



Hyperbaric Oxygen Therapy for the Critically Ill: How Safe is it?

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Introduction

Despite the number of approved indications for HBOT, many critically ill patients continue to go untreated because of the physician's lack of confidence in the safe treatment of these patients in the HBOT environment. The purpose of this study is to evaluate the safety of using HBOT for critically ill patients.

Methods

A review of HBOT patient records between 2007 and 2012 was performed, including patients admitted to the surgical intensive care unit and medical intensive care unit. Demographic data, diagnoses for intensive care unit admission, diagnosis for HBOT, APACHE II score, SOFA score, SAPS II score, use of invasive tubes/lines and vasoactive medications were reviewed for all evaluable subjects.

Results

The HBOT patient charts (4733) were reviewed. Twenty-two evaluable subject charts were examined. Ages ranged from 22-82 years old with 13 males and 10 females. Indications for HBOT included carbon monoxide poisoning (6), necrotizing fasciitis (6), compromised graft/flap (5), mucormycosis (2), acute arterial insufficiency (1), cerebral air embolism (1) and soft tissue radionecrosis (1). HBOT treatment duration ranged from 3-40 treatments with treatments lasting for 90-100 minutes at 2.0-3.0ATA. There were no adverse effects from HBOT. There was zero mortality during HBOT.

ICU parameters	# of HBO Patients
APACHE II \leq 25	11
APACHE II $>$ 25	4
SAPS II \leq 45	11
SAPS II $>$ 45	11
SOFA \leq 9	9
SOFA $>$ 9	2

Table 1 ICU parameters of HBOT patients

ICU Devices	# of HBO Patients
Intravenous lines	22
Central Venous Lines	4
Ventilators	7
Vasopressors	4
Arterial Catheter	2
Chest Tube	3

Table 2 ICU devices for HBOT patients



Figure 1 HBO service at Loma Linda University Medical Center

Discussion

The Acute Physiology and Chronic Health Evaluation (APACHE II) score gathers data from 15 physiological assessments. They include age, hematology, and oxygenation of the patient. Scores range from 0 to 75 with increasing scores correlating with hospital mortality. The Simplified Acute Physiology Score (SAPS II) uses 17 variables to calculate an estimated risk of death without a primary diagnosis. SAPS II is most accurate for assessing the risk for a group of patients rather than individual patients. The Sequential Organ Failure Assessment (SOFA) score uses 6 parameters to quickly determine the extent of organ damage or failure of a patient. All of these scores are used as crude Intensive Care Unit (ICU) assessments and do not specify diagnoses.

The scores were used in this study to establish a grading scale of the severity of illness among HBOT patients. This study also included the use of ICU devices among HBOT patients such as chest tubes, arterial catheters and the use of vasopressors that have been considered contraindications for HBOT. We did not find that the concerns of safety in using HBOT for critically ill patients were justifiable in this sample of HBOT patients.

Conclusion

1. HBOT can be safely utilized for critically ill patients.
2. High APACHE II score is not a contraindication for HBOT.
3. There were no adverse effects or mortalities associated with critically ill patients undergoing HBOT.