min flow rate this mask can deliver up to 50-60% oxygen concentration. But remember, this is *not* a fixed performance mask, and delivery is unpredictable. Always read the manufacturer's instructions on the packaging. Local advice from the physiotherapy and critical care outreach teams is that 5L/min is the minimum flow rate required to ensure CO_2 is flushed from the mask.

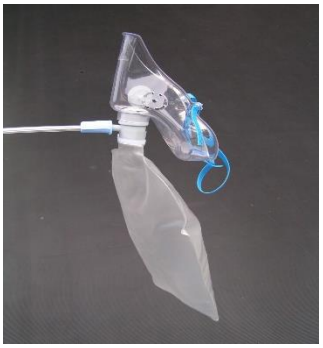
Simple face mask
Source: BTS (2008)

Action	**Rationale**
Using a simple face mask – gently place the mask over the patient's face, position the strap behind the head or loops over the ears. Tighten the elastic until secure.	Ensure a comfortable fit and facilitate maintenance of prescribed oxygen delivery.
Check the strap across the ears and apply padding between the strap and head as required	To prevent irritation.
Adjust the oxygen flow rate according to the prescription.	Always check the manufacturer's instructions as some simple masks should not be used with flow rates below 5L/min.
Educate the patient regarding prevention of pressure to areas on the back of the ear. Make regular checks of these potential pressure areas.	To allow optimum comfort for the patient To prevent pressure ulcers
If patient's oxygenation allows, use nasal cannula – as preferred by patients. If a specific % oxygen delivery is required, then you should use a Venturi mask	

iv) Reservoir (non-rebreathe or trauma) mask

This mask has a soft plastic face piece with flap-valve exhalation ports. A soft, bendy metal strip across the bridge of the nose facilitates close fitting of the mask, to limit leakage around the edges. There is a one-way valve between the face mask and the reservoir bag. This system of valves ensures that on inspiration the patient breaths in gas from the reservoir bag (which is not diluted by atmospheric air as the flap valves on the sides of the mask prevent this). On expiration, the one-way valve ensures that expired gases do not pass into the reservoir bag, but instead are exhaled through the flaps on the side of the mask into the atmosphere. Hence the name 'non-rebreathe' mask, because the patient is not re-breathing their expired carbon dioxide.

High oxygen concentration (80-90%) can be delivered using this device. An oxygen flow rate of **15L/min** is required.



Reservoir mask
Source: BTS (2008)

Do not attempt to wean the patient from this mask by reducing the oxygen flow rate.

To reduce % oxygen delivery, change the patient onto a Venturi mask e.g. 60%

Action	**Rationale**
Using a reservoir mask, ensure the bag is inflated fully before placing the mask on the patient. Once connected to the oxygen supply, apply your finger to the one way valve at the top of the bag to allow it to fill.	To ensure optimum flow of oxygen to the patient.
Establish the oxygen flow rate at **15L/min**	The BTS note on their website that manufacturers have agreed to change the instructions on their packaging to reflect this (10L/min is insufficient).
Do not turn down the flow rate <15L/min	Lower flow rates may result in inadequate oxygen concentration to the patient.
Educate the patient regarding prevention of pressure to areas on the back of the ear. Make regular checks of these potential pressure areas.	To allow optimum comfort for the patient To prevent pressure ulcers

v) Tracheostomy (or laryngectomy) mask

This soft plastic mask is designed for use with patients who have a tracheostomy or those who have had a laryngectomy performed. This is a variable performance device. Oxygen concentration delivered will be influenced by the oxygen flow rate (L/min), the patient's tidal volume and their respiration rate.

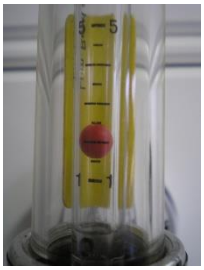
Laryngectomy patients are sometimes referred to as 'neck breathers'. This is because, unlike patients with a tracheostomy, the only route through which they can breathe (or be resuscitated) is via the stoma in their neck. Oxygen must therefore always be provided via the laryngectomy stoma and a tracheostomy/laryngectomy oxygen mask.

Tracheostomy mask
Source: BTS (2008)

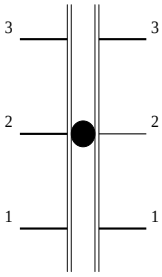
Action	Rationale
Gently place the mask over the patient's airway. Position the strap behind the neck and pull both ends until secure.	Ensure a comfortable fit and delivery of prescribed oxygen is maintained.
Adjust oxygen flow rate to achieve the desired target saturation range. Start at 4L/min and adjust the flow rate up or down as necessary.	To ensure the correct amount of oxygen is given to achieve the target saturation.
You must ensure humidification is provided	Tracheostomy and laryngectomy bypass the normal physiological humidification process. Dry gas will dry the airways so oxygen must be humidified in this patient group.
Educate the patient regarding prevention of pressure to areas on the back of the ear. Make regular checks of these potential pressure areas.	To allow optimum comfort for the patient To prevent pressure ulcers

vi) Oxygen flow meter

The oxygen flow meter is a device that allows the patient to receive an accurate flow of oxygen, usually between 2-15L/min. The flow meter is usually wall-mounted, but can be found on a cylinder also. Please note however, following a recent NPSA oxygen alert, the use of cylinders should be minimised.



Oxygen flow meter
Source: BTS (2008)



The diagram to the left and directly above illustrates the correct position of the ball in the flow meter for a setting of 2L/min.

Action	**Rationale**
Attach the oxygen tubing securely to the nozzle on the flow meter	To ensure that the patient receives the correct amount of oxygen and no disconnection occurs.
Turn the finger-valve to obtain the desired flow rate The centre of the ball shows the correct flow rate as illustrated in the diagram and picture above.	To ensure accuracy
All air flow meters should be removed from clinical areas	Following a recent NPSA oxygen safety alert highlighting the risks of confusing oxygen and air, all air flow meters have been removed from clinical areas

Appendix C

Monitoring and recording of oxygen therapy

All patients must have all mandatory observations (RR, HR, BP, temperature, SpO2, ACVPU) and NEWS performed every 12 hours as a minimum. The frequency of observations must be increased in the presence of any abnormality. For the patient on oxygen therapy, pay particular attention to the following as tabulated below:

Action	Rationale
Monitor oxygen saturation levels	Minimum 12 hourly as per NICE (2007) guidance.
Make visual observations of skin colour. In particular, note the skin colour for central cyanosis (blue lips) which indicates urgent assistance is required.	In some patients, with poor peripheral perfusion as a result of peripheral shutdown, the pulse oximetry probe will not pick up an accurate SpO2. You will need to make visual checks – do not rely entirely on the electronic equipment.
If the oxygen saturation is above or below the target saturation, the observer (often a Health Care Support Worker) must inform the personnel who are qualified to administer oxygen.	To ensure the patient receives the appropriate dose of oxygen as quickly as possible.
If the SpO2 falls by 3% or more, this scores 3 on the NEWS and a doctor must be notified. CCOT can also be contacted for further support	In order that appropriate adjustments can be made to the oxygen prescription, but also in order that a cause for the hypoxia might be sought.
Check the patient's nose, mouth and behind the ears	To identify early any signs of pressure damage from the oxygen delivery device.
Record all observations on an observation chart and ensure a monitoring plan has been formulated. The following is intended as a guide • 4 hourly if on continuous oxygen • 8 hourly if on intermittent oxygen • 12 hourly minimum for all patients	To ensure adequate record keeping.

Appendix D

Health and Safety Issues

Medical oxygen is a non-flammable gas but readily supports combustion and is a very strong oxidant. There is always a danger of fire when oxygen is being used. It is potentially dangerous when in contact with sources of ignition and flammable material. Oxygen may also react violently with oils and grease. Medical oxygen supplied as a compressed gas in a high pressure cylinder may explode if subjected to extremely high temperatures (if involved in a fire).

Medical Oxygen cylinders are heavy and if unsecured can cause crushing or even fatal injuries. Trolleys are designed to enable easier movement of gas cylinders but will not prevent a large cylinder from toppling, should sufficient force be applied. Tests carried out by the HSE following a fatal accident above showed that a G-size cylinder on a trolley can be toppled by a relatively small force. This could also apply to J-size cylinders and trolleys. (See Estates and facilities Alert EFA/2010/008 Issued: 28 July 2010).

Precautions in use

- Gas cylinders and their trolleys should be secured to a wall bracket, or other static/stable structure, while in use to prevent them from toppling.
- Where patients are mobile and need a regular medical gas supply from a cylinder on a trolley, consideration should be given to providing them with a smaller cylinder, e.g. F-size.
- Oxygen should be stored in an area designated as no smoking.
- To eliminate explosion and subsequent fire, avoid any grease or oil coming into contact with the apparatus; for this reason, after alcohol gel application, all traces must be allowed to evaporate from hands and especially inter-digit creases.
- Moisturisers for use with face masks for oxygen therapy should not be petroleum based or have any form of grease in them BOC advise that KY Jelly and RoEezit are approved for use. KY Jelly is water based and although it contains minute traces of carbon particulate it is felt to be safe to use. RoEezit is recommended by European Industrial Gases Association (EIGA) as being safe to use with oxygen.
- Store any unused cylinders in a dry well-ventilated place.
- Where humidified oxygen is prescribed, the water pack assembly must always be mounted (below level of patient's mask) on a **stand-alone** IV pole using special brackets available as part of a kit available from the central medical equipment library. This is so that the assembly can be positioned at a safe distance from electrical power sockets.
- Use of adhesive hands-free defibrillation pads minimizes the risk of potential explosion in an oxygen-enriched environment, which may occur where medical devices with high oxygen-bleeds are in intense use. Examples of such devices include venturi suction and oxygen powered CPAP and CPR automatic chest "thumpers".

Special precautions for disposal and other handling

All personnel handling Compressed Medical Oxygen cylinders should have adequate knowledge of:

- properties of the gas
- how to transport and secure cylinders and their trolleys
- correct operating procedures for the cylinder
- Precautions and actions to be taken in the event of an emergency.

Use of Cylinders

When Compressed Medical Oxygen cylinders are in use ensure that they are:

- only used for medicinal purposes.
- turned off, when not in use, using only moderate force to close the valve *and only with an appropriate, oil/grease-free cylinder valve key*
- only moved with the appropriate size and type of trolley or handling device.
- handled with care and not knocked violently or allowed to fall.
- firmly secured to a suitable cylinder support when in use *or parked in appropriately in an alcove such that its fall would be arrested by the adjacent walls.* (See above)
- not allowed to have any markings, labels or batch labels obscured or removed
- not used in the vicinity of persons smoking or near naked lights.

When the Compressed Medical Oxygen cylinders are empty ensure that the:

- cylinder valve is closed using moderate force only and the pressure in the regulator or tailpipe released,
- valve outlet cap, where fitted, is replaced.
- empty cylinders are immediately returned to an empty cylinder storage area for return to the suppliers.

Firefighting measures

If medical oxygen cylinders are involved in a fire:

if it is safe to move the cylinders:
- close cylinder valve to stop the flow of product
- move cylinders away from source of heat

if it is not safe to move the cylinders:
- cool with water from a protected position.

All types of fire extinguishers may be used when dealing with a fire involving medical oxygen cylinders. No special protective equipment for fire fighters is required. There are no hazardous combustion products released from the gas.

See References (Section 6) for further information.

APPENDIX E

Flowchart for oxygen administration (BTS 2008)

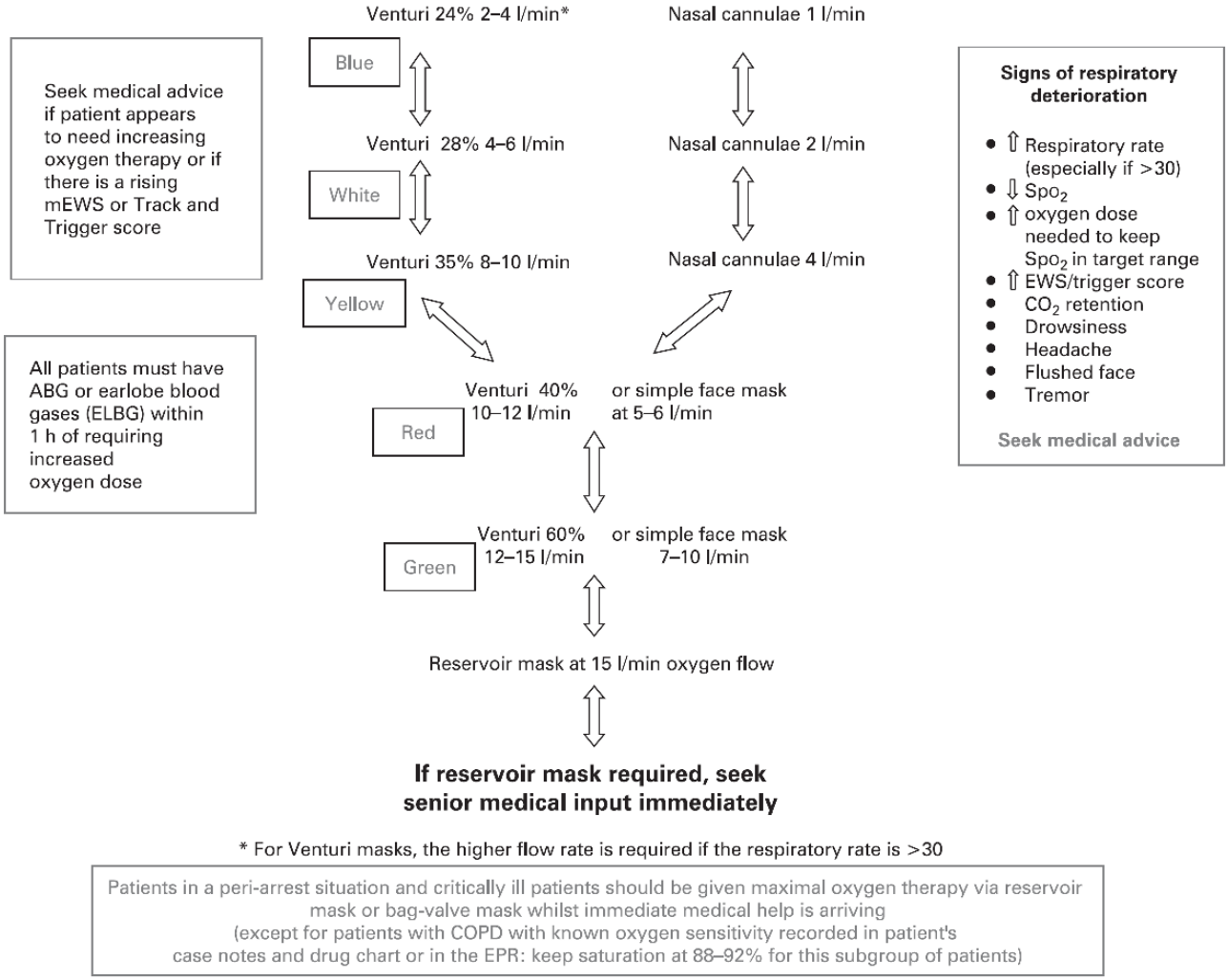


Figure 2 Chart 2: Flow chart for oxygen administration on general wards in hospitals. ABG, arterial blood gas; EPR, electronic patient record; EWS, Early Warning Score; Spo_2, arterial oxygen saturation measured by pulse oximetry.

Humidification

- Humidification is required if the oxygen flow rate exceeds 4L/min for several days - but you cannot humidify oxygen delivered via nasal cannula, venturi masks or reservoir masks
- Humidification is required if the patient has
    - a tracheostomy or a laryngectomy (‘neck breather’)
    - cystic fibrosis
    - bronchiectasis
    - chest infection with retained secretions

Always consider the hydration status of the patient. A dehydrated patient may have sticky secretions. Oral or intravenous hydration will help to loosen their secretions.

A heater for warm humidification is available on request from the **Central Medical Equipment Library**. Consumables for this equipment must be stored on the wards. Please consult with CCOT if you are unsure about a patient’s humidification requirements.

APPENDIX G – EQUALITY IMPACT ASSESSMENT FORM

Name of service/policy/procedure being reviewed: Oxygen policy			
New or existing service/policy/procedure: Existing			
Date of Assessment: 20/05/2021			
For the service/policy/procedure and its implementation answer the questions a – c below against each characteristic (if relevant consider breaking the policy or implementation down into areas)			
Protected Characteristic	**a) Using data and supporting information, what issues, needs or barriers could the protected characteristic groups' experience? For example, are there any known health inequality or access issues to consider?**	**b) What is already in place in the policy or its implementation to address any inequalities or barriers to access including under representation at clinics, screening?**	**c) Please state any barriers that still need to be addressed and any proposed actions to eliminate inequality**
The area of policy or its implementation being assessed:			
Race and Ethnicity	None		
Gender	None		
Age	None		
Religion	None		
Disability	None		
Sexuality	None		
Pregnancy and Maternity	None		
Gender Reassignment	None		
Marriage and Civil Partnership	None		
Socio-Economic	None		

Factors (i.e. living in a poorer neighbourhood / social deprivation)			

What consultation with protected characteristic groups including patient groups have you carried out?
No additional consultation performed

What data or information did you use in support of this EqIA?
The provision of oxygen, and the type of device used, is based on clinical need. None of the protected characteristics have an impact on the delivery of oxygen as outlined in this policy.

As far as you are aware are there any Human Rights issues be taken into account such as arising from surveys, questionnaires, comments, concerns, complaints or compliments?
No

Level of impact

From the information provided above and following EQIA guidance document Guidance on how to complete an EIA (click here), please indicate the perceived level of impact:

Low Level of Impact

Name of Responsible Person undertaking this assessment:

Signature: David Hodgson

Date: 20/05/21