HeartMath Case Study
Subject: “Dan”
Title: Case Study: Improved Sleeping Schedule Using Biofeedback

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This report summarizes the results of biofeedback use for a patient complaining of insomnia, specifically his inability to initiate sleep. The insomnia is secondary to a combat-related injury in 2012. The results of biofeedback training suggest that the treatment was instrumental in helping the patient to create and maintain a healthy sleep schedule.

The patient is a 32 year old active duty male who is being treated for a combat-related gunshot wound to his arm, among other service-related conditions. He received all of his treatment at the Center for the Intrepid (CFI), an outpatient physical rehabilitation clinic for military service members who sustained complex injuries (e.g., poly-trauma, critical care, major surgery) during combat operations primarily in Iraq or Afghanistan. However, the patient is also being treated for insomnia and obstructive sleep apnea (OSA), as well as chronic post-traumatic stress disorder (PTSD) which is reported to be the cause of the patient’s frequent nightmares. His chief complaint regarding his current sleep pattern is the inability to initiate sleep and maintain sleep.

At our first visit, the patient reported that he felt “pretty good” due to all the caffeinated drinks he had that morning despite appearing fidgety with his movements. He also reported poor sleep the night before. Dan was asked if he had any experience with the EmWave. He admitted to having used it before and knew he had to get to the “green zone” and try to stay there. However, he also admitted a limited understanding of what the device was measuring and how it could help him. After a detailed description of the EmWave and to use it, the patient completed a ten minute session. From this, he obtained a better understanding of HRV and how one’s emotional state can greatly impact overall physical performance. For the first three minutes (0-3 minutes), he utilized the EmWave’s ear piece attachment. He was told to remain in his current state. He had no visual feedback indicator beyond the EmWave display (patient could not see the computer screen).

At the three minute mark, the “Six Breaths Measurement” (3-5 minutes) was introduced and he was asked to coordinate his breathing with the indicator light on the EmWave display. At the five minute mark, we introduced the “Quick Coherence Technique” (5-10 minutes). The patient was asked to familiarize and relive a positive emotion that was personal to him and to focus on that feeling during the next five minutes while coordinating his breathing pattern.

At ten minutes, the session ended and we reviewed his HRV chart. The average coherence levels for the patient after the initial three-minute observation period was 82% low coherence, 12% medium coherence, and 6% high coherence with a resting HR of 72 bpm. After ten minutes and once the "Six Breaths Measurement" and "Quick Coherence Technique" were introduced, he achieved 34% low coherence, 8% medium coherence, and 58% high coherence with a HR of 76 bpm. The patient was significantly impressed by the results as conveyed to him via his graph and with how the intervention drastically improved his level of relaxation. Following a line of questioning about how using the EmWave could assist him with his sleep and stress, he responded by stating, "I think this could help me to fall asleep easier." He then went on to discuss his current sleep problems which consisted of troubles initiating sleep between 9:00pm and 10:00pm, maintaining sleep between 2:00am and 3:00am and not being able to go back to sleep. He also reported sleep apnea symptoms (diagnosed with Obstructive Sleep Apnea (OSA) in January 2013) as well as nightmares which often prevent him from falling back to sleep. At this point, he stated that focusing on healthy breathing rhythm combined with tuning out negative feelings would be beneficial for sleep.

The patient's personal goal for managing his stress was to "free his mind and body" of stressors with a special emphasis on improving the quality and duration of his sleep. The emotions and behaviors that typically get in the way of this goal are anxiety and anger issues. When introducing the "Depletion to Renewal Plan" to the patient, he reported that he was initially in the upper left quadrant due to his frustration and anger levels. He indicated that he hoped to eventually get to the lower right quadrant, which would result in higher levels of appreciation and contentment. The patient believes that going into "his world", or his "happy place", is the key to helping him achieve this goal.

The historic patient demographic at our clinic is male, active duty servicemen who have sustained high energy extremity trauma. Secondary conditions often include PTSD, traumatic brain injury (TBI), chronic pain, stress, anxiety, and unhealthy sleep patterns. Many patients become stationed at our location and have a new "occupation" to simply heal. That is, patients' daily routines are full of medical appointments, service-related meetings and other command-driven events. The luxury of returning home to a quiet, relaxing environment is rare. The rationale behind choosing both the "Six Breath's Measurement" and the "Quick Coherence Technique" was to simplify the process for the patient under the assumption that these techniques are easier to practice compared with other techniques, from my experience patients tend to show a more immediate response to the intervention. My goal was to create small successive behaviors and then build on those behaviors as a means of increasing his confidence and provide instant, positive feedback. Instant, positive feedback aids patients in identifying the problem (a stressful state) or, at the very least, a need to attend to their current stressful situation. Based off the initial ten-minute session, a distinct change in his graph pattern was seen at both 3-4 minutes and 5-7 minutes once the two interventions were introduced. The effectiveness of these two

HMIs seen in his initial visit will hopefully spearhead group sessions with specific groups of patients, such as those with similar injuries undergoing the same routine treatment, and be used for pre and post workout HRV assessment.

The patient was given a very basic homework assignment. He has been using the EmWave while reading bedtime stories to his children. Based on the first 5-10 sessions with the EmWave device, he noticed that he was able to reach coherence quicker and stay in the zone longer while at home versus when he performed a session in the clinic. Additionally, his average time spent in a high coherence state increased each time he completed a session at bedtime. He also said that he was able to fall asleep quicker after actively focusing on being in a green (high) coherence zone. His homework was to simply continue using the EmWave daily during his children's bedtime for a minimum of 20 minutes per session. The ultimate goal is to condition his mind and body to build on his current success and for him to comfortably reach coherence around the same time each night and get into the zone following stressful life situations. One of our intermediate goals was to use the moments with his children as an emotional indicator to reach coherence.

The methods for data collection include the "Psychophysiological Observation" worksheet for basic patient information, "HRV Observations" worksheet to identify the patient's HRV baseline, the "Depletion to Renewal" chart, and a modified tracking sheet for all of the patient's EmWave sessions, both in the clinic and at home. This modified tracking form records date, challenge level, HR at the beginning and end of each session, start and end time (duration), average coherence and overall achievement for each session. Clinical documentation was also recorded for each in-clinic session in the form of a SOAP note to track patient's progress with biofeedback use. This clinical documentation also records the patient's feedback regarding use of the EmWave system.

Daniel has reported multiple times that he enjoys using the EmWave at home. He says that it forces his mind to "zone in" which, in turn, allows him to fall asleep. It is likely that his nightly training sessions are accompanied by his sleep medication, however, he says that prior to using the EmWave he would have more trouble maintaining sleep in the event that he woke up throughout the night. Daniel also reported that he has been sleeping longer and waking up fewer times at night. It was observed during his in-clinic sessions that he closed his eyes during each session. He agreed that he did this at home too. He also said that he was more comfortable and stayed in a high coherence zone longer when he had the audible alert turned on because it gave him constant audible feedback that he was "still there". The patient was asked for a couple of examples as to how the EmWave training sessions have impacted his overall lifestyle. He explained that he has noticed a difference with his anger by saying he doesn't get angry as fast when frustrated by his kids and that when he is driving, he is able to process any "road rage" situation and is able to focus on his breathing instead of allowing himself to get angry. Other

observations that the patient presented were that he has a clearer mind, a better overall daily attitude , and is more open with others.

Using the HeartMath skills and protocols has great potential in identifying and treating stress that we may not have already identified in the patient population we serve. There are numerous areas where using tools such as the EmWave will allow us to connect with our patients immediately and show them how we can work with them to improve their overall physical performance as they rehabilitate. The HeartMath system, as a whole, is set up to be very provider-friendly. However, the EmWave device also enables the patient to be more independent by allowing them to perform coherence sessions when it is convenient for them. The software is user-friendly and allows for easy downloading and storage of recorded sessions. The coherence techniques are easy to learn and easy to use. The patient in this particular case study has already requested to continue his coherence training after submission of this report. It is of no question that his progress will set a path for other injured servicemen and women undergoing similar treatment(s) here at the CFI.