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The Effect of Post Traumatic Stress Disorders on Rehabilitation Among Combat-Wounded Veterans

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Abstract. In June 2008 the Congressionally Directed Medical Research Program provided a grant to the Research Foundation at the James A Haley Veterans Hospital in Tampa, Florida to provide care for wounded veterans from Operation Enduring Freedom (Afghanistan) and Operation Iraqi Freedom (OEF/OIF). The telerehabilitation for OEF/OIF returnees with mild or moderate combat related Traumatic Brain Injury (TBI) has as its objectives 1) care coordination for wounded veterans using distance technology via the internet and 2) monitoring of physical and mental health outcomes using a variety of instruments. A total of 75 veterans were enrolled in the study. Our initial findings indicate that 1) Functional capabilities measured by locomotion and mobility appear to have stabilized among our cohort of veterans while deficiencies in cognition (memory, problem solving), psychosocial adjustment (anger, emotional status) and problems in integrating into society pose challenges 2) Those with comorbid PTSD appear to linger in employability and ultimate integration into society as compared to those without the diagnosis 3) Individualized treatment pathways are needed for rehabilitation and ultimate integration into society.

Keywords. Combat, traumatic brain injury, post traumatic stress disorders, rehabilitation

Introduction

As of April 2012, over 6,000 U.S. military personnel have died and more than 35,000 have been wounded in combat in Operations Enduring Freedom and Iraqi Freedom [1] (OEF/OIF). Traumatic Brain Injury (TBI) and Post Traumatic Stress Disorders (PTSD) related to combat and accidents in combat theatres can cause life-long impairments in physical, cognitive, behavioural and social function that are usually more disabling concerning activities of daily living than the residual physical deficits [2]. Over 2.2 million U.S. troops have deployed in Iraq and Afghanistan [3]. Explosions and associated blast injuries are the most common cause of combat trauma and frequently

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result in polytrauma characterized by lung, bowel and inner ear injuries, traumatic limb or partial limb amputation, soft tissue trauma from fragments and other missiles, and brain injuries [4, 5, 6, 7]. Secondary complications include orthopaedic extremity amputations, post-traumatic stress disorders and chronic pain. In World War II, one in three wounded soldiers died; in the present Iraqi war the rate is one in eight.

Every war has its distinctive characteristics in injury patterns. In the current OIF war, only 16% of injuries have been caused by gunshots whereas close to seven of ten injuries are from explosions caused by roadside booby traps, car bombs and rocket propelled grenades.

Regaining insight into the changes caused by polytrauma is often accompanied by an increase in depressive symptoms. Increased suicidal ideation has also been reported to occur for many years after initial trauma. Of those with battle injuries severe enough to require evacuation from theatre to a military hospital in OEF/OIF, 71% had traumatic brain injuries, with approximately half being classified as mild TBI and the rest, moderate to severe [8]. Recovery can continue many years after initial trauma. Little is known about optimal methodologies to treat the vast and complicated secondary manifestations of combat related polytrauma. Wounded warriors who are discharged from the US armed forces are eligible to seek medical treatment at Veterans Administration (VA) health care facilities in the United States. A shortage of rehabilitation resources to meet the demands of all wounded veterans remains a critical challenge. Telerehabilitation using the internet may represent a viable means for the delivery of care coordination and therapeutic services to veterans with TBI who require continued care.

The Telerehabilitation Intervention at the Veterans Hospital in Tampa, Florida.

In June 2008, the US Department of Defence Congressionally Directed Medical Research Program awarded the James A Haley Veterans Research and Education Foundation in Tampa, Florida (Tampa VA) funding to provide care coordination and monitor veterans discharged from the Level 1 Polytrauma/Blast Related Centre at the Tampa VA with a diagnosis of mild and moderate TBI incurred in combat theatres. The Veterans Administration has investigated many telehealth programs for veterans [9, 10, 11, 12, 13, and 14]. However, many of them pertain to telehealth applications for chronic conditions such as dementia or management of diseases such as diabetes, asthma, depression [15] and hypertension. The only telehealth programs addressing war-related injury are few in number, such as the Telemedicine Treatment for Veterans with Gulf War Illness [16] and Telemedicine and Anger Management Groups for PTSD Veterans in the Hawaiian Islands [17]. Our telerehabilitation intervention is one of the first in the VA to provide rehabilitation at a distance to combat wounded veterans.

1. Objectives and Interventions

The primary objectives of this 36 month observational study are to 1) provide medical care coordination to meet the needs of OIF/OEF veterans with combat injuries and 2) monitor patient health outcomes in the areas of function, cognition and community participation. Coordinating medical care at a distance and thereby improving quality of care while reducing their utilization of the VA health system is an important goal of this telerehabilitation intervention.

1.1. Care Coordination

The enrolees are provided laptop computers to communicate, via the internet, on a secured VA server with the care coordinator who also meets them at their scheduled outpatient visits at the VA hospital in Tampa. Veterans are required to update the care coordinator on medication regimen and adverse effects of the same and any new developments of physical and mental health conditions, The Advanced Registered Nurse Practitioner (ARNP) helps in a variety of care coordination efforts including scheduling appointments with specialists, facilitating inpatient admissions, medication management and compliance under the guidance of a physician, counselling, education and monitoring health outcomes. The ARNP also arranges urgent care and counselling to patients with suicidal tendencies.

1.2. Drug Therapy

Drugs are frequently used in the management of common complications of polytrauma such as TBI, particularly for mood disorders such as depression, anxiety and pain management. The ARNP evaluates, periodically, the adequacy of drug therapy to treat symptoms. In consultation with physicians, the care coordinator may change the dosage and frequency as well as change medications to overcome side effects and provide optimal pharmacological management including drug tapering interventions to prevent addiction.

1.3. Behaviour Modification

One of the manifestations of polytrauma is uncontrolled and damaging behaviour. The veteran may be asked to start a digital diary to document the frequency and type of temper episodes and what triggers the episodes. Strategies to avoid triggers may be recommended and complex tasks that act as triggers may be simplified to avoid frustration (e.g., with the use of aids and lists). Such strategies have been successfully tried at the Tampa VA with returning veterans for anger management. A consultation with a psychologist may be initiated.

2. Research Questions

The research questions we attempt to answer are:

- What are the observed changes, over 18 months, in the domains of function, cognition and integration into society for the cohort of veterans observed?
- What is the effect of PTSD on rehabilitation trajectories among wounded veterans?

3. Study Design

This study, started in June 2008, utilizes an observational design to evaluate telerehabilitation care provided to a convenient sample of 75 OIF/OEF veterans

discharged from the Tampa VA with a diagnosis of mild or moderate TBI incurred in combat theatres in Iraq and Afghanistan.

Health status, over time, are monitored in multiple ways including the VA Computerized Patient Record System (CPRS) and validated survey instruments such as the Functional Impairment Measure™ (FIM), the Functional Assessment Measure (FAM) and the Patient Competency Rating (PCR). We chose the above instruments because they are validated and have been utilized extensively in VA for determining the physical and emotional wellbeing of patients. Data is collected at baseline and in six month intervals thereafter for a minimum period of eighteen months after enrolment. Due to the rolling nature of enrolment, surveys were completed by veterans at different times. Patient satisfaction surveys are conducted a year after enrolment in the study. Health outcomes are self-reported and veterans are required to access a secure website and input health data.

3.1. Inclusion Criterion

Veterans who meet the inclusionary criterion of a clinical diagnosis of combat incurred mild or moderate TBI in Iraq and Afghanistan and who utilize the Tampa VA as their primary source of health care are eligible to be consented for participation. The diagnostic code used to identify veterans for sequelae of traumatic brain injury was the International Classification of Diseases (ICD-9-CM):907.0—late effect of intracranial injury without mention of skull fracture. Other factors for diagnosing mild TBI among veterans include: loss of consciousness, if any, lasting for less than 30 minutes, memory loss after the traumatic event, called post-traumatic amnesia that lasts for less than 24 hours, and a Glasgow Coma Score of 13 – 15. This score measures a person's eye-opening abilities, verbal responses and motor responses. Patients who met the inclusionary criterion were identified using the VA Computerized Patient Recording System. Our cohort consisted of a few veterans whose injury were from vehicle accidents in combat theatres resulting in concussion and associated TBI.

3.2. Recruitment

Recruitment of veterans was conducted mainly at the Polytrauma/Blast Related Centre at the Tampa VA. No social marketing such as posters or flyers were used for recruiting purposes. When veterans presented themselves for their outpatient appointments at the Centre, the care coordinator would evaluate them on eligibility and explain the telerehabilitation study. The option to enrol is limited to those who, in the opinion of care providers in the Polytrauma Clinic at the Tampa VA will possibly benefit from the program. We did not enrol those with full-time employment as this was indicative of integration into society and enrolment could not possibly benefit the veteran. Participants must reside within a two hour drive from the Tampa VA and use the facility for their primary and specialist care and be willing to accept computer technology in their homes to enable care coordination.

Veterans and/or care givers must also possess basic computer literacy such as being able to access a web page and making entries in survey instruments posted on a secured website. They must agree to participate in the care coordination and the completion survey instruments in a timely manner. Failure to comply, repeatedly, would result in the veteran being dropped from the study. We excluded from our

intervention those who have a diagnosis of psychosis and the severely injured who are institutionalized.

4. Results

4.1. Sample Characteristics

A total of 75 veterans with a primary diagnosis of mild/moderate TBI were enrolled in the study. Health outcomes data, at baseline, was collected on 65 veterans with 52 of the patients with a comorbid condition of PTSD as well. The enrolment rates varied with approximately five veterans being consented monthly. The mean age of the cohort was 32 years (SD 8.4). The majority were married (39/75) and classified themselves as white (60). Two of the veterans were female. Female veterans cannot be enlisted in combat units but they do sustain injuries due to accidents and indirect fire. Twenty-eight veterans had a significant percentage of disability connected to service (60% - 100%) while 15 others had less severe combat-related injuries (30-59% disability). The majority (51) listed household incomes of less than $30K.

Though a total of 75 veterans were consented, not all enrolees completed all surveys for 18 months. A number of veterans had to be disenrolled from the study because 1) they moved away from the area resulting in care coordination not being made available—a requirement for participation, 2) a small number of veterans chose not to actively participate in telerehabilitation as required, 3) one veteran died of a drug overdose though we could not ascertain whether it was intentional.

4.2. Health Status of enrolled veterans

Though the mechanism of injury is not always identified in their medical charts in the VA, conversations with wounded warriors have revealed that the majority suffer from the effects of blast-related injuries due to direct or indirect fire. Many of the wounded suffer from other adverse side effects of TBI. Post Traumatic Stress Disorders (ICD-9-CM:309.81) is the emotional disorder most frequently associated with combat and other potentially traumatic experiences that may occur during the course of military service (e.g., sexual assault, motor vehicle injury). PTSD is often chronic and is associated with significant adverse consequences, including high rates of depression and other psychiatric comorbidities; substance abuse; suicidal tendencies; impaired social, occupational, and family functioning; decreased quality of life; and increased rates of medical morbidity, health risk behaviours, and health service use [18, 19]. Post Traumatic Stress Disorder after terrorist attacks in the form of bomb explosions can range from 27% to 82%. Among our cohort of 75 veterans, 61 (81%) percent had a comorbid diagnosis of PTSD as well at enrolment. The relationship between PTSD and explosions is also verified by a study showing that 68% of veterans diagnosed with PTSD currently enrolled in PTSD and/or substance abuse treatment identified as having a history of blast exposure [20].

Our findings compare favourably with other studies that have investigated organ damage due to combat exposure [21]. Those with PTSD are more likely to have incurred wounds in combat as evidenced by a higher rate of service connected disability.

In abstracting the medical records of over 400,000 Iraq and Afghanistan returnees, PTSD (ICD-9-CM: 309.81) was cited as the most common diagnosis (23%) followed by Depressive (311) and Neurotic disorders (300), Psychoses (296) and Alcohol Dependence (303). The above survey is for all veterans deployed in combat theatres including those without combat injuries. We abstracted from the VA Computerized Patient Record System the secondary diagnosis associated with TBI for our cohort of veterans. Headaches (27/75), unspecified mental disorders (36), anxiety disorders (55), mood disorders (31) and substance abuse (15) constituted the majority of complications. Complications cited compare favourably with national surveys [22].

4.3. Baseline Surveys

Health surveys were conducted to: 1) to establish rehabilitation trajectories over time in the areas of function, cognition, psychosocial adjustment and integration into society and 2) to individualize care coordination to veterans needs to maximize the effect of telerehabilitation. Unlike traditional telemedicine that deals with disease specific monitoring or intervention (diabetes, CHF, dementia etc.), our cohort exhibits a very diverse population in terms of disease affliction, complexity and propensity to receive care. Listed below are findings from baseline health status measures from the FIM + FAM and the Patient Competency Rating scale. They concisely describe the cohort followed and are similar in findings to other instruments used to measure outcomes.

4.4. Rehabilitation trajectories and health outcomes

Functional Independence Measure™ (FIM) and Functional Assessment Measure FAM)

The (FIM™) [23] is a widely accepted functional assessment measure in use in the rehabilitation community. The FIM measures independent performance in motor and cognitive skills in addition to the Activities of Daily Livings pertaining to the self-care categories of feeding, grooming, bathing, dressing upper body, dressing lower body and toileting. Because disturbances in communication, cognition, and behaviour are prominent characteristics after brain injury, additional items considering those issues were added to the FIM, resulting in a functional assessment measure, FIM+FAM.[3] The main domains of the FIM + FAM instrument are in Self Care, Sphincter Control, Mobility, Locomotion, Communication, Psychosocial Adjustment and Cognition. A total of 30 items comprise the FIM + FAM instrument. The range of scoring for each item in each domain is 1-7. A response of 1 denotes a state where total assistance is required (able to complete less than 25% of task) with 7 implying complete independence. The FIM+FAM has been increasingly adopted as an outcome measure in brain injury rehabilitation [4, 5].

Findings

A total of 52 veterans with a diagnosis of TBI/PTSD and 13 others with standalone TBI completed the FIM + FAM survey instrument at baseline. At 18 months only 34 veterans with dual diagnosis and ten others with a single diagnosis of TBI self-reported their health status. In composite scores indicating change over time, those with PTSD showed a slight worsening of symptoms.

Table 1 provides for some items on the FIM + FAM survey instrument that were comparable at baseline between the two groups but were significantly different at 18 months. Whereas, there was no difference between the two groups at baseline in walking abilities (mean score of 6.56 vs. 6.60), at 18 months those with PTSD were less likely to report the same ($p<0.05$). Another item in the domain of Locomotion, ability to physical access the community, also showed wide disparity between baseline and at 18 months. In the domain of Communication, verbal and non-verbal expression among the two groups displayed disparate rehabilitation trajectories. Employability is a concern among those with PTSD while cognition items such as problem solving and orientation were some of the other items in which those with PTSD fared poorly. In the many emails exchanged between veterans and the care coordinator, those with PTSD repeatedly expressed their frustration at their inability to hold steady employment. Factors that may contribute to this may include depression, agitated behaviours, anger management issues and substance abuse. Emotional outbursts appear to be are fairly frequent among this population.

Table 1: Observed Changes in Functional Assessment and Independence.

	Baseline		**18 months**	
	PTSD (n=52)	**No PTSD (n=13)**	**PTSD (n=34)**	**No PTSD (n=10)**
Variable	**Mean**	**Mean**	**Mean**	**Mean**
1. Walking	6.56	6.60	6.29	6.90 **
2. Community access	5.90	6.38	5.62	6.80 **
4. Adjustment to limitations	5.24	5.33	5.06	6.00 **
5. Employability	4.41	5.31	4.09	5.60 **
6. Problem solving	5.14	5.08	5.06	6.00 **
7. Orientation	5.37	5.38	5.06	6.20 **
Mean	**5.65**	**5.86**	**5.14**	**6.24**

* ($p<0.1$)

** ($p<0.05$)

Figure 1 denotes changes over time in the areas of physical functioning, cognition and other domains as measured by FIM + FAM for veterans enrolled in the telerehabilitation intervention. They represent composite scores for each of the domains of Self Care, Sphincter Control, Mobility items, Locomotion, Communication items, Psychological Adjustments and Cognitive Function. The two graphs represent stratification by comorbidities: a clinical diagnosis of TBI only (n=51 at baseline) and TBI with comorbid PTSD (n=14 at baseline).

As compared to veterans with stand-alone TBI, those with a dual diagnosis of TBI/PTSD indicate greater fluctuation in physical and mental health outcomes over time. The differing trajectories emphasize the mood swings, depression, anger and

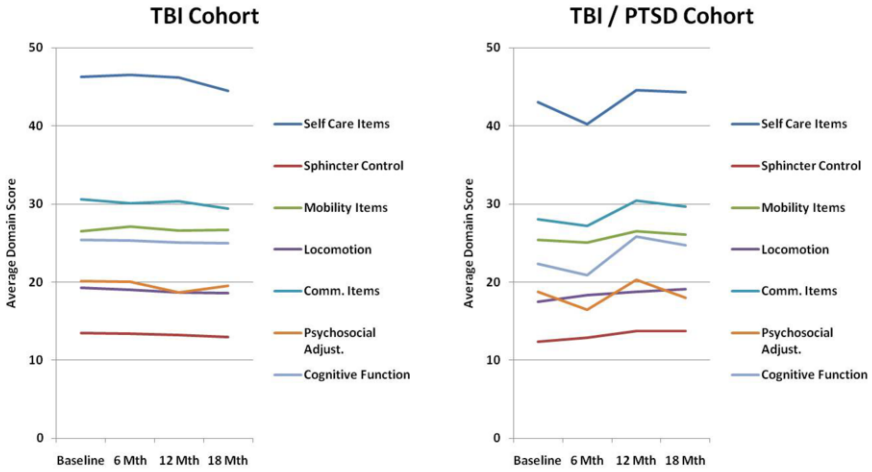

Figure 1: Health outcomes as measured by the Functional Independence Measure and the Functional Assessment Measure.

problems with psychosocial adjustment that characterizes the population with comorbid PTSD. Problems with law and order issues and substance abuse are also more prevalent with this group with one veteran enrolled in our study incarcerated on an assault charge and another dying of a drug overdose.

Patient Competency Rating Scale (PCRS)

The primary purpose of the PCRS is to evaluate self-awareness (the ability to appraise one's current strengths and weaknesses) following traumatic brain injury. The PCRS is a 30-item self-report instrument which asks the subject to use a 5-point Likert scale to rate his or her degree of difficulty in a variety of tasks and functions. The PCRS provides for a rating with responses on a 1-5 scale with 1 denoting the most difficulty in addressing a problem and a score of 5 implying ability to handle the problem with total ease. The range of most responses is 1-5 though the means tend towards the higher numbers. This is due to the binary nature of our cohort where the majority of individuals display good health and a small minority are of poor health status. There are thirty items comprising various items in the PRC instrument and include categories such as everyday activities including financial planning. Some items on the PRC are similar to those in the FIM + FAM. However, the PCRS also captures elements of social integration and employment that are not contained in the FIM + FAM.

Findings

In Table 2 are outlined statistical differences at 18 months between the two groups for selected patient competency scores. Findings are similar to those of FIM/FAM with psychosocial adjustment (problem controlling temper, keeping from being depressed, accepting criticism, participating in groups) and cognition (remembering) posing challenges to those with a dual diagnosis of TBI/PTSD.

Table 2: Changes in the Patient Competency Rating Instrument.

	Baseline		**18 months**	
	PTSD (n=52)	**No PTSD (n=13)**	**PTSD (n=34)**	**No PTSD (n=10)**
Variable	**Mean**	**Mean**	**Mean**	**Mean**
1. Dressing myself	3.98	4.50 **	4.00	4.50 *
2. Remembering daily schedule	2.50	2.93 **	2.67	3.00
3. Adjusting to unexpected events	2.63	3.07 *	2.67	3.00
4. Accepting criticism from others	2.69	3.14	2.67	3.60 **
5. Showing affection to others	2.46	3.14 **	2.48	3.40 **
6.. Participating in groups	2.71	2.79	2.73	3.40 **
7. Controlling temper	2.27	2.64	2.33	3.30 **
8. Keeping from being depressed	2.38	3.07 **	2.33	3.40 **
9. Keeping emotions from affecting abilities.	2.65	3.29 **	2.70	3.60 **
Mean	**2.66**	**3.13**	**2.71**	**3.35**

* ($p<0.1$)

** ($p<0.05$)

5. Study Limitations

A lack of a control group dilutes the findings of our study. Health outcomes are self-reported by veterans though the usual protocol is for health care workers to assess function and record the same on survey instruments such as the FIM. A considerable time, in the order of weeks and months elapses before veterans are treated for combat injuries. Our study does not adjust for the time between occurrence of injury in the battlefield and enrolment in our study which may vary greatly between individual veterans.

The Functional Independence Measure is not TBI specific. It has limitations in sensitivity to component abilities within tasks for people with TBI. There is a ceiling effect with the socio-cognitive subscale for individuals and it does not measure the social, psychological or vocational impact of disability experienced by those living with TBI. The primary purpose of the PCRS is to evaluate self-awareness (the ability to appraise one's current strengths and weaknesses) following traumatic brain injury. The subject's responses are compared to those of a significant other (a relative or therapist) who rates the subject on the identical items. Impaired self-awareness may be inferred from discrepancies between the two ratings, such that the subject overestimates his/ her abilities compared to the other informant. However, in our study, for convenience, we used the PCRS as a tool to compare rehabilitation pathways among those with and without PTSD.

6. Conclusions

With injuries resulting from past wars, physical and mental complications, acute or chronic from blasts were addressed as separate manifestations. The changing nature of warfare and battlefield medicine presents challenges for the VA care delivery system. As a result of new mechanisms of injury (e.g., improvised explosive devices), improvements in body armour and surgical stabilization at the front-line of combat, more war-wounded are returning with complex, multiple injuries in unpredictable patterns. Mortality was the concern in the first two World Wars. Now, death is less frequent than disability. This seems to reflect a defining change in war, medicine and politics. This trend will continue given both medical science and the effectiveness of insurgent warfare tactics against United States soldiers. Therefore, this research has long term benefits because the US is likely to continue to use troops as peace keepers around the globe.

References

[1] U.S. casualty status. Washington, D.C.: Department of Defence, 2006. (Accessed May 30, 2012, at http://www.defenselink.mil/news/casualty.pdf)
[2] Khan F, Baguley I and Cameron I. Rehabilitation after traumatic brain injury. *Medical J Australia;* 2003, 178(6):290-5.
[3] Hosek JR, United States, Department. Of Defence. Office of the Secretary of Defence., National Defence Research Institute (U.S.). How is deployment to Iraq and Afghanistan affecting U.S. service members and their families? An overview of early RAND research on the topic. Santa Monica, CA: RAND Corporation; 2011.
[4] Belanger HG, Scott SG, Scholten J, Curtiss G and Vanderploeg RD. Utility of mechanism-of-injury-based assessment and treatment: Blast Injury Program case illustration. *J of Rehabilitation Research and Development*, 2005, 42, 403-412.
[5] DePalma RG, Burris DG, Champion HR, Hodgson MJ. Blast Injuries. *New England J Medicine* 2005; 352(13):1335-1342.
[6] Scott SG, Vanderploeg RD, Belanger HG, Scholten JD. Blast Injuries: Evaluating and Treating the Post-acute Sequelae. Federal Practitioner, Jan 2005, 67-75.
[7] Sorkin P, Nimrod A, Biderman P, et al. The quinary (Vth) injury pattern of blast [abstract]. *J Trauma* 2004; 56:232.
[8] Defence and Veterans Brain Injury Centre data, Warden, personal communication, April, 2005
[9] Wakefield BJ, Holman JE, Ray A, Morse J, Kienzle MG. Nurse and patient communication via low- and high-bandwidth home telecare systems. *J Telemedicine & Telecare.* 2004; 10(3): 156-159.
[10] Hopp F, Woodbridge P, Subramanian U, Copeland L, Smith D. Home telehealth's role in diabetes case management. *J Telemedicine & E-Health.* 2005; 11: 220.
[11] Kochevar LK, Yano EM. Understanding health care organization needs and context. Beyond performance gaps. *J General Internal Medicine*. 2006; 21 Supplement 2: S25-S29.
[12] Cluver JS, Schuyler D, Frueh BC, Brescia F, Arana GW. Remote psychotherapy for terminally ill cancer patients. *J Telemedicine & Telecare*. 2005; 11(3): 157-159
[13] Mittal D, Fortney JC, Pyne JM, Edlund MJ, Wetherell JL. Impact of comorbid anxiety disorders on health-related quality of life among patients with major depressive disorder. *Psychiatric Services*. 2006; 57(12): 1731-7.
[14] Wakefield BJ, Holman JE, Ray A, Morse J, Kienzle MG. Nurse and patient communication via low- and high-bandwidth home telecare systems. *J Telemedicine & Telecare*. 2004; 10(3): 156-159.
[15] Dobscha SK, Corson K, Pruitt S, Crutchfield M, Gerrity MS. Measuring depression and pain with home health monitors. *Telemedicine J & E-Health.* 2006; 12(6): 702-6.
[16] Veterans Administration Health Services Research & Development Study: GWI 04-355
[17] Veterans Health Services Research & Development (Grant: TEL 03-080) Telemedicine and Anger Management Groups for PTSD Veterans in the Hawaiian Island

[18] Hoge CW, Terhakopian A, Castro CA, et al. Association of posttraumatic stress disorder with somatic symptoms, health care visits, and absenteeism among Iraq war veterans. *Am J Psychiatry*. 2007; 164(1):150-3.
[19] Jakupcak M, Cook J, Imel Z, et al. Posttraumatic stress disorder as a risk factor for suicidal ideation in Iraq and Afghanistan War veterans. *J Trauma Stress*. 2009; 22(4):303-6.
[20] Trudeau DL, Anderson J, Hansen LM, Shagalov DN, Schmoller J, Nugent S, Barton S (1998). Findings of mild traumatic brain injury in combat veterans with PTSD and a history of blast concussion. *J Neuropsychiatry and Clinical Neurosciences*, 10, 308-313.
[21] Owens BD, Kragh JF Jr, Wenke JC, Macaitis J, Wade CE, Holcomb JB. Combat wounds in operation Iraqi Freedom and operation Enduring Freedom. *Trauma.* 2008 Feb;64(2):295-9.
[22] Analysis of VA Health Care Utilization among Operation Enduring Freedom (OEF), Operation Iraqi Freedom (OIF), and Operation New Dawn (OND) Veterans, Office of Public Health, Veterans Health Administration Department of Veterans Affairs, June 2012.
[23] Wright J. The FIM(TM). *The Centre for Outcome Measurement in Brain Injury.* http://www.tbims.org/combi/FIM.