

# Undersea & Hyperbaric Medical Society

## Guidelines for infection control, patient treatment, and staff safety considerations related to Hyperbaric Oxygen Therapy (HBO<sub>2</sub>) in monoplace and multiplace hyperbaric chambers during the novel coronavirus disease (COVID-19) outbreak

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### Introduction

This document is provided with the intended purpose to enhance infection prevention practices, address patient selection, and offer solutions for safe patient care practices for monoplace and multiplace hyperbaric facilities during the novel coronavirus disease (COVID-19) outbreak. The following guidelines are not intended to replace the infection prevention policies and procedures that have been established by hospitals, healthcare centers and manufacturers, but to provide some confidence in the safety measures you already use and to provide some additional input to optimally reduce infection risk.

Due to the shared space and presence of multiple bodies within a confined area, the greatest infection risk exists within the multiplace chamber. As a result of this, the bulk of this document is aimed at infection prevention measures in that environment.

The proposed guidelines are an amalgamation of recommendations from our Safety Committee, Oxygen Committee, and the generous contributions of our colleagues in the European Committee for Hyperbaric Medicine (ECHM) and the Canadian Undersea and Hyperbaric Medical Association (CUHMA).

The UHMS recommends that all medical facilities independently evaluate and review their infection prevention procedures, to include, but not limited to: patient screening upon arrival, patient selection, patient and staff interactions, physical spacing/distancing, how to limit patient access throughout the clinic/department, use and cleaning of changing rooms, patient spacing/seating within the chamber, and co-morbidities as a measure of morbidity/mortality risk.

The Centers for Disease Control (CDC), as well as local and state governments, provide a continually changing landscape of recommendations related to population measures aimed at infection control. Within the clinical setting, thoughtful, and often difficult decisions are required to balance infection risk against the benefits of HBO<sub>2</sub> therapy.

In highly affected populations, consider the need to limit HBO<sub>2</sub> to selected cases only and to the minimum number of sessions necessary to reach a pre-defined clinical goal or endpoint. The intention is to avoid unnecessary exposures for medical personnel and patients, as well as saving limited resources (masks, disinfectants etc.).

### General Guidelines

- Restrict/prevent medical staff from providing patient care who are sick or febrile
- Restrict/prevent patients from entering the department or receiving HBO<sub>2</sub> who are sick or febrile
- Establish a handwashing sanitization station at the clinic entrance. Encourage regular hand sanitization practices before and after changing and entering and exiting the chamber
- If available, clinics may consider having all patients wash their hands and don surgical masks at the clinic entrance as a means to reduce the physical scope of viral shedding in asymptomatic patients

## Multiplace Chamber Guidelines

- Limit the number of in-chamber occupants (patients as well as clinical staff) to enable at least 3-feet (1-meter) between all occupants.
- Optimize ambient air isolation by donning hoods or BIBS masks prior to or as the door/hatch is closed, and maintain air isolation until the patient treatment is completed and just before exiting.
  - If available, patients may transition to surgical masks to minimize the potential spread of viruses. Masks can be donned as soon as patients enter the clinic, removed during treatment, and re-applied immediately once the hood or BIBS mask is removed.
- Limit or preferably eliminate time when patients and staff are breathing ambient air in the chamber
  - Air breaks – either eliminate these through treatment at reduced pressures (2ATA) or change BIBS/hood gases from oxygen to air to effect the break and then return to oxygen.

## Safety of Inside Attendants

### Options may include:

- Use of N95 mask, ensuring proper fit testing prior to use (only if available)
  - Note: Staff use of N95 masks is not currently feasible due to shortages and the need for this can be markedly reduced by implementation of mask/hood/BIBS use as described above.
- Use of a BIBS/aviator mask with extendable hose throughout the treatment
  - Gas mixture would be adjusted from air to oxygen to effect proper decompression practices
- Standard eye protection in the form of personal protective equipment (PPE) glasses or face shields

All personal breathing equipment to include masks, BIBS, and hoods are either discarded or properly and thoroughly disinfected after every use.

- Patient specific medical equipment to include masks and hoods, shall not be stored in patient lockers or other location not under direct control by medical staff where it may not undergo appropriate disinfection after each use.

All chamber surfaces require thorough disinfection procedures with use of approved solutions and materials. [Disinfection solutions](#) must be effective against bacteria and viruses. If available, the chamber atmosphere should be appropriately cleaned with closed UV systems (avoiding direct exposure on PVC windows) after each treatment.

## Multiplace Guidelines for Urgent/Emergent Indications for Patients with Suspected COVID-19 Infection

All of the recommendations stated above regarding general infection control recommendations still apply.

A thoughtful approach that balances the risk of disease transmission to staff and other patients versus the anticipated benefit to the patient is an imperative part of whether treatment is provided and which procedures/safety measures are used.

- Current shortages of personal protective equipment underscores the importance of this deliberation as availability of PPE may significantly impact clinical decision making.

Optimize isolation of the infected person through standard droplet precautions (the World Health Organization (WHO) is considering a recommendation for airborne precautions) with a surgical mask, or if necessary and based on the clinical scenario, intubation. If the patient is intubated, a HEPA filter may be placed between the endotracheal tube and the bag or ventilator. However, it is important to consider the risk of inadequate ventilation and increased CO<sub>2</sub> within the breathing circuit if the patient requires high minute ventilations and high PEEP.

- Optimize staff safety. Staff in immediate contact with these patients should wear a gown, double gloves, N95 mask or PAPR, per CDC guidelines (<https://www.cdc.gov/coronavirus/2019-ncov/infection-control/control-recommendations.html>).
- Inside chamber staff can further limit exposure through use of BIBS mask, aviator mask, or N95 while in the chamber or when providing care to an infected patient.
  - Additional PPE may include gowns and gloves, depending on level of patient contact required.
  - Note: the addition of gowns and other burnable non-approved materials for use within the chamber, increases fire risk.
    - Chamber operators should maintain in-chamber oxygen fractions at ~21%.
    - Ensure proper functioning of manual fire-extinguisher and deluge system.

## Monoplace Chamber Guidelines

- Refer to General Guidelines above.
- A thoughtful approach that balances the risk of disease transmission to staff and other patients versus the anticipated benefit to the patient, is an imperative part of whether treatment is provided and what procedures/safety measures are used.
- Consider staggering treatment times to reduce patient-to-patient exposure
- Hands should be washed with soap and water or sanitized (with chamber approved sanitizer) prior to entering the chamber.
- Approved disinfectants applied to hands and gurneys should be allowed to dry before pressurization. It is important to utilize a chamber-appropriate disinfectant identified by your chamber manufacturer.
- All chamber surfaces require thorough disinfection procedures with use of approved solutions and materials. Disinfection solutions must be effective against bacteria and viruses.
- There is no evidence to support that the virus associated with COVID-19 is uniquely resistant to standard disinfectant products used for hyperbaric chambers and healthcare settings.
  - Refer to your manufacturer recommendations for appropriate disinfection procedures and products.

## Statement Regarding use of HBO<sub>2</sub> as Treatment of Severe COVID-19 Infection

There is a cohort of patients who suffer severe hypoxia associated with COVID-19, and there are some reports related to the experimental use of HBO<sub>2</sub> to minimize these effects. Based on the current evidence, logistics of care, temporary effect of treatment, and the availability of other treatment options, HBO<sub>2</sub> is not recommended for the treatment of COVID-19 associated hypoxia. Recommended treatment options include ventilator support or extracorporeal membrane oxygenation (ECMO).

## References

<https://www.uhms.org/resources/medfaqs-frequently-asked-questions-faq/safety-technical/161-infection-prevention.html>

[https://www.uhms.org/images/Safety-Articles/ECHM-position-on-HBOT-and-COVID-19-16th-March-2020\\_1.pdf](https://www.uhms.org/images/Safety-Articles/ECHM-position-on-HBOT-and-COVID-19-16th-March-2020_1.pdf)

<https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2>