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DEPARTMENT OF HEALTH

DOH STANDARD FOR HYPERBARIC OXYGEN THERAPY

Standard

PUBLIC عـــام

Contents:

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1. Purpose

1.1. This standard aims to ensure safe operations of medically required Hyperbaric Oxygen Therapy in the Emirate of Abu Dhabi. To do so, the standard defines the duties of Healthcare Providers, payers and third party administrators (TPAs), patients' eligibility criteria, and HBOT minimum service requirements.

2. Scope

This standard applies to:

2.1. Healthcare facilities seeking license from DOH to provide Hyperbaric Oxygen Therapy.
2.2. All healthcare facilities licensed by DOH to provide Hyperbaric Oxygen Therapy.
2.3. Healthcare Professionals engaged in the provision of Hyperbaric Oxygen Therapy in the Emirate of Abu Dhabi.
2.4. All payers and third party administrators (TPA).

3. Definitions and abbreviations

The below definitions are applied for the purpose of this standard:

3.1. Hyperbaric Oxygen Therapy (HBOT): an intervention in which an individual breathes 100% oxygen or oxygen and other gas mixtures while inside a hyperbaric chamber that is pressurized to greater than atmospheric pressure (1.4 atm abs or higher).
3.2. Hyperbaric chamber: a pressure vessel designed for human occupancy for use in the treatment of illness or injury by the use of oxygen, or combinations of oxygen and other gas mixtures, breathed at greater than atmosphere pressure. There are several types of Hyperbaric Chambers including:
3.2.1. Monoplace: transportable by air, sea or land.
3.2.2. Multiplace or "walk-in" chambers: chamber can be driven from place to place.
3.2.3. Chambers for testing and training divers.
3.2.4. Small hyperbaric chambers for neonates, or animal experiments.

3.3. Multi-place chamber: A hyperbaric chamber with more than one compartment that is designed for occupancy by more than one person at a time. This chamber is pressurized with compressed air while the patients' breath 100% oxygen via masks, head hoods or endotracheal tubes and it allows entrance or exit whilst the treatment compartment remains under pressure.
3.4. Mono-place chamber: a stand-alone, single compartment hyperbaric chamber designed for occupancy by one person without an attendant. The entire chamber is pressurized with 100% oxygen, and the patient breathes the ambient chamber oxygen directly.
3.5. Healthcare Facility: An establishment at which healthcare services are provided and falls within a category named by DOH in a Healthcare Facility Definition.
3.6. Undersea and Hyperbaric Medicine: is a discipline that deals with the prevention of injury and illness due to exposure to environments in which the ambient pressure is increased, such as in diving or hyperbaric chamber exposure, and the therapeutic use of high environmental pressure and the delivery of oxygen under high pressure to treat disease.
3.7. Undersea and Hyperbaric Physician: is a DoH licensed healthcare professional licensed to practice Undersea and Hyperbaric Medicine as defined in this standard.
3.8. Chamber Operator: The person responsible for operating the chamber.
3.9. Control Panel: The place from where the operations of the hyperbaric chamber are controlled and monitored.
3.10. Patient: anyone undergoing hyperbaric oxygen therapy for elective, medical or investigational exposure.
3.11. Relative Indications: Conditions in which caution must sometimes be observed but which are not necessarily a contraindication to HBOT.
3.12. Atm: is a unit of pressure defined as 101325 Pa (1.01325 bar). It is sometimes used as a reference or standard pressure.
3.13. NFPA: National Fire Protection Association.
3.14. UHMS: Undersea & Hyperbaric Medicine Society.

4. Duties for Healthcare Providers

Healthcare Providers shall:

4.1. Read this standard in conjunction with related UAE laws and DOH Standards, policies and Manuals.
4.2. Provide HBOT clinical services in accordance to the requirements specified in this Standard, along with the relevant DOH Clinical Care Standards.
4.3. Ensure that practices reflect internationally recognized and evidence-based clinical care pathways, delivered in the context of UAE culture and laws.
4.4. Maintain a system in place for effective data recording, confidentiality, and data reporting.

5. Approved Types of Chambers:

5.1 DOH approves the use of the following types of chambers with consideration of the safety requirement of each type:
5.1.1 Multi-place Chambers.
5.1.2 Mono-place Chambers.
5.2 Inflatable chambers shall not be used in any health facility as they are not recognized medical devices for hyperbaric oxygen treatment.
5.3 The HBOT chambers shall be installed and assessed by a qualified service representative and documentation of installation and assessment shall be kept in the facility.

6. HBOT Service Requirements:

6.1. Licensure requirements:

Healthcare providers licensed to provide HBOT services in the emirate of Abu Dhabi should:

6.1.1. Comply with the Facility licensing requirements and regulations available on DOH website.

6.1.2. May seek approval to provide HBOT services by submitting a request of adding service under the existing DOH licensed facility.

6.1.2.1. HBOT services can be provided in different Licensed Healthcare Facilities including:

6.1.2.1.1. Hospitals.

6.1.2.1.2. Centers including Medical Centers and Day Care Surgery Centers that are licensed to provide Hyperbaric Oxygen Therapy or two from the following specialties General surgery, Plastic Surgery, Orthopedic Surgery, Internal Medicine, Pulmonary medicine and Vascular Surgery.

6.1.3. Obtain DOH approval before re-allocation of Chambers and/ or if decision was taken to discontinue the provided HBOT service.

6.2. Staffing Requirements:

All healthcare facilities providing HBOT should:

6.2.1. Ensure that the multi-disciplinary teams comprise of all DoH licensed personnel necessary to deliver services in accordance with this Standard, and that HBOT Providers:

6.2.1.1. Have in place a nominated Director/ Chair of HBOT services.

6.2.1.2. Employ the sufficient number of certified and experienced DOH licensed staff as per each type of used chamber in the facility and the patient's condition by meeting the minimum staffing requirements available in appendix D.

6.2.1.3. Ensure that HBOT multi-disciplinary team includes.

6.2.1.3.1. HBOT Physicians.

6.2.1.3.2. HBOT Technicians (Chamber Operators).

6.2.1.3.3. Registered Nurses (Chamber Attendants).

6.2.2. Ensure that employed staff meets the qualification and training requirements available in Appendix B.

6.2.3. HBOT Technician (Chamber operator) or any of the licensed healthcare professionals employed in the HBOT facility can manage the roles and responsibilities of the facility's safety officer and fire marshal mentioned in Appendix B.

6.2.4. All staff should be medically checked for fitness to be involved in HBOT. The medical check-up shall be conducted annually and in a third part facility.

6.2.5. At all times while a patient is under pressure, there shall be a minimum of two persons outside the chamber and within the hyperbaric facility.

6.2.6. All personnel shall complete equipment – specific training for the system which they will be operating.

6.2.7. Every Multi-place chamber should have minimum of two chamber operators or one chamber operator and one chamber supervisor during the operating hours of the facility.

6.2.8. Every two Mono-place Chambers should have minimum of one chamber operator during the operating hours of the facility.

6.3. HBOT Medical Equipment Requirements:

Medical equipment used for the provision of the HOBT should be:

6.3.1. Registered with the Ministry of Health (MOH) in the United Arab Emirates.

6.3.2. Approved by minimum of two of the following authorities:

6.3.2.1. Food and Drug Administration (FDA).

6.3.2.2. Health Canada.
6.3.2.3. Conformité Européenne (CE).
6.3.2.4. Australian Register of Therapeutic Goods (ARTG).
6.3.2.5. Japans Ministry of International Trade and Industry (MITI).

6.3.3. Installed and operated according to the manufacturing specifications and DOH requirements.

6.3.4. Regularly maintained and all necessary parts shall be changed as per equipment manufacturers' recommendation.

6.3.5. All HBO facilities shall have the following equipments:

6.3.5.1. Oxygen resuscitation equipment, which can supply 100% oxygen to a non-breathing patient.

6.3.5.2. Equipment to allow intubation and ventilation of a patient with close to 100% oxygen.

6.3.5.3. A set of apparatus to enable pleurocentesis to be performed.

6.3.5.4. A system to call the doctor in case of an emergency. This call device shall be simple to operate with an uninterruptable path to the doctor who is required to respond within five minutes.

6.3.5.5. Therapeutic equipment such as cervical traction for cervical spine injuries.

6.3.5.6. Gas analysis system calibrated in accordance with the manufacture's instructions.

6.3.6. For multi-chamber facilities, the facility shall have available and maintain some of the equipment inside as well as outside the chambers. This includes but is not limited to:

6.3.6.1. Apparatus to measure blood pressure with an appropriately sized cuff.
6.3.6.2. Equipment for electrocardiographic monitoring.
6.3.6.3. IV supplies and accessory equipment such as syringes, needles, tape, etc.
6.3.6.4. Emergency drugs and supplies with procedures to review expiry date.

6.4. **HBOT Facility Design Requirements:**

The HBOT facilities shall:

6.4.1. Ensure that the site design of HBOT room follow the recommendations of any the following Safety Committees:

6.4.1.1. National Fire Protection Association (NFPA) Standard for Health Care Facilities.
6.4.1.2. American Society of Mechanical Engineers.
6.4.1.3. Compressed Gas Association. and
6.4.1.4. UHMS Hyperbaric Oxygen Therapy: A Committee Report.

6.4.2. Not provide the HBOT in active areas such as malls or industrial areas.

6.4.3. Ensure that the floor can support the weight of the pressure vessels and all ancillary equipment, both when moving the chamber into place and under operating conditions.

6.4.4. Chamber room should be large enough for not only the chamber, but also patient support and staff activities.

6.4.5. Chamber placement within the room should ensure adequate space for chamber operations, patient loading and support equipment.

6.4.6. Multi-place Chambers shall be located on the ground floor.

6.4.7. If the chamber is placed near a wall, it shall not hamper the controls or viewports of the chamber. and

6.4.8. HBOT Facility/service area shall include but not limited to:

6.4.8.1. Reception and waiting area (Separate for Male and Female).
6.4.8.2. Consultation/ Examination room (s).

6.4.8.3. Holding area for inpatients.
6.4.8.4. Patient changing area (Separate for Male and Female).
6.4.8.5. HBOT treatment room.
6.4.8.6. Gas cylinder storage room.
6.4.8.7. Compressor room.
6.4.8.8. Gurney/ Stretcher storage.
6.4.8.9. Clinical and non-clinical storage.
6.4.8.10. Clean and Dirty utility.
6.4.8.11. Administrative activities area.

6.5. **Safety Measures, Equipment and Supplies Requirements:**

The HBOT facilities shall:

6.5.1. Develop a fire safety and protection procedure, which must include but not limited to fire safety plans for early detection, confining, extinguishment, rescue, evacuation and alerting the Abu Dhabi Civil Defense.
6.5.2. Comply with NFPA 99 (Chapter for HBOT) regarding fire safety standards.
6.5.3. Ensure that the control panel of the chamber has a fire alarm that can be activated when required.
6.5.4. Train staff as fire marshals and at least one (1) fire marshal shall be present on the premises during working hours.
6.5.5. Ensure that all staff shall have fire and safety training to respond to fire events in the building. Orientation on the fire safety measures must be included in the new staff induction program. All staff shall be aware of the following:
  6.5.5.1. Location and use of fire hose reel/ cabinets/ blankets.
  6.5.5.2. Assembly points.
  6.5.5.3. Fire alarms/ call points break glass/ pull station.
  6.5.5.4. Fire evacuation drill should be conducted and documented at least two (2) times a year.
  6.5.5.5. Fire in the facility buildings and evacuation procedures including removing patients from the chamber should be documented.
  6.5.5.6. The installation of additional electrical equipment should be limited only for devices, which comply with hyperbaric conditions.
6.5.6. Have effective evacuation maps displayed in the facility and periodically reviewed to provide information regarding escape routes, fire exits and fire extinguishers.
6.5.7. Ensure that “No Smoking” signs are visibly displayed all around the facility.
6.5.8. Maintain smoke alarms, sprinkler system and other fire protection equipment and devices as per the Abu Dhabi Civil Defense requirements.
6.5.9. The HBO therapy facility shall maintain:
  6.5.9.1. Efficient access for emergency extrication.
  6.5.9.2. Anti-static precautions.
  6.5.9.3. Ambient humidity of >40%.
  6.5.9.4. Protection of patients from fast-flicker lighting during dives.
  6.5.9.5. Safe storage of compressed gases.
  6.5.9.6. Precautions to prevent unauthorized entry.
6.5.10. Ensure that fire extinguishers shall be immediately available in adequate numbers. Fire extinguishers shall be properly and accessibly located. They must be fixed securely on the wall with safety pins fitted, seals intact, charged and current service record available.
6.5.11. Ensure that clothing and linen in the HBOT Chamber shall be 100% cotton only.

6.5.12. Have policies and procedures that prohibit any flammable material. Such procedures shall cover prohibitions and restrictions for the hyperbaric facility as well as for the Chamber itself.

6.5.13. Ensure that all items taken inside the Hyperbaric Chamber should be assessed for their necessity and approved by the Hyperbaric physician.

6.5.14. The prohibited materials shall include but not limited to the following:

6.5.14.1. Flammable gases, vapours or liquids that represent an extreme hazard and shall not be used or stored within the hyperbaric or near the chamber intakes.

6.5.14.2. Mercury: Mercury shall be prohibited within the Chamber at any time. Mercury is commonly used in thermometers, manometers and in some electrical switching apparatus.

6.5.14.3. Certain chemicals, drugs, medical materials, wound dressings, pharmaceuticals and other substances used in patient care may present a risk of fire or toxic contamination of the facility's procedures.

6.5.14.4. Cleaning materials containing alcohol should not be used in the hyperbaric facility.

6.5.14.5. Alloys: Equipment made of magnesium, beryllium, cadmium or their alloys shall not be used.

6.5.14.6. Oil-based toiletries and cosmetics: These products should not be used by Chamber occupants before hyperbaric exposure.

6.5.14.7. Paper products: the use of paper items such as cups, dishes, food containers, towels, reading materials, or tissues should be kept to a minimum.

6.5.15. Develop a fire safety checklist to be shared with the patient by the attendant before each pressurization.

6.6. Administrative requirements:

HBOT HealthCare Facilities should:

6.6.1. Support the HBOT services by having written policies and comprehensive manuals, for treatment within the healthcare facility and associated HBOT department/clinic and this includes but not limited to HBOT Manual, Infection Prevention and Control Manual. Safety Manual and Policy Manual. Manuals shall be:

6.6.1.1. Site specific.

6.6.1.2. Readily accessible and all staff shall be aware of their content.

6.6.1.3. Reviewed annually.

6.6.1.4. Any changes in the interim shall be approved and initialled by the Director.

6.6.2. Develop a quality assurance program that follows international evidence based guidelines and recommendations.

6.6.2.1. An external review of the quality assurance program shall be undertaken.

6.6.3. Keep a record of the following checklists which should be available for DOH when required:

6.6.3.1. Installation checklist.

6.6.3.2. Assessment checklist.

6.6.3.3. Operational checklist.

6.6.3.4. Cleaning checklist.

6.6.3.5. Maintenance log.

6.6.3.6. Log of use of the chamber.

6.6.3.7. Occupational and Health Safety Risk Register.

6.6.4. Adopt a set of published decompression procedures in order to reduce to a minimum the risks associated with single and repeated exposures.
6.6.4.1. Procedures should consider the limits of repeated exposure (pressure, duration, and surface interval) per person within a 24 hour period and the number of daily exposures without a break.
6.6.4.2. Obligation for decompression stops should be kept to a minimum, enabling decompression to atmospheric pressure within a reasonable time.
6.6.4.3. Procedures for immediate recompression of attendants should be in place.
6.6.5. Develop Standard Operating Procedures for therapeutic hyperbaric facilities, which should document the presence of guidelines or facility policy for the reception, treatment, and discharge of patients in the facility.

7. Access to HBOT Therapy:

HBOT is available for the treatment of patients who meets the following criteria:

7.1 Have medical conditions with the indications included in Appendix A.
7.1.1 HBOT Services should be immediately available for patients with emergency conditions where HBOT is considered as the first line treatment.
7.1.2 Where HBOT is not considered as first line treatment, HBOT should be provided as adjunctive therapy where there are no measurable signs of healing for at least 30 days of treatment with standard treating protocols of these conditions.
7.2 Obtain DOH approval before using the HBOT in treating conditions not specified in Appendix A.
7.3 Patient is referred by a physician, or dentist.
7.4 All referrals shall be assessed by a physician with privileges in the facility for the appropriateness of and fitness for HBOT and according to the patients' medical status and history.
7.5 Avoid HBOT treatment for patients with the international recognized contraindications including but not limited contraindications mentioned in Appendix C.
7.6 HBOT on critically ill or unstable patients shall be carried out only in hospital-based facilities unless, subject to a determination that is made by both the referring and HBOT physician that the risk of treatment at a HBOT medical center is less than the risk of delays associated with the transfer of the patient to a hospital based facility.
7.7 Pediatric cases considered for hyperbaric treatment should be:
7.7.1 Carefully reviewed and discussed with the referring pediatrician prior to commencement of hyperbaric oxygen therapy.
7.7.2 Reviewed by an ENT and bilateral myringotomy (+/ - tympanostomy tubes) should be considered (especially in the case of a child with an emergency indication for hyperbaric oxygen treatment).
7.8 If needed, pediatric cases considered for hyperbaric can be accompanied by adult with a non-re-breathing, reservoir facemask to deliver air or oxygen.
7.8.1 The accompanying adult should be evaluated and found suitable to be exposed to hyperbaric air and oxygen.

8. Patients' Care and Rights

Healthcare Facilities shall:

8.1 Educate patients on the treatment and associated procedures, including the risks and benefits of Hyperbaric Oxygen Therapy, the likelihood of success, and any potential pre and post interventions.
8.2 Ensure that patients are provided with a written summary of their diagnosis and planned treatments prior to the commencement of Hyperbaric Oxygen Therapy.

8.3 Provide educational materials for patients and their families that covers the different aspects of the HBOT treatment and this including the safety measures.

8.4 Informed Consent form shall be obtained from the patient for the HBOT service. If the age of the patient is below eighteen (18) years or is incapacitated, the parents or legal guardian shall fill and sign the consent form.

8.5 If a patient approaches a HBOT facility more than once for different medical conditions then a new informed consent shall be requested due to the change in the medical condition and hence change in the treatment plan.

9. Duties for Payers and Third Party Administrators (TPAs)

Payers and Third Party Administrators (TPAs) shall:

9.1. Comply with the provisions and requirements of this Standard with respect to healthcare services specified in this standard, to be covered under the health insurance scheme.

9.2. Ensure that these healthcare services are authorized to be covered under the patients' health insurance plan, and that this authorization is completed within no more than 4 weeks.

10. Enforcement and Sanctions

10.1. DOH may impose sanctions in relation to any breach of requirements under this standard in accordance with the Chapter XI Complaints, Investigations, Regulatory Action and Sanctions Policy, Healthcare Regulator Manual Version 1.0.

11. Appendices:

Appendix A: Accepted Indications for HBOT:

1. Air or gas embolism.
2. Arterial Insufficiencies.
   a. Central retinal artery occlusion.
   b. Enhancement of healing in selected problem wounds.
3. Carbon monoxide poisoning.
4. Decompression sickness.
5. Clostridial Myonecrosis (Gas Gangrene).
6. Compromised grafts and flaps.
7. Crush injuries and Skeletal Muscle-Compartment syndromes.
8. Delayed Radiation Injury (soft tissue and bony necrosis).
9. Idiopathic sudden Sensorineural Hearing Loss.
10. Intracranial abscess.
11. Necrotizing Soft Tissue Infections.
12. Refractory Osteomyelitis.
13. Severe Anemia.
14. Thermal Burns.

Note:

- Facilities that wish to use HBOT on conditions other than the approved conditions listed above should submit an official letter to Health Facility Licensing that identifies the condition they need to use the HBOT for with clear justification and evidence of approval from a recognized international body.

Appendix B: HBOT Staff Requirements and Responsibilities:

Staff	Requirements
1) Chair of HBOT services	Chair of HBOT services should: a) Be DOH licensed to practice in the Emirate of Abu Dhabi as specialists or consultant in Undersea and Hyperbaric Oxygen Medicine or one of the specialties mentioned in article 6. b) Meet the qualification and training requirements of HBOT physicians mentioned in this standard. c) Responsible on ensuring safe and ethical care of patients, developing proper facility's structure, procedures and equipment, supervises the provided services and HBOT personnel.
2) HBOT physician	HBOT physician should be: a) Be licensed by the Department of Health Abu Dhabi in any of the specialties mentioned in article 6. b) To be initially privileged by the facility to provide HBOT if completed: i) Minimum, a 40-hour course approved by the recognized international organizations. A record of completion of the course of training shall be kept on file in the facility. ii) HBOT training Two months (min 240 hours) of practical training including assessment and management of clinical cases, supervision of routine hyperbaric treatment sessions and a requirement for consultation on complicated cases. c) To be annually privileged by the facility to provide HBOT if i) Maintain a valid certificate in Advanced Cardiac Life Support (ACLS). ii) Maintain valid certificate of Pediatric Advanced Life Support (PALS) when applicable. iii) Maintain a minimum of 50% of the CME required for licensing renewal in the field of HBOT d) Responsible on performing an assessment of the appropriateness of HBOTand the fitness of the patient for HBOTbefore the first dive. e) Should remain in the facility during a patient's first dive. f) Be available within five minutes during the treatment of any patient in the facility. g) Be present at the premises and immediately available at all times that the chamber is occupied.
3) HBOT Nurse (Chamber Attendant)	HBOT Nurse (Attendant) should: a) Be licensed by the Department of Health Abu Dhabi as registered nurse. b) To be initially and annually privileged by the facility if i) Maintain a current certificate in Advanced Cardiac Life Support (ACLS). ii) Maintain a minimum of 50% of the CME required for licensing renewal in the field of HBOT. c) In case of a multi-place chamber the RN shall be present inside the multi-place chamber during treatment to monitor patients. d) In case of critically ill patients, the attendant should be registered nurse competent in critical care nursing. e) Be medically fit to enter the chamber. f) Not be exposed to a maximum of ninety (90) minutes of treatment time per day. In case of more time necessary inside the chamber, the RN must breathe oxygen according to the preplanned decompression table. g) For each nurse, the time gap between two sessions shall be at least 12 hours.
4) HBOT Technician (Chamber operator/ Supervisor)	HBOT Technician should be: a) Be licensed by the Department of Health Abu Dhabi as either registered nurse, respiratory therapist or podiatrist. b) To be initially privileged by the facility to facilitate the HBOT if i) Have completed at a minimum, a 40-hour course approved by a recognized

	international body. A record of completion of the course of training shall be kept on file in the facility. c) To be initially and annually privileged by the facility if i) Maintain a current certificate in Basic Life Support. ii) Maintain a minimum of 50% of the CME required for licensing renewal in the field of HBOT. d) Remain in continuous attendance on patients in the facility when a supervising physician is not in attendance. e) Should maintain visual and audio contact with patient during dives when a physician is not in attendance. f) Report patients complaints or any unexpected signs during the HBOT treatment. g) Experienced with the operation and maintenance of the mechanical, electrical, liquid and gas systems. h) Responsible for safe operation of the chamber and associated plant as well as the safe decompression procedures for patients. i) Should not carry out hyperbaric treatment without physician order. and j) End-user training shall be conducted by the suppliers/vendors on operation, safety and user level maintenance of HOBT chambers after completing the installation process of HOBT chambers.
5) Safety officer	a) Any healthcare worker employed in the HBOT facility could be nominated as the safety officer. b) The facility should assure that the safety officer has a formal and comprehensive training in the safety aspects of hyperbaric medicine and related technology from international or national organization such as National Examination Board in Occupational Safety and Health (NEBOSH) or Occupational Safety and Health Administration (OSHA). c) The safety officer shall develop, maintain and manage a safety program based upon compliance with recognized standards, which shall demonstrate effective elements of hazard mitigation, while employing recognized risk management concepts.
6) Fire Marshal	a) Any healthcare worker employed in the HBOT facility could be nominated as the fire marshal. b) The facility shall ensure that these fire marshals are formally trained and at least one (1) fire marshal shall be present on the premises during working hours. c) The fire marshal shall orient, train the staff on fire safety measures and response to fire events in the facility.

Appendix C: Contraindications to Hyperbaric Oxygen Therapy for Patients and attendant

Contraindications	Absolute Contraindications	Relative Contraindications
1) Contraindications to Hyperbaric Oxygen Therapy *(for Patients)*	▪ Unvented pneumothorax ▪ Acute sever bronchospasm ▪ Concomitant treatment with doxorubicin ▪ Usage the following medication: Bleomycin, Doxorubicin, Cis-Platinum, and Disulfiram and Mafenide Acetate (Sulfamylin).	▪ Upper airway infection ▪ Allergic rhinitis ▪ Chronic sinusitis and otitis Chronic obstructive pulmonary disease with emphysema ▪ History of pneumothorax or thoracic surgery ▪ History of ear, nose and throat surgery ▪ Epilepsy ▪ Optic neuritis ▪ Arterial hypertension (uncontrolled) ▪ Heart failure (uncontrolled) ▪ Claustrophobia ▪ Dangerous behavior.
2) Contraindications to Serving as an Inside Attendant in a Clinical Multiplace Hyperbaric Chamber *(for attendant)*	▪ Seizure disorder ▪ History of spontaneous pneumothorax ▪ Significant hearing loss ▪ Active chronic obstructive pulmonary disease or asthma ▪ Residua of decompression illness ▪ Current or impending pregnancy ▪ Psychiatric disorder ▪ Congestive heart failure ▪ Lung bullae or cysts	▪ ▪ Difficulty equalizing middle ear pressure. ▪ Previous unexplained decompression illness. ▪ Diabetes with frequent hypoglycaemia.

Appendix D: Minimum-staffing requirements based on patients' condition and Chamber type

Patient Condition / Chamber Type	Mono-place chamber	Multi-place chamber
1) Elective, uncomplicated patient. 2) Elective patient likely to require nursing care or non-invasive monitoring during therapy.	HBOT physician should be available within five minutes. HBOT Technologist (Chamber operator) should be present during therapy (Maximum two chambers/ operator). HBOT Nurse (Chamber Attendant): One attendant should be present during therapy.	HBOT physician should be available within five minutes. Minimum of two chamber operators or one chamber operator and one chamber supervisor during the operating hours of the facility. One operator should be present during therapy (Maximum one chambers/ operator) in the chamber/ treatment room and second operator or the supervisor should be available in the facility during the operating hours of the facility. HBOT Nurse (Chamber Attendant): two attendants should be present during therapy. one inside and one outside the chamber.
3) Unstable or critically ill patients requiring a high level of medical and nursing intervention.	HBOT physician should be present during the treatment. Could require critical care skills. HBOT Technologist (Chamber operator) should be present during therapy (Maximum one chambers/ operator). HBOT Nurse (Chamber Attendant): One attendant who is competent in critical care nursing should be present during therapy.	HBOT physician should be present during the treatment. Could require critical care skills. Minimum of two chamber operators or one chamber operator and one chamber supervisor during the operating hours of the facility. One operator should be present during therapy (Maximum one chamber/ operator) in the chamber/ treatment room and second operator or the supervisor should be available in the facility. HBOT Nurse (Chamber Attendant): One attendant who is competent in critical care nursing should be inside the chamber during therapy and one attendant should be outside the chamber (registered nurse).

Note: Appendix D sets out the minimum requirements only. Facilities should further determine their staffing requirements depending on the facility patients' needs, chamber types, number of chambers as we as the patients type.

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