Testimony of
Andrew Kozminski, MD MSE
Clinical Assistant Professor of Emergency Medicine and Anesthesia
University of Iowa Health Care's (UIHC) Medical Director for Hyperbaric Medicine and the UIHC Wound Center
Before the House Committee on Veterans' Affairs, Subcommittee on Health
U.S. House of Representatives on "H.R. 1336, The Veterans National Traumatic Brain Injury Treatment Act (Rep. Murphy)"
March 11, 2025

Good afternoon, Chairwoman Dr. Miller-Meeks, Ranking Member Brownley, and Members of the Subcommittee. Thank you for inviting me to participate in this hearing to discuss H.R. 1336, The Veterans National Traumatic Brain Injury Treatment Act.

This piece of legislation aims to improve the health of our veterans. Establishing a pilot program for the use of hyperbaric oxygen (HBO) therapy for veterans with traumatic brain injury (TBI) or post-traumatic stress disorder (PTSD) could help improve these patients' quality of life. Besides the potential clinical improvement, a VA pilot program would enable veterans to receive HBO in a safe environment. Furthermore, using this pilot program as a means to conduct more research for these indications could help to improve the delivery of care for not just veterans but for all civilians.

Over the course of a lifetime, an average of 7% of veterans experience PTSD with the highest incidence at 29% for veterans deployed in Operations Iraqi Freedom and Enduring Freedom. As an emergency medicine physician, I have cared for numerous veterans suffering from TBIs and PTSD. With my experience in hyperbaric medicine, I think the implementation of HBO for these ailments would be uncomplicated. Veterans already use this therapy through their VA insurance for currently approved HBO indications. Thus, HBO has proven its safety after many decades of use by the medical community. For these reasons, this legislation has potential to help improve the lives of our friends, families, and neighbors.

I am Dr. Andrew Kozminski, an emergency medicine physician with a specialization in undersea & hyperbaric medicine. I am the current medical director for hyperbaric medicine at University of Iowa Health Care (UIHC) and medical director for the UIHC Wound Center.

One main function as the director of a hyperbaric medicine service is providing safe treatments for patients. The usual population for a hyperbaric medicine service includes patients with complicated chronic wounds, radiation injuries, and cases of acute soft tissue ischemia. Most patients receiving HBO across the country are in ambulatory, non-critical condition. However, many large healthcare systems are treating patients for emergency indications (i.e. decompression sickness, arterial gas embolism, central retinal artery occlusion, carbon monoxide poisoning, acute blood loss anemia) and patients who come from intensive care settings with life or limb-threatening conditions like necrotizing fasciitis, crush injuries, or impending compartment syndrome. At the University of Iowa, my team has treated the full spectrum of indications and for patients who are merely days-old to greater than 100 years of age. This range of patient demographics and conditions highlights HBO's relative safety when administered by trained hyperbaric medicine professionals at accredited healthcare facilities.

Since 2018, University of Iowa Health Care has participated and has been a top enrolling site in a phase II adaptive, multi-center, randomized clinical trial called Hyperbaric Oxygen Brain Injury Treatment Trial (HOBIT). This trial aims to determine

the optimal dose and frequency of hyperbaric oxygen that is most likely to improve outcomes for acute severe traumatic brain injury patients. As expected for those who incur a severe TBI, the mechanism of injury can damage any and all organ systems, which can make treating these cases riskier than an average HBO patient. However, despite these critical circumstances, skilled healthcare providers knowledgeable in the specific potential complications within a hyperbaric environment have been able to maintain a robust safety profile throughout the course of this trial. In comparison to treating these patients, caring for ambulatory, non-critically ill patients with chronic TBI or PTSD should be well within the capabilities of any accredited hospital system across the country with HBO capabilities.

The 14th Edition of the Undersea & Hyperbaric Medical Society's Indications Manual contains a summary of 34 publications, a mixture of case reports, retrospective reviews, prospective and randomized clinical trials from 1985 to 2018, that aimed to examine TBI and the potential role for HBO as a treatment. Adverse events, if reported, are listed in this summary. Neurologic oxygen toxicity and claustrophobia are two such adverse events that might be more prevalent in this sub-population compared to the general HBO patient population.

Oxygen toxicity seizures for the general population are a potential but rare complication of hyperbaric oxygen and is something I educate all of my patients on prior to beginning their treatment course. The Epilepsy Foundation reports 1 in 50 TBI cases result in post-traumatic epilepsy. This does not mean veterans with a TBI and concurrent epilepsy will be unable to receive HBO treatments. It is appropriate, however, to adjust treatment profiles to account for lower seizure thresholds in patients with known epilepsy or patients that experience an oxygen toxicity seizure during their treatment course. In any case, an oxygen toxicity seizure is a complication that trained hyperbaric medicine professionals are well-versed in how to manage and should be able to ensure continued patient safety throughout a treatment course.

I have also treated many patients with claustrophobia or hesitancy about receiving treatment in a confined space. Anecdotally, some patients find wearing an oxygen mask or hood to be bothersome. Within a patient population suffering from traumatic combat experiences, there will be some qualifying patients who refuse treatment because of the confined environment. Anxiolytic medications can be administered safely by trained professionals to help these patients receive HBO. In a worst-case scenario, a patient would need to be removed from a hyperbaric chamber mid-treatment. Aborting a treatment does not pose any increased risk of physical harm to a patient and would not keep them from continuing with other forms of therapy for their condition.

It is important to comment on the possibility of complications during an HBO treatment not only to provide a complete picture of the risks and benefits but to highlight the importance of trained hyperbaric medicine professionals being the ones to administer

this care for our veterans. As TBI and PTSD are not currently covered indications by insurance companies in the United States, there are desperate patients who seek HBO treatments at health clinics or “health spas” --businesses that claim to offer life-altering HBO treatments at low prices for off-label indications. In my experience, these “health spas” do not adhere to the same level of safety as hyperbaric services within a hospital system, nor might they even provide correct HBO doses or treatment profiles. Just this past January, a 5-year-old child was killed in Troy, Michigan at one of these businesses from an explosion. Reportedly, the mishap is still under investigation, but it was likely a result of insufficient training and/or lax safety measures. I do not want our veterans, or any person, to seek treatment for TBI or PTSD in health clinics that place patients in danger. Establishing a pilot program for veterans will enable them to get treatment at fully accredited institutions where they can be cared for by true medical professionals.

Unfortunately, current treatment options for TBI and PTSD leave a range of 15-50% of patients with persistent symptoms after standard intervention. The medical community strives to improve this outcome through more research and clinical trials. This legislation will help progress and add to this effort.

My participation in the ongoing HOBIT trial--testing the effect of HBO on acute, severe TBI—encompasses the extent of my personal experience in treating TBI or PTSD with HBO. As mentioned, these conditions are currently off-label and thus classified as experimental. I look to the lead investigators in my field and the research they have completed to derive my opinion on whether HBO has potential for providing relief for patients with chronic TBI and PTSD.

It is believed that HBO holds promise as a treatment for these conditions as it elevates oxygen tension in the blood and damaged tissues which helps promote neuroplasticity in the acute setting of injury. For chronic TBI cases, it has been found that HBO can improve cellular metabolism, reduce cell death and oxidative stress, and enhance mitochondrial function. These mechanisms aim to promote neuronal repair and regeneration. The Brain Injury and Mechanism of Action (BIMA) trial, published in 2016, demonstrated improved post-concussive symptoms, PTSD, cognitive processing speed, sleep quality and balance function by 13 weeks after 40, 60-minute HBO sessions at 1.5 ATA. Unfortunately, these improvements did not persist beyond 6 months. More studies have also shown clinical improvement in their HBO intervention groups while others have mixed results and would likely provide clearer answers with more patient recruitment and better long-term follow-up.

Most recently, Dr. Lindell Weaver, a leader in my field, and his team published their most recent study last month (February 2025), “A double-blind randomized trial of hyperbaric oxygen for persistent symptoms after brain injury.” This study included both TBI and non-TBI brain injuries, making the findings more generalizable across patient populations. Participants were divided either into an HBO treatment group or a sham

group for the first phase of the trial. The treatment group received 40 HBO sessions at 1.5 ATA within 12 weeks. 13-week follow-up showed improvements in cognitive test scores, similar to what was seen in the BIMA trial, for both sham and HBO groups. These improvements were maintained at 6-months only for the HBO group. The second phase of the trial offered another 40 HBO sessions to all trial participants. At final follow-up, 3 months after the last treatments were given, patients who received 80 HBO treatments had greater neuropsychiatric improvement compared to their results after 40 sessions. The initial sham group, patients who received a maximum of 40 treatments, showed neuropsychiatric improvements similar to the treatment group in the first phase of the trial.

I find the outcomes of these trials to be promising. More work needs to be performed to better understand the potential long-term efficacy of HBO for TBI and PTSD. HBO dose and treatment frequency could also be further investigated, though 1.5 ATA is more neuroprotective in a population with higher incidence of seizures. For TBI and PTSD, HBO should still be performed in conjunction with frequent, specialized brain injury rehabilitation.

In conclusion, this piece of legislation aims to improve the health of our veterans. Establishing a pilot program for the VA to offer HBO therapy for veterans with TBIs and PTSD could help improve these patients' quality of life, provide access to safe health care environments in which to receive these treatments, and continue to build insight on how best to construct and administer treatment courses in the future.

References

Committee on the Assessment of Ongoing Efforts in the Treatment of Posttraumatic Stress Disorder; Board on the Health of Select Populations; Institute of Medicine. Treatment for Posttraumatic Stress Disorder in Military and Veteran Populations: Final Assessment. Washington (DC): National Academies Press (US); 2014 Jun 17. 2, Diagnosis, Course, and Prevalence of PTSD. Available from: https://www.ncbi.nlm.nih.gov/books/NBK224874/

Elaine Kiriakopoulos MD, et al. “Traumatic Brain Injury and Epilepsy.” Epilepsy Foundation, www.epilepsy.com/causes/structural/traumatic-brain-injury-and-epilepsy. Accessed Mar. 2025.

Fann JR, Hart T, Schomer KG. Treatment for depression after traumatic brain injury: a systematic review. J Neurotrauma. 2009 Dec;26(12):2383-402. doi: 10.1089/neu.2009.1091. PMID: 19698070; PMCID: PMC2864457.

Skipper LD, Churchill S, Wilson SH, Deru K, Labutta RJ, Hart BB. Hyperbaric oxygen for persistent post-concussive symptoms: long-term follow-up. Undersea Hyperb Med. 2016 Aug-Sept;43(5):601-613. PMID: 28768076.

“Va.Gov: Veterans Affairs.” How Common Is PTSD in Adults?, 13 Sept. 2018, www.ptsd.va.gov/understand/common/common_adults.asp#:~:text=About%205%20out%20of%20every,some%20point%20in%20their%20life.

“Va.Gov: Veterans Affairs.” How Common Is PTSD in Veterans?, 24 July 2018, www.ptsd.va.gov/understand/common/common_veterans.asp.

Weaver LK, Chhoeu A, Lindblad AS, Churchill S, Deru K, Wilson SH. Executive summary: The Brain Injury and Mechanism of Action of Hyperbaric Oxygen for Persistent Post-Concussive Symptoms after Mild Traumatic Brain Injury (mTBI) (BIMA) Study. Undersea Hyperb Med. 2016 Aug-Sept;43(5):485-489. PMID: 28768068.

Weaver, L.K., Ziemnik, R., Deru, K. et al. A double-blind randomized trial of hyperbaric oxygen for persistent symptoms after brain injury. Sci Rep 15, 6885 (2025). https://doi.org/10.1038/s41598-025-86631-6

Weaver LK, Wilson SH, Lindblad AS, Churchill S, Deru K, Price RC, Williams CS, Orrison WW, Walker JM, Meehan A, Mirow S. Hyperbaric oxygen for post-concussive symptoms in United States military service members: a randomized clinical trial. Undersea Hyperb Med. 2018 Mar-Apr;45(2):129-156. PMID: 29734566.

Weaver, Lindell. “Hyperbaric Oxygen for Symptoms Following Mild Traumatic Brain Injury.” UHMS Hyperbaric Medicine Indications Manual, 14th ed., Best Publishing, 2019, pp. 379–389.

Summary:

Good afternoon, Chairwoman Dr. Miller-Meeks, Ranking Member Brownley, and Members of the Subcommittee. Thank you for inviting me to participate in this hearing to discuss H.R. 1336, The Veterans National Traumatic Brain Injury Treatment Act.

I am Dr. Andrew Kozminski, an emergency medicine physician with a specialization in undersea & hyperbaric medicine. I am the current medical director for hyperbaric medicine at University of Iowa Health Care (UIHC) and medical director for the UIHC Wound Center.

This legislation aims to improve the health of our veterans. Establishing a pilot program for the implementation of hyperbaric oxygen (HBO) therapy for veterans with traumatic brain injury (TBI) or post-traumatic stress disorder (PTSD).

As an emergency medicine physician, I have cared for numerous veterans suffering from TBIs and PTSD. With my experience in hyperbaric medicine, I think the implementation of HBO for these ailments would be uncomplicated. Veterans already use this therapy through their VA insurance for currently approved HBO indications. Consequently, HBO has proven its safety after many decades of use by the medical community. For these reasons, this legislation has potential to help improve the lives of our friends, families, and neighbors.

I want to comment on the potential for an increased likelihood of oxygen toxicity seizures in this patient population as 1 in 50 TBI patients develop post-traumatic epilepsy. However, an oxygen toxicity seizure is a complication that trained hyperbaric medicine professionals are well-versed in how to manage and should be able to ensure continued patient safety throughout a treatment course. Clinical trials I will mention even utilize a protective pressure of 1.5 ATA, which should reduce the likelihood of this complication. However, this is an important reason to create a pilot program through the VA health system as this would provide a safe option for patients seeking treatment for what is currently an off-label indication. Without this program, desperate patients may find themselves at the mercy of popular “health spas”--businesses that might not have adequately trained staff, may use incorrect treatment profiles, and at times pose serious risk to their clients.

The research that investigators in my field have completed on the utility of HBO for TBI and PTSD shows promise for improving health outcomes in these patient populations. For chronic TBI cases, HBO has been found to improve cellular metabolism, reduce cell death and oxidative stress, and enhance mitochondrial function. These mechanisms aim to promote neuronal repair and regeneration. The Brain Injury and Mechanism of Action (BIMA) trial, published in 2016, demonstrated improved post-concussive symptoms, PTSD, cognitive processing speed, sleep quality and balance function by 13

weeks after 40, 60-minute HBO sessions at 1.5 ATA. Unfortunately, these improvements did not persist beyond the 6-month follow-up.

In February 2025, Dr. Lindell Weaver, a leader in my field, and his team published their most recent study, “A double-blind randomized trial of hyperbaric oxygen for persistent symptoms after brain injury.” This study showed similar results to what was observed in the BIMA trial for both sham and HBO groups at 13 weeks, with the HBO treatment group maintaining the neuropsychiatric benefits at 6 months. A second phase within the trial offered another 40 HBO sessions to all participants. At final follow-up, 3 months after the last of the second round of HBO treatments were given, patients who received 80 HBO treatments had greater neuropsychiatric improvement compared to their results after 40 sessions. The patients who received a maximum of 40 treatments also showed neuropsychiatric improvements compared to their baseline scores but less improvement than their counterparts who received 80 treatments.

In conclusion, I find the outcomes of these clinical trials to be promising. Establishing a pilot program for the VA to offer HBO therapy for veterans with TBIs and PTSD could help improve these patients’ quality of life, provide access to safe health care environments in which to receive these treatments, and continue to build insight on how best to construct and administer treatment courses in the future.