

Standard Operating Procedure

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Management of Critically Ill Patients referred for Hyperbaric Oxygen (HBO)

I. Patient Referral

Referral for HBO in a critically ill patient must be from a consultant responsible for their care. Before accepting the patient,

1. Contact the on-call ICU consultant to discuss case and availability of ICU bed and explain/ discuss clinical situation and transfer arrangements.
2. Inform the referring surgeon/ physician that they **must** transfer clinical responsibility to the on-call surgical/ medical team at Whipps Cross hospital and confirm the name of the consultant who has accepted the patient. Obtain names of both the referring medical or surgical consultant and the names of the accepting medical or surgical consultant at WXH. Note that some specialities such as Radiology, Anaesthesia and ICU lack patient ownership and they must identify a medical or surgical consultant at the referring hospital to take ownership of the patient.
3. Inform ICU at WXH of the estimated time of arrival and patient level of care.
4. Clarify with the referring hospital (ie clinical site manager, ICU consultant) that in most cases HBO therapy will only be required for a short period (24-48h); therefore the referring hospital MUST confirm that they are prepared to readmit the patient as soon as possible after HBOT. A suitably trained anaesthetist will act as medical escort for transfer back to the referring hospital if a doctor is required on the transfer.
5. Update LHM supervisor and ensure adequate staffing for 3 treatments, with at least one hyperbaric-chamber-trained ICU-nurse and one ICU- trained hyperbaric physician for each session.
6. Request a referral letter to be emailed to BHNT.hyperbaric@nhs.net. It must include the name of the referring and accepting medical or surgical consultant(s) and not a radiologist/ anaesthetist or ICU consultant, regardless of who made the referral. It should also include the patient's home address, contact number of next-of-kin, medical history, observations, lab result, lines, airway devices and complications, and any other investigations (radiology, ECG etc.), blood gas, monitoring, ventilatory requirements and medications.

7. Contact ENT on-call team for myringotomy but do not delay emergency hyperbaric treatment when it is time critical.
8. Decide treatment plan and timetable with all specialists involved in the case.
9. Contact the medical director or, in his absence, their deputy in case of any queries or concerns.

The referring hospital is responsible for arranging patient transfer to Whipps Cross Hospital. The destination for the ambulance would be the Hyperbaric Unit unless there is agreement that the patient will need to go the ICU or A&E Resus, in which case the consultant in those areas should be informed of the plan.

II. Before transferring a patient to the hyperbaric unit:

1. Check drug stocks and prepare:

- a. Sedation – remifentanyl/propofol, unless otherwise stated. Remifentanyl to be prescribed on Cerner inpatient drug chart and procured from the Duty Pharmacist as per the CD SOP.
- b. Muscle relaxants as indicated by airway trained doctor. Rocuronium unless Duty Doctor prefers atracurium. Extra ampules of muscle relaxant must be available in the chamber.
- c. x2 emergency drugs boxes plus any other drugs indicated by the airway trained doctor. Suxamethonium to be available in the fridge. Sugamadex must be available in the drug cupboard.

2. Prepare syringes of

- a. Sedation to be used for bolus use.
- b. Muscle relaxant for bolus.
- c. Epinephrine 10µg/ml and noradrenaline syringe driver 4mg in 50mls normal saline drawn up and available if indicated.
- d. Prefilled syringes of ephedrine and metaraminol available in the chamber, noradrenaline.
- e. Atropine (1mg/10ml)
- f. Other drugs as indicated by Hyperbaric Duty Doctor.

3. Prepare chamber

- a. Remove all but one/two chairs
- b. Clear space for trolley in middle of chamber
- c. Stethoscope must be in the chamber

4. Prepare chamber equipment

- a. Check suction is working.
- b. Assemble drip hooks.
- c. Turn on infusion pumps and check function.
- d. Position Propaq for visibility (over chair no. 4).
- e. Attach breathing system to ventilator.
 - i. Check ventilator for function and leak tested.

- ii. Collect and display ventilator function graphs.
- iii. EtCO₂ connection (and Ohmeda volume meter if Siaretron used).
- f. Check manual breathing system and outlet connection.
- g. Check spare tracheal tubes of appropriate sizes are available.
- h. Check spare laryngoscope.
- i. Pens and anaesthetic chart(s) available in the chamber.

III. Management of patient in the chamber

1. Take a verbal handover from the ICU doctor and nurse.
2. Ensure that the patient is stable before leaving the ICU or ED.
3. Check Chest X-ray and myringotomy (also document reason if no myringotomy/ grommet inserted).
4. Transfer patient to the hyperbaric trolley before leaving the ICU or A&E Resus.
5. Transfer patient on to all chamber compatible monitoring equipment and infusion pumps before entering the chamber, keeping in mind that Fresenius Vial Pilote syringe pumps are not battery driven.
6. For journey to chamber, use transport ventilator used for transfers to CT.
7. Check patency of IV infusion devices before leaving ICU
 - a. Add 3-way taps to each giving set, if necessary.
 - b. Change infusion pumps to chamber-compatible equipment where possible at least 20min prior to HBOT (4 syringe drivers available).
 - c. completely fill drip chambers to avoid air entering the system.
8. Check patient for banned materials and substances before leaving ICU.
9. Transfer the patient into the chamber.
10. Check all equipment for chamber compatibility.
11. Check under the trolley for banned substances, oxygen cylinders, electrical cables, plugs and battery packs.
12. Make sure there is no major endobronchial secretion/ mucus before compression/ decompression and carry out endotracheal and pharyngeal suction accordingly.
13. Confirm patient is well sedated and relaxed and ensure adequate ventilation.
14. Change cuff to fluid just before closing the door. Use a manometer to ensure ETT cuff pressure is maintained between 15 and 25cm H₂O **after** saline is swapped with air after HBOT.
15. Adjust the inflation of the pressure bag for invasive monitoring during compression and decompression.
16. Give notice to ICU duty staff (doctor and nurses) 20min before HBOT ends.
17. Transfer the patient with all monitoring and devices back to ICU and change them to ICU equipment when patient is stable. Confirm power supply to all battery-operated devices.
18. Don't forget to change the cuff back to air.
19. Inform ICU staff of the timing of further treatments. The patient should receive the lowest FiO₂ required to maintain a normal PaO₂ in between HBOTs.
20. Complete notes in ICU clinical records.