



**Education of nurses, operators  
and technicians  
in hyperbaric facilities in Europe**

**EBAss/ECHM Resources manual**

Reviewed: 2023

*Document prepared by*

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## **Purpose**

The purpose of this document is to describe the training, based on the EBAss/ECHM recommendations, of nurses, operators and technicians working in a hyperbaric facility in Europe.

This document is intended to be a reference document for European countries for guidelines, regulations and standards in hyperbaric medicine.

This document was written by the members of the Education Committee of the European Baromedical Association for nurses, operators and technicians (EBAss).

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## 1. Responsibilities

Ref: ECHM 2004 European Code of Good Practice on Hyperbaric Oxygen Therapy

### 1.1 Multiplace chamber

#### Operators

- Operation of the internal and external devices of the Chamber.
- Control and operation of the mechanisms for compression and decompression, and for delivering gas mixtures and oxygen.
- Control and application of the safety regulations concerning prevention of fire, and oxygen toxicity.
- Calculation, application and control of compression and decompression schedules for all chamber occupants, applying decompression stops, when necessary.
- Be available for intervention inside the Chamber under pressure, in order to control or check the correct operation of determined parts of the circuits or devices.
- Adaptation and checking of the medical instruments carried by the patients before being introduced into the Chamber, in order to ensure their correct operation, and to avoid dangerous or undesirable effects.
- Control and checking of the operation of auxiliary facilities to the Chamber: air-compressors, sources of compressed air or medical gases, gas/air reserves, pneumatic circuits, control systems etc.
- Maintenance of the facility. Small repair jobs or technical interventions due to problems which occasionally might occur, and which do not require the intervention of highly specialised technical staff.
- Safe handling of technical emergency situations.
- Check the calibration of technical equipment relating to the hyperbaric facility.
- Steering, Controlling and documentation of the HBO-Treatment according to prescribed procedure.
- Duties in emergency situations (locking in and out of personnel).
- Adherence to national law of the appropriate member state.

#### Nurses

- Nursing measures belonging to the common pathologies of the hyperbaric therapeutics to be applied to the patients in a hyperbaric chamber.
- Nursing assistance of patients inside the hyperbaric chamber, taking special care of the specific conditions of the hyperbaric environment.
- Where possible adaptation of conventional medical techniques and specific treatments of each illness to the hyperbaric environment, so that other treatments the patient is habitually receiving will not need to be interrupted while in the chamber.
- In some cases, operating the external controls of a Monoplace Hyperbaric chamber according to the compression and decompression schedules established.
- Care of patients including sporadic emergency treatments conducted either inside or outside of HBO chamber.

#### Hyperbaric Nurses intensive care:

Nursing assistance of intensive, critical care patients during hyperbaric treatment.

#### Attendants NOT nurses:

- Patient care in non-invasive, non-specialised medical activities inside and outside the chamber.
- Accompanying patients who are receiving treatment inside the Multiplace Chamber, but who do not need special assistance by doctors and nurses, but only by way of support, control, and to give them confidence.
- Other activities to develop inside or outside the Chamber, indicated by the Medical Director or the Nurse.

## 1.2 Monoplace chamber

Minimum Team levels during a hyperbaric session for Monoplace chambers are described as one hyperbaric physician and one operator. (Abstract, European Code of Good Practice for HBO- page 5)

### **Chamber Operator:**

Monoplace chambers are handled sometimes by nurses and doctors and/or hyperbaric specialists: (Abstract, European Code of Good Practice for HBO- page 25)

### **Nurses:**

In some cases, operating the external controls of a Monoplace Hyperbaric chamber according to the compression and decompression schedules established.

(Abstract, European Code of Good Practice for HBO- page 21)

Based on those concise requirements, we propose to verify what these personnel need to know.

### **Monoplace chamber**

#### **Operator:**

- Operation of the external devices of the Chamber.
- Control and operation of the mechanisms for compression and decompression, and for delivering gas mixtures and oxygen.
- Appreciation of appropriate gas laws.
- Control and application of the safety regulations concerning prevention of fire, and oxygen toxicity.
- Calculation, application and control of compression and decompression schedules for chamber occupant, applying decompression stops, when necessary.
- Adaptation and checking of the medical instruments carried by the patients before being introduced into the Chamber, in order to ensure their compatibility, correct operation, and to avoid dangerous or undesirable effects.
- Control and checking of the operation of auxiliary facilities to the Chamber: air-compressors (if air filled), sources of compressed air or medical gases, gas/air reserves, pneumatic circuits, control systems etc.
- Day to day technical maintenance of chambers in order to identify and repair and rectify minor technical issues.
- Safe handling of technical & medical emergency situations.
- Check the calibration of technical equipment relating to the hyperbaric facility.
- Steering, Controlling and documentation of the HBO-Treatment according to prescribed procedure.
- Recognising emergency clinical and technical emergencies.
- Adherence to national law of the appropriate member state.

#### **If the operator is a nurse**

- Nursing measures belonging to the common pathologies of the hyperbaric therapeutics to be applied to the patients in a hyperbaric chamber.
- Nursing assistance of patients taking special care of the specific conditions of the hyperbaric environment.
- Where possible adaptation of conventional medical techniques and specific treatments of each illness to the hyperbaric environment, so that other treatments the patient is habitually receiving will not need to be interrupted while in the chamber.
- Care of patients including sporadic emergency treatments conducted outside of HBO chamber.

## 2. Entry levels.

### 2.1 For Multiplace chambers.

	Precondition	Competence will be lost	Recovering
Common Module for Chamber Operators and hyperbaric nurses (attendant)	<ul style="list-style-type: none"> <li>- medically fit for working under hyperbaric conditions</li> <li>- Current Basic Life Support certificate (BLS) or higher (max. 1-year old). *</li> </ul>	If the individual does not progress to the appropriate specialist module within 12-month after graduation	
Specific Module for Chamber operator	<ul style="list-style-type: none"> <li>- Successful graduation of Common Module. Except in the case of recertification</li> <li>- medically fit to work under conditions</li> </ul>	<ul style="list-style-type: none"> <li>- Carries out less than 10 hyperbaric procedures or simulations a year, to operate under supervision</li> <li>- And carries out less than 10 hyperbaric treatments a year with patients, to operate autonomously.</li> <li>- no participation on a BLS course (qualifications must be to European Resuscitation Council guidelines, but may be taught by any organisation which works to these guidelines)</li> <li>- Has not been working in a hyperbaric chamber as an operator for more than 5 years</li> </ul>	<ul style="list-style-type: none"> <li>- 10 autonomous steered treatments (under supervision).</li> <li>- Participation on a BLS course. (qualifications must be to European Resuscitation Council guidelines, but may be taught by any organisation which works to these guidelines)</li> <li>- participate in hyperbaric operator training (hyperbaric operator module only)</li> </ul>
Specific Module for Hyperbaric Nurse (Attendant)	<ul style="list-style-type: none"> <li>- medically fit to work under hyperbaric conditions</li> <li>- Registered nurse (RN)</li> <li>- successful graduation of the Common Module except in the case of recertification</li> </ul>	<ul style="list-style-type: none"> <li>- no participation on a BLS course according to the European Resuscitation Council guidelines</li> <li>- Has not been working in a hyperbaric chamber as a nurse for more than 5 years</li> </ul>	<ul style="list-style-type: none"> <li>- participation on a BLS course (qualifications must be to European Resuscitation Council guidelines, but may be taught by any organisation which works to these guidelines)</li> <li>- participate in hyperbaric nurse training (hyperbaric nurse module only)</li> </ul>
Specific Module for Hyperbaric Nurse in Intensive Care (HNIC) (attendant)	<ul style="list-style-type: none"> <li>- medically fit to work under hyperbaric conditions</li> <li>- registered nurse (RN)</li> </ul>	<ul style="list-style-type: none"> <li>- If the HNIC does not have the required ICU Nurse experience within the previous 18 months</li> </ul>	<ul style="list-style-type: none"> <li>- current re-qualification depending on the member states national legislation for accompany</li> </ul>

	Precondition	Competence will be lost	Recovering
	<ul style="list-style-type: none"> <li>- current qualification depending on the member states national legislation for accompany of intensive care patients</li> <li>- successful graduation of the Module Hyperbaric Nurse except in the case of recertification</li> </ul>	<ul style="list-style-type: none"> <li>- If the HNIC does not work as an ICU nurse inside a hyperbaric chamber within the previous 18 months</li> <li>- no participation on an ALS course according to the ERC guidelines</li> </ul>	<ul style="list-style-type: none"> <li>- of intensive care patients</li> <li>- participate in HNIC training (HNIC module only)</li> <li>- participation on an ALS course according to ERC</li> </ul>
Module for hyperbaric attendant (Not Nurse)	<ul style="list-style-type: none"> <li>- Medically fit to work under hyperbaric conditions.</li> <li>- Current (BLS) or higher (within the previous 12 months)(qualifications must be to European Resuscitation Council guidelines, but may be taught by any organisation which works to these guidelines)</li> </ul>	<ul style="list-style-type: none"> <li>- attends less than 10 hyperbaric-treatments a year inside the chamber with patients</li> <li>- no participation on a BLS course (qualifications must be to European Resuscitation Council guidelines, but may be taught by any organisation which works to these guidelines)</li> </ul>	<ul style="list-style-type: none"> <li>- attends at least 3 hyperbaric treatments under supervision</li> <li>- participation on a BLS course (qualifications must be to European Resuscitation Council guidelines, but may be taught by any organisation which works to these guidelines)</li> </ul>

- Training to be carried out according to ERC guidelines or internationally recognised equivalent.

## 2.2 Entry levels for Monoplace chambers

	Precondition	Competence will be lost	Recovering
Module for Chamber operator not nurse	<ul style="list-style-type: none"> <li>- Medically fit to work at atmospheric pressure unless being asked to enter the chamber when they would need to be fit do work under hyperbaric conditions.</li> <li>- Current certificate (BLS) or higher (qualifications must be to European Resuscitation Council guidelines, but may be taught by any organisation which works to these guidelines)</li> <li>- successful graduation of the Common Module except in the case of recertification</li> </ul>	<ul style="list-style-type: none"> <li>- Carries out less than 10 hyperbaric procedures or simulations a year, to operate under supervision</li> <li>- And carries out less than 10 hyperbaric treatments a year with patients, to operate autonomously.</li> <li>- no participation on a BLS course (qualifications must be to European Resuscitation Council guidelines, but may be taught by any organisation which works to these guidelines)</li> <li>- Has not been working in a hyperbaric chamber as an operator for more than 5 years</li> </ul>	<ul style="list-style-type: none"> <li>- 10 autonomous steered treatments (under supervision).</li> <li>- Participation on a BLS course. (qualifications must be to European Resuscitation Council guidelines, but may be taught by any organisation which works to these guidelines)</li> <li>- participate in hyperbaric operator training</li> </ul>
Module for chamber operator Nurse	<ul style="list-style-type: none"> <li>- Medically fit to work at atmospheric pressure unless being asked to enter the chamber when they would need to be fit do work under pressure</li> <li>- Registered nurse</li> <li>- Current certificate (BLS) or higher (qualifications must be to European Resuscitation Council guidelines, but may be taught by any organisation which works to these guidelines)</li> <li>- successful graduation of the Common Module except in the case of recertification</li> </ul>	<ul style="list-style-type: none"> <li>- no participation on a BLS course according to the European Resuscitation Council guidelines</li> <li>- Has not been working in a hyperbaric chamber as a nurse for more than 5 years</li> </ul>	<ul style="list-style-type: none"> <li>participation on a BLS course (qualifications must be to European Resuscitation Council guidelines, but may be taught by any organisation which works to these guidelines)</li> <li>- participate in hyperbaric nurse training (hyperbaric nurse module only)</li> </ul>

### 2.3 Safety Manager.

	Precondition	Competence will be lost	Recovering
Safety Manager	<ul style="list-style-type: none"> <li>- Evidence of working at senior level in hyperbaric or associated service for at least 5 years as a hyperbaric nurse or chamber operator (attendant not-nurse excluded).</li> <li>- Medically fit to work at atmospheric pressure unless being asked to enter the chamber when they would need to be fit to work under pressure</li> <li>- Successful graduation of EBAss Safety Manager Module except in the case of recertification</li> </ul>	Has not been working in a hyperbaric facility for more than 5 years	<ul style="list-style-type: none"> <li>- Show evidence of renewed need for ECHSM certification</li> <li>- Resit EBAss ECHSM examination</li> </ul>



### 3.2 Specific Module for Chamber operator (Multiplace chamber)

Theory	Level	Practical	Level
<p><b>Control panel</b> Chamber steering, Chamber monitoring, Computer control, manual steer, Steering at the pneumatic control panel Communication, Video monitoring O<sub>2</sub>, CO<sub>2</sub>, Temperature &amp; Relative Humidity – Monitoring, Patient Monitoring</p>	L3	<p><b>Hyperbaric chamber</b> Daily checking, Starting and tag-out Set up of the hyperbaric chamber Steering of the chamber (Computer, manual, pneumatic) Documentation of the HBO-treatment Take care of an ASA 1 (otherwise healthy) patient, Locking (personnel)</p>	L3
<p><b>Prescriptions and documentation</b> Awareness of relevant national laws Records of chamber operations Equipment maintenance records</p>	L3	<p><b>Maintenance of the chamber</b> Technical failures, (emergency power supply), Built in breathing system (BiBS), Technical monitoring, Compressors, Emergency power supply</p>	L3
<p><b>Clinical-HBO</b> Therapeutic effects of the HBO Indications</p>	L2	<p><b>Recognition and necessary behaviour in emergency situations</b> Medical Emergencies (infiltrate and exit of personnel), Obscure operating states (in case of fire, loss of computer control, loss of gas supply etc.) Understanding of each emergency operating procedure described in the European Code for good Practice Annex 4 point 3 which are: -</p>	L3
<p><b>Complications</b> Barotrauma, Oxygen-Intoxication</p>	L3	<p><b>EMERGENCY OPERATING PROCEDURES</b> <b>Medical</b></p> <ul style="list-style-type: none"> <li>- cardio-respiratory complaints including procedures for safe defibrillation</li> <li>- loss of consciousness</li> <li>- convulsions</li> <li>- neuropsychological acute reactions (including panic, claustrophobia, aggression)</li> <li>- vomiting</li> <li>- dysbaric injuries to patients and staff:</li> <li>- barotrauma</li> <li>- decompression illness / sickness</li> </ul> <p><b>Chamber systems.</b></p> <ul style="list-style-type: none"> <li>- uncontrolled change of pressure</li> <li>- loss of gas supplies</li> <li>- contamination of gas supplies</li> <li>- contaminated atmosphere inside chamber</li> <li>- high oxygen levels in the chamber atmosphere</li> <li>- inability to maintain adequate temperature</li> <li>- fire in the chamber</li> <li>- fire in the facility</li> <li>- loss of communications (visual, verbal)</li> </ul>	L3

Theory	Level	Practical	Level
		<ul style="list-style-type: none"> <li>- power failure</li> <li>- internal equipment malfunction</li> <li>- medical device malfunction</li> <li>- BIBS malfunction</li> <li>- any external threats to the facility</li> </ul>	
Total:	16 Hr	Total:	32 Hr

### 3.3 Specific Module for Hyperbaric Nurses (Attendant) (Multiplace)

Theory	Level	Practical	Level
<p><b>Effects of the HBO Therapy and oxygen</b> Oedema reduction by vasoconstriction 'Squashing' of gas bubbles in case of gas embolism, Bacteriostatic effects (anaerobic organisms), Competitive displacement of CO Activation of fibroblast proliferation and collagen synthesis, Activation of osteoclasts Angioneogenesis, Activation of macrophages</p>	L2	<p><b>Pre-examination of patients</b> Suitability for HBO-Treatment (ECG, Pulmonary function etc.)</p>	L3
<p><b>Physiology of hyperbaric exposure</b> e.g. Functional Anatomy, Breathing, Ears Decompression, Thermoregulation, Immersion, heart-circulation, Lungs, Kidney function</p>	L2	<p><b>Practice of assisting patients with HBO-Treatments</b> Before treatment Preparation of the chamber, Checking patients During treatment Accompanying of patients, Caring during chamber treatment Specification of medication under hyperbaric conditions (for example - infusion), Drainage (i.e. Redon, Colostomy etc.)</p>	L3
<p><b>Hyperbaric Pathophysiology and complications</b> Theory of decompression Acute decompression Illness Toxic effects of oxygen (Acute &amp; Chronic) Effects of inert gas (HPNS)</p>	L2	<p>After Treatment Documentation</p>	L3
<p><b>Suitability and contraindications for hyperbaric exposure</b> Patients, HBO-staff</p>	L3	<p><b>EMERGENCY OPERATING PROCEDURES</b> <b>Medical</b> - cardio-respiratory complaints including procedures for safe defibrillation - loss of consciousness - convulsions - neuropsychological acute reactions (including panic, claustrophobia, aggression) - vomiting - dysbaric injuries to patients and staff: - barotrauma - decompression illness / sickness</p>	
<p><b>HBO: Indications by UHMS and ECHM</b> Indication in case of emergency, Approved Uses Case examples and discussion</p>	L3	<p><b>Chamber systems</b> - contaminated atmosphere inside chamber - high oxygen levels in the chamber atmosphere - fire in the chamber - loss of communications (visual, verbal) - power failure - internal equipment malfunction - medical device malfunction - BIBS malfunction</p>	
<p><b>Caring and leading of patients during chamber treatment</b> Psychology, Professional-client relations Nursing &amp; Medical records Patient Care Plans</p>	L3		
<p><b>Extended Monitoring Expiratory oxygen measurement</b> e.g., Online Blood gas analysis, TcPCO<sub>2</sub>, IBP, Camino-Sonde</p>	L3		
<p><b>Legal prescription for operation of medical devices in hyperbaric chambers</b> National or EU policies, EN norms</p>	L2		
<p><b>Medication</b> e.g., Effects under hyperbaric conditions, Specific procedures &amp; requirements for giving of medication under hyperbaric conditions</p>	L3	<p>3 x monitored attended treatments during practical training.</p>	
<p><b>Drainage systems</b></p>			

Theory	Level	Practical	Level
<p>e.g., Redon, Bülow, Ventrikel, VAC etc.</p> <p><b>Introduction to mandatory ventilation and special considerations under hyperbaric conditions</b></p> <p>e.g. ventilatory changes, hemodynamic changes, quality use of medicines, NGT feeding, arterial lines, NGT feeding, Open lung manoeuvre</p> <p><b>Hygiene in hyperbaric facilities</b></p> <p>Specialities of disinfection in hyperbaric environment</p> <p>Requirements of disinfection and cleaning of the chamber fixtures and fittings</p> <p>MRSA and other infectious diseases in HBO</p> <p>Self protection</p>	L3		
Total:	16 Hr	Total:	32 Hr

### 3.4 Specific Module for Hyperbaric Nurses in Intensive Care (attendant) (Multiplace)

Same module as for nurse – inside attendant plus

**Giving critical intensive care of patients** (incl. 5 accompany of intensive critical care patients)

Theory	Level	Practical	Level
<b>Physiology and Pathophysiology under hyperbaric conditions</b> e.g., Heart-circulation, Lungs, Kidney-function	L3	<b>Respirators, Ventilators &amp; medical devices applicable for use under hyperbaric conditions</b>	L3
<b>Extended Monitoring Expiratory oxygen measurement</b> e.g., Online Blood gas analysis, TcPCO <sub>2</sub> , IBP, Camino-Sonde	L3	An awareness of the different types and their capabilities	L2
<b>Legal prescription for operation of medical devices in hyperbaric chambers</b> National or EU policies, EN norms	L2	<b>Working practices</b> at a top level hyperbaric facility	L3
<b>Medication</b> e.g., Effects under hyperbaric conditions, Specific procedures & requirements for giving of medication under hyperbaric conditions	L3	<b>Hygiene</b> Preparation specialities of breathing devices and accessories	L3
<b>Monitoring</b> ECG, NBP, CVP, TcPCO <sub>2</sub> /TcPO <sub>2</sub> , ExO <sub>2</sub> & CO <sub>2</sub>	L3	The infectious patient	
O <sub>2</sub> -Monitoring of the Chamber	L3	<b>Giving critical intensive care of patients</b> (incl. 5 accompany of intensive critical care patients)	
Relative Humidity		e.g., Cuff pressure control, Bü-lau-Drainage	
<b>Drainage systems</b> e.g., Redon, Bü-lau, Ventrikel, VAC etc.		Intracranial pressure control, Complications	
<b>Special requirements for mandatory ventilation in hyperbaric environment</b> Volume measurement, Oxygen measurement, Open lung manoeuvre	L2		
<b>Case examples and discussion of the examples</b> e.g., CO Intoxication, Burns and smoke inhalation injury, Brain abscess, Anaemia Decompression illness, Emphysema			
Total:	8 Hr	Total:	32 Hr

### 3.5 Module for hyperbaric attendant (Not Nurse) (Multiplace)

Theory	Level	Practical	Level
<b>Hyperbaric Chamber Technology</b>	L1	<b>Hyperbaric chamber and devices</b>	L3
<b>Physics in a hyperbaric environment</b>	L1	- Locking (personnel and material)	
<b>Physio- and Pathophysiology under hyperbaric conditions</b>	L1	- Built in breathing system (BiBS)	
<b>Safety</b>	L1	- Breathing masks and Hood-tent	
<b>Fire Protection</b>	L2	- Illumination and communication	
Prevention by limiting materials entering chamber		<b>Patient education</b>	L2
Clothes and other possible fuels		<b>Chamber hygiene</b>	L2
Procedures in case of fire		<b>Emergency training</b>	L2
Fire extinguishing systems		3 x accompanied treatment sessions. (in addition to 8hrs practical)	
Practice of fire extinguishing			
<b>Treatment profiles and decompression tables for patients and personnel</b>	L1		
Total:	8 Hr	Total:	8 Hr



Theory	Level	Practical	Level
O <sub>2</sub> -Monitoring of the Chamber Relative Humidity <b>Safety, Risk Assessment and Management</b> <b>Fire Protection</b> Prevention by limiting materials entering chamber Clothes and other possible fuels Prohibited items, materials and equipment Procedures in case of fire Fire extinguishing systems Practice of fire extinguishing <b>Treatment profiles and decompression tables for patients</b>	L1	<ul style="list-style-type: none"> <li>- fire in the chamber</li> <li>- fire in the facility</li> <li>- loss of communications (visual, verbal)</li> <li>- power failure</li> <li>- internal equipment malfunction</li> <li>- medical device malfunction</li> <li>- BIBS malfunction</li> <li>- any external threats to the facility</li> </ul>	
Total:	16 Hr	Total:	16 Hr

### 3.7 Additional module for nurses (Monoplace chambers)

Theory	Level	Practical	Level
<p><b>Effects of the HBO Therapy and oxygen</b> Oedema reduction by vasoconstriction 'Squashing' of gas bubbles in case of gas embolism, Bacteriostatic effects (anaerobic organisms), Competitive displacement of CO Activation of fibroblast proliferation and collagen synthesis, Activation of osteoclasts Angioneogenesis, Activation of macrophages</p>	L2	<p><b>Pre-examination of patients</b> Suitability for HBO-Treatment (ECG, Pulmonary function etc.)</p> <p><b>Practice of assisting patients with HBO-Treatments</b> Before treatment Preparation of the chamber, Checking patients During treatment Accompanying of patients, Caring during chamber treatment Specification of medication under hyperbaric conditions (for example - infusion), Drainage (i.e. Redon, Colostomy etc.) After Treatment Documentation Dealing with emergencies</p> <p>3 x monitored attended treatments during practical training.</p>	L3
<p><b>Physiology of hyperbaric exposure</b> Functional Anatomy, Breathing, Ears Decompression, Thermoregulation,</p>	L2		L3
<p><b>Hyperbaric Pathophysiology and complications</b> Theory of decompression Acute decompression Illness Toxic effects of oxygen (Acute &amp; Chronic) Effects of inert gas (HPNS)</p>	L2		
<p><b>Suitability and contraindications for hyperbaric exposure</b> Patients</p>	L3		
<p><b>HBO: Indications by UHMS and ECHM</b> Indication in case of emergency, Approved Uses</p>	L3		
<p><b>Caring and leading of patients during chamber treatment</b> Psychology, Professional-client relations Nursing &amp; Medical records Patient Care Plans</p>	L3		
<p><b>Hygiene in hyperbaric facilities</b> Specialities of disinfection in hyperbaric environment Requirements of disinfection and cleaning of the chamber fixtures and fittings MRSA and other infectious diseases in HBO Self protection</p>	L3		
Total	16 Hr		Total:

### 3.8 Module for Safety Manager

Theory	Level	Practical	Level
<b>Introduction to EN Norms related to Hyperbaric Technology including Code of Good Practice</b> Show reasons why EU Norms are important and how they should be used by safety managers	1	<b>Production of procedures</b> Produce procedures and test their effectiveness	3
<b>Operational Decompression Procedures</b> Explain common decompression procedures showing advantages and disadvantages including UPTD effects	3	<b>Practical risk analysis exercise</b> Carry out and record risk analysis exercises	3
<b>Staff and patient education</b> Give comprehensive outline of why staff education is required Methods of education available Levels of acceptable education required for staff at all levels in the facility Show why patient education is required Give methods available for patient education	3	Analyse risk of new equipment that is to be taken into the chamber, record the results and discuss as a group the findings maybe to organise and demonstrate a fire fighting exercise	
<b>Safety of Medical Gases</b> Show why medical gases could be unsafe Methods of ensuring safety Pressure safety Marking of gas vessels and pipework	3		
<b>Operation of Planned Maintenance Systems</b> Discuss planned maintenance systems Show why PMS are required? Show methods are available? Show what items should be included	3		
<b>HBO Infection Control</b> Show safety manager's role in good HBO infection control	2		
<b>Fire and fire safety</b> Fire development Prohibited items Discuss fire safety in the HBO environment Discuss fire safety in the HBO facility in general Methods of fire control	3		
<b>Documentation of routine practices and incidents</b> Give examples of documentation required for routine practice and also for emergencies or incident record	2		
<b>Audits/surveys for Multiplace and Monoplace facilities</b> Show why audits are positive Show types and methods of audit Preparation for audit	2		
<b>Principles of risk management</b> Role of safety manager in risk management Discuss the risk management process Risk control measures and how to apply them Documentation of Risk Assessments	3		
<b>Hyperbaric facility safety management</b> Show effective safety management systems and how they can be utilised for a hyperbaric facility	2		
Total:	18 Hr	Total:	4 Hr

#### **4. Levels of Knowledge**

Source:

CERTIFICATION SCHEME FOR WELDING AND INSPECTION PERSONNEL  
DOCUMENT NO. CSWIP-DIV-9-03  
Requirements for General Inspectors of Offshore Facilities  
3rd. Edition November 2004  
Appendix 1: Examination Syllabus, S. 9  
<http://www.cswip.com/pdfs/cswipdiv903.pdf>

"The level of knowledge required by the candidate varies according to topic. To ensure comprehension by all parties the following terms have been defined to demonstrate an increasing level of knowledge.

#### DEFINITIONS

##### OUTLINE KNOWLEDGE:

The candidate must be familiar with the subject in outline terms.  
He/she should know that the topic exists and what it is applied to. In the context of hyperbaric methods/techniques the candidate would be expected to know the „what it is, what it does “but would not be expected to know the finer points of application of the technique.

##### KNOWLEDGE:

The candidate must have a working knowledge of the subject and be able to apply it.

##### DETAILED KNOWLEDGE:

The candidate must have a depth of knowledge sufficient to enable him/her to exercise judgment. “

Level 1 = Outline Knowledge = L 1  
Level 2 = Knowledge = L 2  
Level 3 = Detailed Knowledge = L 3

#### **5. Resources manuals.**

Handbook on hyperbaric medicine / Ed. Daniel Mathieu / Springer

Recommendations of the ECHM consensus conferences

European Code of good practice of hyperbaric oxygen therapy

EN 14931: Pressure vessels for human occupancy (PVHO). Multi-place pressure chambers for hyperbaric therapy. Performance, safety requirements and testing

EN 16081: Hyperbaric chambers. Specific requirements for fire extinguishing systems. Performance, installation and testing

#### **6. Levels of lecturer's competence.**

For level 1 (Outline Knowledge) and Level 2 (Knowledge) depending the topic (medical or technical) a recognised operator or nurse, member of an HBO team.

For level 3 (Detailed Knowledge) on medical topic, a hyperbaric physician (ECHM level IIb or equivalent) or, under the responsibilities of the hyperbaric physician (level IIb or equivalent), a registered nurse specialised on HBO.

For level 3 (Detailed Knowledge) on technical and safety topics, a safety manager or a medical director (ECHM level III or equivalent).

## **7. Safety Manager.**

### Introduction

There is a need to develop a formal standardized management team within European hyperbaric facilities, Management of the team as a whole is important and safety should be a major part of this team for any Hyperbaric Unit. The medical director has a right and specific requirement to have a competent individual as part of this team who can be relied on to ensure the safety of the hyperbaric facility. This person will be ultimately responsible to the medical director for this role.

7.1 The functions of the safety manager are: -

The Safety Manager will be qualified and experienced to the specific unit they are to manage and will be appointed by the Medical Director. Should have knowledge in medical aspects, technical aspects and safety aspects of the hyperbaric treatment, and maintain his competence by continuing professional development.

- a. There must always be a designated Safety Manager who has a sound professional relationship with the Medical Director.
- b. The Safety Manager is to ensure there is no confusion between personnel, responsibilities and boundaries.
- c. The Safety Manager will support the Medical Director as a competent individual who will be able to help with complex safety decisions.
- d. To ensure a “Global” approach to management of safety and education within the team.
- e. Responsible for implementing or accepting effective maintenance of safety management system and for its appropriate dissemination.
- f. Responsible for implementing or accepting effective Safety Management and Quality Assurance systems are provided to include risk assessment and incident/accident reporting procedures within the Hyperbaric Centre.
- g. Responsible for implementing or accepting effective operational, emergency procedures and internal guidelines for all aspects of safety.
- h. Responsible for implementing or accepting and monitoring an effective maintenance programme for the hyperbaric system(s).
- i. Responsible for implementing or accepting and monitoring an effective regular re-evaluation of the safety management system (including internal audits).
- j. Responsible for implementing or accepting and monitoring effective internal and external education programs; including requirements for continuous professional development (CPD) for all members of the hyperbaric team. (European Code of Good Practice for Hyperbaric Oxygen Therapy 3.2 Competencies and Education)
- k. Responsible for ensuring continuous professional development (CPD) and skills training for all members of the hyperbaric team under the direct supervision of the medical director. (European Code of Good Practice for Hyperbaric Oxygen Therapy 3.2 Competencies and Education)
- l. To ensure that the hyperbaric unit’s policies and procedures comply with local, national and European directives.

7.2 Education of the Safety manager

- a. Safety Manager will have in addition to the basic hyperbaric education (ECB Certification, ECHCO or ECHRN) received specific and recognized advanced education related to the hyperbaric fields (i.e., Safety Manager Safety Director, firefighting course, detailed knowledge of rules and regulations, safety culture in Healthcare etc.) and has presented or is working towards presentation of work related to safety at a scientific congress on Hyperbaric Medicine.
- b. Will have received education in the fields of Risk Assessment/Management, general Health and Safety management and Quality Assurance management.
- c. Will have a working knowledge of all aspects of Hyperbaric Systems including management of infection control.

### 7.3. Profile of the safety manager

- a. Will be appointed by the Medical Director.
- b. Will have appropriate education.
- c. Will have received certification as a safety manager from ECB/EBAss
- d. Maintain ongoing continuing professional development in advanced hyperbaric safety.
- e. Will have appropriate experience; and will have worked at least 3 years in the last 5 years in a Hyperbaric Centre treating the ECHM indications regularly as Operator, Nurse or Doctor.
- f. Recommended that the individual will have attended a recognized HBO national or international congress within the last 5 years.

### 7.4 Certification of Safety Manager.

ECB/EBAss has specific certification for European Hyperbaric Safety Manager. Candidates will provide evidence of their qualifications, experience and competence to the EBAss accreditation committee for assessment and recommendation to ECB.

## **8. Examination of the candidates for Safety Managers, Operators, Nurses and Attendants**

The examination of the candidates concerns operators and nurse's attendants.

For hyperbaric nurses in Intensive Care (attendant), final evaluation will be done by their local Medical Director.

The examination of the candidate is in two steps: theory and practical.

The theory examination is based on multiple choice questions each with four possible answers as recommended by ECB/EBAss. All questions will be at the required level for the qualification according to the EBAss resource manual.

Before progressing to the practical examination, the candidate must achieve at least 70% of the points for the theory examination.

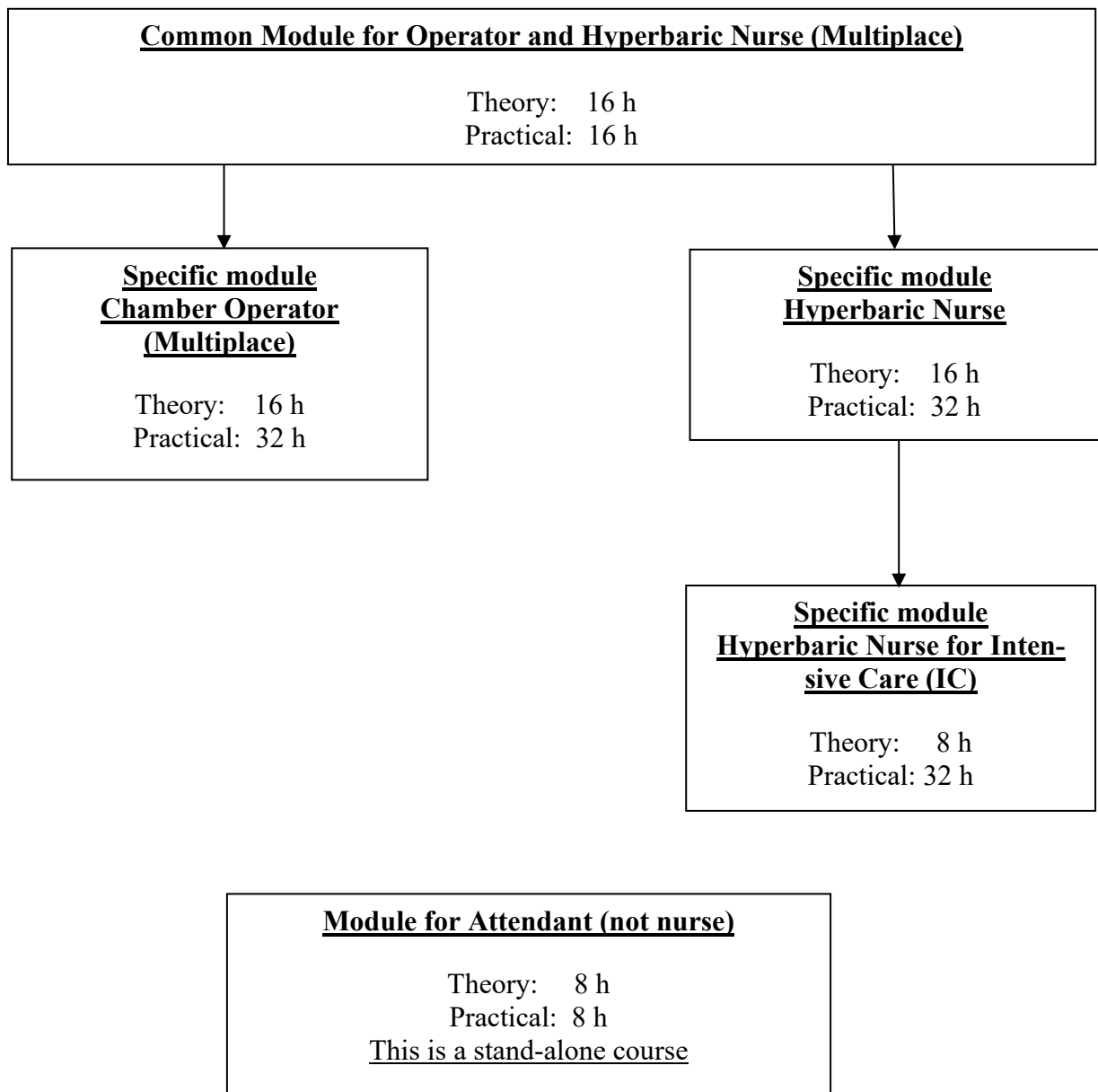
The practical examination is of situations or problems that the candidate will be required to solve. These situations are listed in the European Code of Good Practice for HBO Annex 4 point 3 emergency operating procedures. References should be made to the modules of education in the previous paragraphs for the relevant type of chamber.

Following successful completion of the above the candidate can apply for certification of the ECB/EBAss.

Successful completion of the examination opens the possibility for the candidate to introduce his/her candidature as European certified personnel. This pathway is fully described on the EBAss website.

## Annex: Principles of the Modules

### 1. Multiplace Chambers



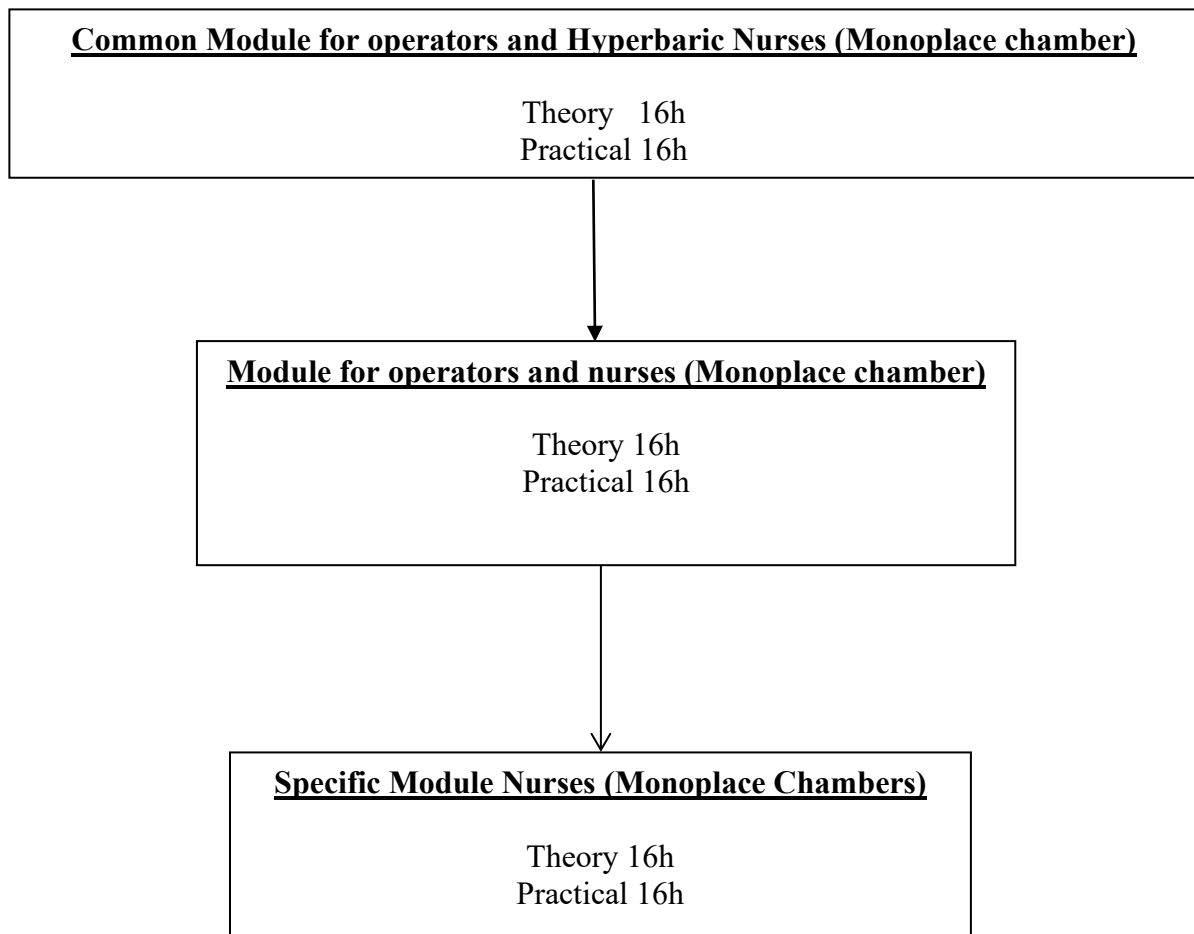
### ***European Baromedical Association for Nurses, Operators and Technicians***

EBAss is an international, non-profit association

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E-Mail: [secretary@ebass.org](mailto:secretary@ebass.org) Website: [www.EBASS.org](http://www.EBASS.org)

## 2. Monoplace Chambers



### 3. Safety Manager

