HYPERBARIC OXYGEN THERAPY

June 2025

Introduction

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- Hyberbaric Technicians
- Monroeville PA
- 2 Years/2 Months

This month’s topic: Clinical & Non-Clinical Emergencies and Preparedness

Overview:

Every emergency should be handled in a calm, collected, comprehensive manner. The best way to ensure this is to practice and know the emergency procedures! We perform clinical emergency drills quarterly and fire drills semi-annually in the hyperbaric center, per SerenaGroup® Policies and Procedures; however, every hospital system may have a different standard so make sure you are aware of what is necessary for your center to be compliant. Medical emergencies such as seizures, respiratory distress, hypoglycemia, and oxygen toxicity put patients at severe risk that could lead to injury or death. Non-clinical or environmental emergencies such as fire, active shooter, aggressive patients, and hospital evacuations or lockdowns are equally as important to practice. In the event of any emergency, you should know how to manage the hyperbaric department. Emergency drill cards are located on each chamber. All drills that are performed should be documented and saved in your center’s safety binder.

Preventing Fires in the Chamber Room

- Mandatory no smoking/oxygen in use signs
- Prohibited items poster easily located
- Checklist reviewed with each patient prior to every dive
- Grounding (chamber, gurney, wrist strap)
- Anti-static flooring or cleaner
- Humidifier
- Use of hyperbaric only linens
- No floor or low electrical outlets
- No power strips or unauthorized electrical devices plugged in in chamber room
- Fire drills performed and documented
- Daily and weekly maintenance performed, questions, concerns, or inconsistencies reported to the National Safety Director
- Annual Preventative Maintenance performed by Hyperbaric Service Technician

Preventing Hypoglycemia

- Check the blood glucose level of diabetic patients pre and post hyperbaric treatment
- Make sure the blood glucose is above 100mg/dl or whatever level the overseeing physician or non-physician provider is comfortable with for that patient.
- 120 mg/dl is SerenaGroup's ideal pre-treatment number. Cases in which diabetes is managed, 100 mg/dl may be sufficient.

Preventing Oxygen Toxicity

- Treat patients at 2.4 ATA or below to lower the likelihood of oxygen toxicity, unless a higher ATA is required or at 2.0 ATA if the provider feels the patient cannot tolerated 2.4 ATA
- Incorporate air breaks in treatment protocols (SerenaGroup recommends one 10 minute air break, centered in the 90 minutes treatment
- Know the signs of and symptoms of oxygen toxicity:
  - Blurry vision
  - Coughing
  - Chest Pain
  - Confusion
  - Diziness
  - Feeling of unease
  - Muscle twitching in hands and face
  - Nausea
  - Seizures
  - Throat irritation
  - Trouble breathing

A short list of signs and symptoms of CNS O_2 toxicity

CONvulsion - grand mal seizure, usually without warning
Vision - tunnel vision or any other change
Ears - ringing in the ears or other changes
Nausea - mild to severe, continuous or intermittent
Twitching - usually facial muscles, most frequent symptom
Irritability - behavior or personality changes
Dizziness - vertigo, disorientation

Preventing Barotrauma

- Patients should be treated at a standard rate of 1.5 psi/minute unless otherwise ordered by their physician
- Lower the set rate if patients have difficulty equalizing their ears during descent or complain of tooth squeeze, pain in the sinus cavity areas, and/or pain in the ears
- If a patient experiences respiratory distress, abort treatment
- If a patient is complaining of difficulty equalizing, lower the set pressure and wait for the pressure to decrease, guide the patient through equalizing techniques until their ears "pop" or are no longer uncomfortable, then attempt pressurization again. It is suitable to attempt this approximately three times before aborting treatment

Use the below SerenaGroup Fire Drill Observation and Evaluation Form

SG

FIRE DRILL OBSERVATION & EVALUATION

Drill Date: ___/___/___ Time: _____ Center: _____

Scenario: _____

Drill Activity Level: ☐ Verbally Communicated ☐ Demonstrated & Timed

PASS	FAIL	N/A	
			COMMUNICATION
☐	☐	☐	Emergency phone number was called or simulated
☐	☐	☐	Alarm activated or simulated
☐	☐	☐	Staff alert and participating appropriately
☐	☐	☐	Fire alarm sounded and heard
☐	☐	☐	Visual alarm seen
			LIFE SAFETY
☐	☐	☐	Smoke hoods donned or simulated
☐	☐	☐	Doors in area closed (place wet blanket/sheet at base of door)
☐	☐	☐	Smoke doors shut
☐	☐	☐	Halls/Corridors clear of all items
☐	☐	☐	Patients and staff accounted for
			STAFF KNOWLEDGE
☐	☐	☐	Location of smoke hoods
☐	☐	☐	Location of fire extinguishers
☐	☐	☐	Location of alarm pull stations or how to activate phone system
☐	☐	☐	Knowledge of smoke compartments
☐	☐	☐	What is your fire plan (RACE)
☐	☐	☐	How to operate extinguisher (PASS)
☐	☐	☐	Evacuation equipment (i.e. Evacuation Chair, Paraslyde, etc.)
☐	☐	☐	Evacuation meeting location
☐	☐	☐	Evacuation routes
☐	☐	☐	Location of medical gas shut off valves
☐	☐	☐	Location of Fire Plan

Chamber 1 starting pressure/depth: _____

Chamber 2 starting pressure/depth: _____

Chamber 3 starting pressure/depth: _____

Chamber 4 starting pressure/depth: _____

Total time to evacuate: _____

Circle one: Drill Passed / Drill Failed

If failed, please note why: _____

Comments: _____

Fire Drill Participation Sign-In Sheet

First & Last Name (Printed)	Position

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Use the below SerenaGroup Emergency Drill Observation and Evaluation Form

EMERGENCY DRILL OBSERVATION & EVALUATION

Drill Date: ___/___/___ Time: _____ Center: _____

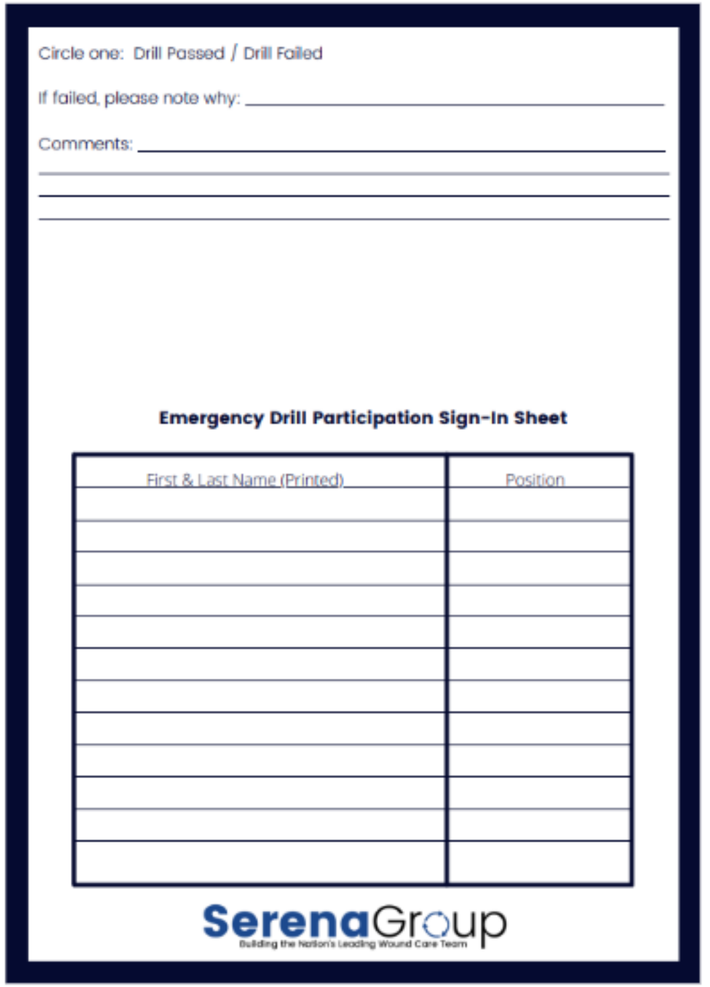
Scenario: _____

Drill Activity Level: ☐ Verbally Communicated ☐ Demonstrated & Timed

PASS	FAIL	N/A	COMMUNICATION
☐	☐	☐	Emergency phone number was called or simulated
☐	☐	☐	Alarm activated or simulated
☐	☐	☐	Staff alert and participating appropriately
☐	☐	☐	Simulate communication and explanation to patient

			LIFE SAFETY
☐	☐	☐	Halls/Corridors clear of all items
☐	☐	☐	Patients and staff accounted for

			STAFF KNOWLEDGE
☐	☐	☐	Location of alarm pull stations or how to activate phone system
☐	☐	☐	Evacuation equipment (i.e. Evacuation Chair, Paraslyde, etc.)
☐	☐	☐	Evacuation meeting location
☐	☐	☐	Evacuation routes
☐	☐	☐	Appropriate and correct responses to the scenario
☐	☐	☐	Verbalized or practiced decompression specific to the scenario
☐	☐	☐	Location of chest tube tray
☐	☐	☐	Location of defibrillator
☐	☐	☐	Safety measures taken or simulated if defibrillation is required



Circle one: Drill Passed / Drill Failed

If failed, please note why: _____

Comments: _____

Emergency Drill Participation Sign-In Sheet

First & Last Name (Printed)	Position

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Chamber Cards

Cardiopulmonary Arrest

- Activate emergency system
- Turn set pressure to zero
- Decompress the chamber
  - Increase rate set to 4-5 psi per min. If chamber decompression slows significantly
    - Perry - turn system off, and hold exhaust bypass button
    - Sechrist - turn master valve to emergency vent, hold red button
  - Observe patient continually
- Move patient away from chamber (minimum of 10 feet from chamber)
- Remove patient from mattress and remove blankets, sheet, gown
- Once linens removed and patient has been relocated, defibrillator may be used
- Assist code team/EMS as required
- Document incident (see manager)
- Complete charting as time permits

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FIRE

RACE = Rescue, Alarm, Contain, Escape/Extinguish

Fire In Chamber:

- Do not remain at either end of the affected chamber
- Patient in the chamber with fire is presumed deceased, follow emergency procedures for remaining chambers
- Technicians put on smoke hoods
- Activate fire alarm
- Emergency dump the chamber with exhaust bypass (Perry) or emergency toggle switch (Sechrist)
- Once surfaced, remove patients from chamber
- If possible, close chamber oxygen valves
- Evacuate room and close doors
- Turn off main zone oxygen valve (in hall)

Fire In Chamber Room:

- Technicians put on smoke hoods
- Remove anyone in immediate danger
- Activate fire alarm
- Contain fire with extinguisher, if possible
- Inform patient of rapid decompression
- If imminent threat to life, emergency dump chambers. If fire can be contained, decompress chamber with an increased rate set.
- Once surfaced, remove patient from chamber
- If possible, close chamber oxygen valves
- Evacuate room and close doors
- Turn off main zone oxygen valve (in hall)

Fire In Building:

- Call security/verify threat
- Ensure doors to the HBO room are closed
- Inform patients and decompress at increased rate set (increase rate set according to threat/risk)
- Evacuate area if warranted

Pneumothorax

Signs and Symptoms:

- Sudden stabbing chest pain
- Sudden shortness of breath
- Uneven chest excursion during respiration
- Increasing respiratory distress
- Deviated trachea
- Distended neck veins
- Acute cardiovascular changes

1. Halt further pressure reduction. Note time and complaint
2. Notify hyperbaric physician and activate emergency services
3. Increase pressure slightly to relieve symptoms
4. Inform patient of what is suspected and likely required management
5. Prepare needle decompression kit
6. Once all necessary thoracostomy equipment is assembled, decompress chamber as ordered and as tolerated
7. Order STAT chest x-ray or transfer to ED

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Oxygen Toxicity

Signs & symptoms of oxygen toxicity:

- V - vision (tunnel vision)
- E - ears (tinnitus)
- N - nausea
- T- Twitching/tingling in face
- I - irritability
- D - dizziness
- C - convulsions

1. If any symptom is noted, convert patient to air breathing. (Note complaint and time of occurrence)
2. Within 1-2 minutes of patient beginning air breathing, ask patient if complaint has resolved, improved, remained the same or worsened
3. If patient complaint/problem has resolved/improved - have patient complete an entire air break (10 minutes); the decision to continue or abort therapy will rest with the hyperbaric physician. It is important that staff maintain direct visual observation of patient throughout the ascent
4. If patient complaint/problem is unresolved or unchanged return patient to surface pressure while patient continues breathing from air mask
5. With seizure activity DO NOT decrease pressure until free air movement is clearly established. See Seizure card.

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Seizures

Seizures can look different for individuals. Signs of seizures could include jerking/convulsing, staring, sudden stiffness, loss of consciousness, drooling, confusion, and disorientation

1. If any sign of seizure is noted, halt treatment at current depth, do not allow chamber to continue to compress or decompress
2. Notify hyperbaric physician
3. Activate emergency services
4. DO NOT decompress patient until they are postictal and exchanging air. Once normal chest rise and fall has been noted, decompression may begin at a slightly increased Rate Set (3 psi per minute)
5. Once patient is removed from chamber, obtain a blood glucose level on ALL patients and complete vital signs
6. Transfer to Emergency Department if necessary. Ensure that the team transferring to ED is aware of any medications or diagnoses that may increase the risk of seizure (i.e. Suboxone, narcotics, Wellbutrin, diabetes, substance abuse, etc.)
7. Notify manager of event
8. Document

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Safety Pin Jam & Communication Failure

Door Safety Pin Jammed - Perry

If the chamber door will not open with the chamber pressure gauge showing zero, the pressure safety lock pin may be jammed in the extended position.

To release the safety lock pin:

1. Insert a blunt instrument (pen, screwdriver, etc.) into the hole
2. Push safety lock pin into the retracted position
3. Note this in the maintenance log, and inform manager

Communication Failure

1. Use cue-cards to advise patient of communication failure
2. Begin ascent to surface pressure, continue to communicate with patient via cue-cards
3. Report failure to the manager

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Emergency Decompression (Dump)

Any situation where it is necessary to have the most rapid access possible to the patient (warning: this could cause a pneumothorax and should only be used in extreme life threatening emergencies)

1. Activate emergency services
2. Inform patient
3. Decompression (only use 3 sec on/3 sec off method when there is not an imminent threat to life, if there is a threat to life, hold button continuously)
   a. Sechrist: Flip Emergency toggle switch OR turn master valve to Emergency Vent and press red button
   b. Perry: Turn system switch to Off and press Exhaust Bypass button
4. Open door when pressure indicator eye goes from red to black (Sechrist) or when chamber pressure is at 0
5. Remove patient, proceed as ordered and patient's condition dictates. See pneumothorax chamber card, if applicable

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Failure of Oxygen Supply

In the event that the oxygen supply/storage system is depleted or interrupted during operation, perform the following procedure:

1. Notify the patient that the chamber is depressurizing
   a. Depressurization will already be in progress - when loss of supply pressure occurs, the chamber will automatically begin depressurizing by venting off through the Ventilation Control valve
2. Flip the system On/Off switch to the Off position
3. Adjust the rate of depressurization with the Ventilation Control valve
   a. The rate of depressurization can be slowed somewhat by turning the ventilation control valve fully clockwise to the minimum setting
4. When chamber pressure reaches zero (0), open chamber door

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Uncontrollable Depressurization

Should the automatic pressure control system malfunction and the chamber starts depressurizing perform the following steps:

1. Notify the patient that the chamber is depressurizing
    a. Warn patient not to hold breath
2. Combat depressurization by increasing Pressure Set and Rate Set, turn Ventilation Control dial to minimum. Attempt to evacuate the patient from the chamber safely through careful manipulation of pressure using the Pressure Set.
3. When chamber resurfaces, have patient evaluated by hyperbaric physician

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Uncontrolled Pressurization

If the automatic pressure control system malfunctions and the chamber starts pressurizing, perform the following steps:

1. (Perry) Flip the system ON/OFF switch to the OFF position. (Sechrist) Turn Master Valve to Off position
    a. This will stop chamber compression and will very slowly decompress the chamber
2. Notify the patient that the treatment is being aborted, and that the chamber is depressurizing
3. Adjust the rate of depressurization using the Ventilation Control to speed up depressurization
4. When chamber pressure reaches zero (0), open the chamber door

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Policies

SerenaGroup policies state that we are to complete TWO fire drills per year and TWO clinical drills per year. Forms must be completed, and drill forms will remain in the back of the safety binder.

Quiz

Question 1

Per SerenaGroup guidelines, how often should a fire drill be performed?

a. Monthly
b. Quarterly
c. Biannually
d. Yearly

Answer 1

C. Biannually

Question 2

Name 3 Measures taken to prevent fires in the chamber room

Answer 2

- Mandatory no smoking/oxygen in use signs
- Prohibited items poster easily located
- Checklist reviewed with each patient prior to every dive
- Grounding (chamber, gurney, wrist strap)
- Anti-static flooring or cleaner
- Humidifier
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Question 3

Who has responsibility for maintaining the Hyperbaric Center's Safety Binder?

Answer 3

On site hyperbaric safety director

Question 4

An announcement comes over the loudspeaker to initiate lockdown procedures with no additional information. What should the hyperbaric technician do FIRST?

a. Emergently decompress the patient (2 min)
b. Decompress the patient at the normal rate of 1.5 psi/min
c. Decompress the patient at an increased rate as tolerated
d. Wait for verification of why the facility is being locked down to determine if your area is threatened or at-risk

Answer 4

FIRST…

b. Decompress the patient at the normal rate of 1.5 psi/min

THEN…

Verify why the facility is being locked down to determine if your area is threatened or at-risk

Question 5

If you suspect oxygen toxicity, you should put the patient on an air break and abort the treatment.

True or False?

Answer 5

True.

Always include and inform the physician when a decision is made to add an air break that is outside of the orders or abort treatment.

Round Table

- Follow up on implementation of the pre-dive checklist with patient signatures
- Moving next month’s meeting to Thursday

Attendance: May

In Attendance:

- Henry Ford
- Chambersburg
- Fairview
- Inspira
- Monroeville
- MGMC
- ACMH
- Jackson
- Akron

Absent:

- No one, great work!!!

Topic:

What Can and Cannot Go Into the Chamber

THURSDAY, July 3, 2025

12:15pm est

Contact Us

QUESTIONS/PROBLEMS

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THANK YOU !!!