

The Economics of the National Brain Injury Rescue & Rehabilitation Project (NBIRR)

The National Brain Injury Rescue & Rehabilitation Project (NBIRR) is a Multicenter, Observational Study of Hyperbaric Oxygen Therapy (HBOT) at Low Pressure in Chronic Traumatic Brain Injury (TBI)/Post-Concussion Syndrome (PCS) and TBI/Post-Traumatic Stress (PTS).

NBIRR will directly impact the public health crisis facing DOD: the surge of untreated brain insults including traumatic brain injury. Federal, state and local budgets are paying for the consequences of ignoring an innovative and cost-effective therapy for those brain insults. Lost performance and aberrant behavior of injured individuals – and their support networks -- cost billions each year for their care, and additionally in entitlements, prison, education, and safety net programs, not to mention the quality of life challenges faced by current and past combat veterans.

This Executive Summary is meant to paint the economic penalties of continuing to ignore those costs. It is not meant as a scientific nor exhaustive analysis of full-spectrum costs. It is meant to draw attention to the known, as well as some of the uncounted, costs of delaying treatment.

Hyperbaric Oxygen Therapy (HBOT) is FDA-approved for many kinds of non-healing wounds and is the only FDA approved non-hormonal treatment for the repair and regeneration of human tissue. It causes a biological repair to tissue damaged by a lack of oxygen or compromised circulation and signals DNA to begin the healing process. Tricare and VA reimburse for many hyperbaric indications, including non-healing wounds, and diabetic foot wounds, but they do not routinely pay for treatment for persons who recover or make significant improvement from their brain injuries or non-healing wounds in their brain after they have been treated with HBOT.

On 12 March 2010 at the International Brain Injury Annual Meeting in Washington, D.C. scientific evidence was presented about the use of HBOT on 15 war veterans. To date 80% of those treated with this protocol have been able to return to duty, work, or school. On average they have experienced a 15 point IQ increase, a 37% decrease in post-concussion syndrome symptoms, and a 28% reduction in PTS, after the first 40 of 80 treatments. These results are dramatic and greater than those produced by any other therapy or combination of therapies currently available to physicians today. HBOT is safer and more effective than drugs used by the military and black-labeled by the FDA as causing "suicidality" in persons under 25, routinely given to military personnel and veterans seeking help for PTS at the VA.

Value of Helping a Service Member Return to Duty

According to DA PAM 385-40 (6 March 2009) "Army Accident Investigations and Reporting," saving the careers of experienced servicemen and women represents tremendous savings. For example, in the case of two airmen saved by HBOT, the initial savings were \$500,000 each; their

lost time prior to being treated was worth \$78,750 each. At a minimum, it would have cost \$155,000 each to replace them with E-1's from basic training. Therefore their loss to the service and replacing them with E-1s, was \$500,000 + \$78,750 + \$155,000 or **\$733,750 each**, or \$1.467 million for both of them. But that's just the start.

VA Disability Costs

The savings figure above does not count the follow-on VA disability payments the two airmen would have received for the rest of their lives from the Treasury. Those payments are estimated to be **\$1,283,000 each** based on published figures for an unmarried veteran for the forty years from age 25 to age 65 without cost of living adjustments. This adds \$2.566 million in costs to the \$1.467 million computed above.

Lost Tax Revenue due to Mild-Moderate Traumatic Brain Injury/PTS

Neither does it count lost tax revenue. At 100% disability, the airmen would not work. For the two airmen, the loss to the public treasury resulting from them not working is an additional **\$548,911 each** in lost tax revenue over their lifetime (counting them as high school graduates). Adding the costs up, there is a \$733,750 cost for the loss to the service and replacement with an E-1, plus a \$1.283 million cost for 100% lifetime disability and a lifetime loss in tax revenue of \$548,911. **This comes to a total of \$2.6 million each or a cost of about \$5.2 million for the pair.** All that was saved for a cost of \$20,000 each in hyperbaric oxygen therapy.

Mild TBI Results in a Loss of Lifetime Income and Loss of Tax Revenue

If these airmen had received no VA disability, and struggled to work, the government still loses a significant amount of revenue and the economy takes a real hit. Dr. Gamboa, a vocational economic analyst (Vocational Economics, Inc.) has calculated that a high school graduate who experiences a mild TBI will lose \$1,081,000 (Present Value) in life-time earnings, which translates to \$270,250 in lost tax revenue (FICA + 10% income tax) or **\$6,756 in lost tax revenue per injured enlisted member per year**. For those that have a Bachelor's degree or could have gotten a Bachelor's degree before injury, the loss of earnings from a mild TBI is \$1,873,000 over their life time. This results in an associated lifetime loss in tax revenues of about \$468,000 or about \$11,700 per year. Therefore, the estimated 600,000 war veterans that RAND corporation estimates have an untreated TBI (as reflected by symptoms of mTBI/PTS/Depression), is estimated at \$4.35 billion in lost tax revenue per year. This assumes all of them are gainfully employed at something.

Unfortunately, we know that many of this population are unemployed, and also wards of the government in one manner or another. Many of them have already entered the criminal justice system (reports are that up to 10% of county jail inmates in one state are recently returned veterans), 154,000 of them are homeless, and recent reports list as many as 184,000 unemployed.

An examination of the homeless veteran population gives us an idea of the magnitude of the problem, and how HBOT, by biologically repairing these persons, could help the Treasury.

Current programmatic costs for this community from the current stimulus package are

approximately \$3 billion on an annualized basis. The stimulus money plus \$2.4 billion in lost tax revenue is \$5.4 billion PER YEAR in revenue drain. If this group were treated with HBOT for a one-time cost of \$2.4 billion, and 80% of them were able to return to work or school, the savings would be \$4.3 billion per year in programmatic costs and increased tax revenue. Remember that most of these veterans are under 25.

Cost of HBOT 1.5 Treatments

On average, 80 HBOT 1.5 treatments (the recommended NBIRR HBOT 1.5 protocol) is about \$20,000 with all costs included. These are "retail" rates, available at clinics around the country. The Medicare rate for one hour of HBOT treatment for covered conditions is \$310 per dive; HBOT for TBI is not a covered condition but is available "off-label" and is prescribed widely in the US and around the world. Clinics participating in the NBIRR Coalition treat *pro bono* or at deep discounts, typically \$100 per dive.

Beyond just PTS and TBI

Note that according to CDC, 1.2 million people per year experience a brain injury. Most TBI's happen between the ages of 1 to 4 and 15 to 19. Of the number that live (50,000 per year die as a result of their injuries), many millions are of working age in our society. The lost annual tax revenue alone from this many people, earning under their potential, is conservatively estimated at \$8,900 each or \$99 billion per year.

Conclusion

Helping solve untreated traumatic brain injury, brain insults, and PTS will lead to huge improvements in the lives of millions. President Obama said in his radio address on 10 July that "...we have a solemn responsibility to provide our veterans and wounded warriors with the care and benefits they've earned when they come home....That is our sacred trust with all who serve – and it doesn't end when their tour of duty does....And to do right by our vets, we're working to prevent and end veteran homelessness – because in the United States of America, no one who served in our uniform should sleep on our streets....we have a solemn responsibility to provide our veterans and wounded warriors with the care and benefits they've earned when they come home." Gradually, the military will come around to actually doing what it insists it is already doing: providing ***all*** the care that is humanly possible.

The VA acknowledges that 22 service members [from all wars] a day commit suicide, ~ 8,000 a year. Another 45 a day try and fail, over 16,000 a year. 24,000 reported stories of despair a year. More active duty suicides than battlefield casualties for two years running. **[The VA acknowledged the numbers might be significantly underestimated because they're based on incomplete data from only 21 states, not including Texas or California. Even so, the data document an increase of nearly 11 percent between 2007 and 2010, the most recent year of data in the study.]**

SNAPSHOT OF SAVINGS FROM TREATING TBI and PTS WITH HBOT 1.5

[Numbers used are intentionally conservative and are for illustrative purposes. While purely scientific and medical arguments can be made for the immediate use of HBOT 1.5, they ignore the moral and social arguments that can be made. Further, calculating the cost of permanent reduction in quality of life for the wounded and at least one family member is hazardous, but should not be ignored.]

Estimated number of veterans, active duty, Guard and reserves suffering from TBI and PTS from OIF and OEF: middle number of 300-600,000 = 450,000

Cost to Society of current palliative methods

Disability costs of each of above over lifetime = \$1.25M

Lost tax revenue from each over lifetime = \$500K

Lost tax revenue from care giver for each over lifetime = \$500K

TOTAL costs per injured: \$2.25M

$\$2.25\text{M} \times 450,000 = \text{\$1.012 Trillion}$

Cost of HBOT Treatment

$\$20,000 \times 450,000 = \text{\$9 Billion}$

Bottom Line: for about 1% of the costs of **not** treating broken brains, 85% of wounded vets when treated with HBOT 1.5 and their families could get an increase in their quality of life – a priceless gift, for both the wounded and their support group.

[NOTE: Ignored in the direct costs to society, in addition to the >\$1T above, are the avoided costs associated with the social, legal and psychological support networks, prisons, medical and emergency room visits, and psychiatric and other medical and social services for families affected by the service members' disability.]

Further updated notes: Johns Hopkins Medicine, Fall 2010 writes:

- **5.3 million Americans are currently living with a TBI-related disability**
- **2.5 million will suffer a TBI incident this year**
- **500,000 of those will be hospitalized**
- **50,000 TBI victims will die from the condition**
- **80,000 TBI survivors per year (from causes including sports, combat and stroke) will develop long-term disabilities – 8 times more than the number of Americans diagnosed with breast cancer**