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Program curriculum covers:

Course Introduction and Registration

Introduction to Hyperbaric Chambers: multi, dual and mono place

Calculation of Pressure

- Atmosphere Absolute (ATA)
- Ambient
- BAR
- mmHq
- PSI
- FSW
- Bottom Pressures
- Overbottom Pressures
- Hydrostatic
- Pneumatic
- Partial Pressures
- Cylinder Pressure Conversions

Mathematical Formulas of Dalton's Law

- Dalton's Law as Applied to Calculations of Partial Pressures/fractions of Gases
- Depths for Using Gases Ensuring the Safe Physiological Limits of All Treatment Gases
- Decompression Gases: air, oxygen, nitrox, etc. ... for patients and observers

Barotrauma of Ears and Sinuses

- Sinus Squeeze
- Inner Ear and Middle Ear Trauma
- Alternobaric Vertigo
- Oval and Round Window Rupture
- Tympanic Membrane
- Vestibular 8th Nerve DCS
- Hemorrhage Along the 8th Nerve

Barotrauma of the Lungs, Extra Alveolar Air Syndrome (E.A.A.S.)

- Arterial Gas Embolism (AGE)
- Tension Pneumothorax
- Pneumopericardium
- Pneumomediastinum
- Subcutaneous Emphysema

Extra Alveolar Air

- Physical Requirements of Diving
- Candidates
- Factors that Predispose to E.A.A.
- Primary
- Medical
- Operational
- Environmental Factors

Scene Management of E.A.A.

- On the Scene First Aid
- Advantages and Disadvantages of Head Down/Left Lateral Position
- The Use of Oxygen and Other Emergency Medical Procedures for Medical and Lay Personnel

Treatment of E.A.A.

- Treatment Protocol for Diving Medical Officers (DMO's)
- USN, Commercial, NOAA, USAF and Foreign Treatment Tables Philosophies
- Medications and Drugs Fluids
- Critical Care Management
- Post Treatment Evaluation
- Retreatments

Physiological Implications of Oxygen and Oxygen Life Support Ranges for Diving and Recompression Therapy (Patient/Observer)

(Recompression Chamber Manual page 33-44)

Oxygen Life Support Limits (Operational/Therapeutical)

- Underlying Pathophysiology of CNS Oxygen Toxicity
- Pulmonary Oxygen Toxicity
- Hypoxia
- Limits as Applied to Patients and Observers

Central Nervous System Oxygen Toxicity (CNS O_2 Toxicity)

- Pathophysiology of the Signs and Symptoms
- Underlying Mechanisms of the Off Phenomenon
- Oxygen Delivery Systems
- Ventilation Rate Requirements for Chambers, Hood Systems, Masks and Ventilators
- Factors That Reduce Tolerance to Oxygen for Patient and Observer Care
- Oxygen Exposure Limit Tables and Their Use
- The Use of Oxygen for Decompression of Observers
- Protocol for Seizures in a Multi, Dual or Mono Chamber

Pros and Cons of In-Water Use of Oxygen for Therapy and Decompression

- Safety Considerations for Using Oxygen Enriched Air Mixtures for Therapy
- Oxygen Tolerance Test
- CNS Oxygen Toxicity and the Oxygen Treatment Tables

Pulmonary Oxygen Toxicity

(Recompression Chamber Manual page 45-59)

Pathophysiology of Pulmonary Oxygen Toxicity

Understanding the Pulmonary O_2 Clock for Operational Diving and Therapy

- Preventing Damage to the Lungs of Patients and Observers

Using the Unit Pulmonary Toxicity Dose

- Determining the Net Effect of a Specific Duration of Breathing Oxygen at Pressure
- Converting the UPTD to Percentage of Vital Capacity Decrement (%Vc)

Determining the percentage of Vital Capacity Decrement at the Dive Site O_2 Consumed During the Dive During Decompression Treatment at Dive Site

- Evacuation on O_2
- Amount of Oxygen Given During Treatments With or Without Extensions
- Can Oxygen Be Given on Ward After Treatment?
- When to Bring Patient Back for Retreatment

Signs and Symptoms of Pulmonary O_2 Toxicity

Pathophysiology of Pulmonary O_2 Toxicity

Arithmetic Method for Predicting Percentage of Vital Capacity Decrement

Pulmonary Symptom Reversal and Restart Times of the Pulmonary O_2 Clock

Lowering the Partial Pressure of Oxygen on the Pulmonary Clock

- Open Circuit Air
- Closed Circuit Mixed Gas
- Change Gas Mixtures

Decompression Sickness (DCS)

Physiological Considerations Found in the Development of DCS
History of DCS

Factors that Predispose Certain Tissues to DCS

Types, Signs and Symptoms of DCS

Scene Management of DCS

Factors that Contribute to DCS

- Primary
- Medical
- Operational
- Environmental

Clinical Manifestations and Diagnosis of DCS

Physiological Basis for Dive Table Development

Critical Care of DCS in Hyperbaric Chamber

Treatment Table Selection for All Types of DCS

Medications for Field and Hyperbaric Treatment of DCS

- Fluids
- Drugs
- Steroids, Etc.

Medications in Diving and Hyperbaric Environments

Medications and Underlying Diseases that Disqualify Divers

Medications Used in Hyperbaric Therapy (E.A.A. and DCS)

Common Medications Used for Field

Physical Fitness for Diving

An Overview of the Physical Requirements for Divers

Physical Conditions and Medical Problems Which Present Hazards to Divers and Chamber Observers

Physiological and Operational Implications of Carbon Dioxide (CO_2)

(Recompression Chamber Manual page 65- 78)

Carbon Dioxide Life Support Ranges

Maximum PCO, for Patients on 2-3 ATA of O_2

Mechanism ofPCO_2 and PO_2 Contributing to Convulsions

Ventilation Rate Requirements

- Multi, Dual and Mono Chambers
- Hoods, Masks and Ventilators
- (ACFM vs. SCFM)

Ventilation of Respiratory Dead Space

- How the Mechanical Dead Space or Mechanical Resistance to Breathing Can Contribute to CNS O_2 Toxicity

Ventilation Rate Requirements for Chamber With or Without Overboard Dump

Continuous and Interrupted Venting Procedures

Venting ACF, SCF and Liters to Ensure Adequate Flow

Chamber Life Support Duration Without Venting Before Physiology Becomes Life Threatening

Note: CO_2 scrubbers, scrubbing agents and closed circuit systems will be discussed during special advanced programs.

Nitrox Therapy Gas Mixtures (N_2/O_2)

(Recompression Manual page 79-86)

Why Diving Accident Victims May Require Nitrox

- The Advantages of N_2/O_2 for Therapy
- The Advantages of N_2/O_2 for Observers

Nitrox Mixtures

Nitrox Tables

Physiological Implications of N_2/O_2

Avoiding CNS and Pulmonary O_2 Toxicity

Nitrox Advantages for Decompression of Observers

Equating a N_2/O_2 Observer to the USN Deco Tables

Therapeutical and Operational Advantages for 60/40 Nitrox Mixtures and 50/50 Nitrox Mixtures

Nitrox (N_2/O_2)vs. Heliox (He/O_2)

Isobaric Bubble Growth

Isobaric Gas Switching Resulting in Super Saturation and Life Threatening Symptoms

Switching to He/O_2 While Increasing or Decreasing Pressure

Chamber Gas Supply Requirements (Free Flow System)

(Recompression Manual page 89)

Determining Internal Volume of Chamber, Cylinder, Flask in Cubic Feet, Gallons and Liters.

Determining How Many Actual Cubic Feet (ACF) are Required to Pressurize Chamber

Determining Compressor Output (SCF)

Determining Volume of Gas Required to Pressurize Chamber at Least Twice

Determining Primary/Secondary Gas Supply Requirements for Treatment Tables

How CO, Scrubbers Can Assist Primary and Secondary Air Supply

Emergency Procedures for Storing Personnel in Chambers in the Event Primary and Secondary Air Supplies are Lost

Chamber Cylinder Gas Suddenly Required for Masks, Hoods Ventilators (Open Circuit Demand/Free Flow)

(Recompression Chamber Manual page 93)

Determining SCF of Gas to Conduct a Dive Operation in Water or Chamber for All Demand and Free Flow Systems

Determining How Many Cylinders of O_2 is Needed to Conduct a Treatment or Decompression of Observers

Determining How Many SCF of Air, O, or Nitrox is Required by Mask for Emergency Breathing.

Determining How Many SCF of Air or Nitrox is Required for Observers to Make Bounce Dives in the Chamber

Decompression of Observers from Air or Oxygen Treatment Tables

(Recompression Chamber Manual page 99)

Decompression of Observers from Air or Oxygen Treatment Tables

Pro's and Con's of USN, USAF, NOAA, Civilian and Foreign Treatment Tables

Decompression of Observers

- Using Oxygen
- Using Nitrox
- Ensuring the Hydrostatic and Off Gassing Components Are Met
- Using Standard USN Decompression Tables
- Using "Surface Decompression Oxygen"
- Using the EAD Concept
- Staying From One Minute to Two Hours at 165 FSW and Coming Out on a USN O_2 TT6 or Extended 6
- For 165 to 60 FSW on a USN Air TT4 to 60 FSW, Then Out on USN O_2 TT6 or Extended 6

Treatment Tables and Viable Treatment Table Options for DMO's

(Recompression Chamber Manual page 105)

This portion of the program describes how to successfully treat a patient and observer when the patient loses vital signs and it becomes necessary to increase pressure to restore the vital signs. Ideally, we would recompress the patient on a single treatment table. However, it is important to know the next slower table to use to ensure the safety of the patient and observer. The deeper the recompression depth is, the faster the CNS, Pulmonary Oxygen and Decompression Clocks are running, therefore it is necessary to know other treatment table options

Critical Care and Medical Equipment in the Hyperbaric Environment

(Practical Hands On)

Fluid Management (I.V.'s), Catheters, Suction, E.K.G.'s, Hoods, Ventilators, Masks

Neurological Evaluation

Adjusting Treatment Tables for Reoccurrence of Symptoms

Tension Pneumothorax, Pneumocardium and Pneumomediastinum

- Awareness
- Treatment
- Stabilization

Protocol for Placing Persons in a Coma or with Life Threatening Vital Signs Under Pressure

Protocol for Pre-Screening Patients for Safety Before Placing in Chamber to Prevent Injury

Note: Daily hands on use of this equipment and procedures

Recompression Chamber Safety

Pre-Screening Medical Equipment for Hyperbaric Environment

Chamber Life Support Systems

Preventing Chamber Fires

- fO_2 >.23
- Electronics
- Types and Causes of Previous Chamber Fires
- Oxygen Safety, Handling and Analyzation

Types of Cleaning Materials, Clothing and Painting for Interior Chamber Safety

Pressure Vessel Integrity

- Viewports
- Piping
- Filters

Emergency Breathing Gases and Their Importance

Practical Use of Multi-Place, Multi-Lock Hyperbaric Chambers

Each participant will receive 2-3 hours hands on use of the recompression chamber each day to practice the following:

Venting Procedures and Requirements

Logs and Timekeeping

Lock-In/Lock-Out Procedures

Use of All Calculations for Gas Supply, Pressures and Venting

Scenarios to Practice Skills Outlined Under Critical Care and Medical Equipment

Numerous Chamber Dives from 30 FSW to 130 FSW Using All Breathing Gases (Air, Oxygen, Nitrox Therapy Gas)

- Safety Awareness
- Safety Systems
- Fire Suppression
- Compressors
- All Gas Supply Requirements
- Decompression Schedules
- Treatment Schedules