

Rehabilitation of Neuro-musculoskeletal Injuries within and Intensive Outpatient mTBI and Pain Rehabilitation Program: Outcome Success for Special Operators

Jeff Frankart¹, PT, MAJ, USAR, SP, Kendra L. Jorgensen-Wagers, Ph.D², Samantha Parker, BS³
 US Army Health Clinic^{1,3}, Landstuhl Regional Medical Center; Defense Veterans Brain Injury Center, Landstuhl Regional Medical Center²

BACKGROUND AND SIGNIFICANCE

The Movement Recovery Program (MRP) system is a time and ability based **biopsychosocial** treatment system. It consists of twelve 90 minute ADVANCED restorative group PT, Yoga, and Cognitive Restructuring sessions. The MRP uses a functional diagnostic and symptom based Neuroplastic-Graded Proprioceptive Stimulation (N-GPS) approach to reduce chronic pain related kinesiophobia, desensitize the CNS, and improve the physical fitness, readiness, and retention standards expected of our Soldiers, Airmen, Sailors, and Marines. Complex neuro-musculoskeletal injuries dramatically decrease military force readiness. Recent research suggests that the polytrauma clinical triad of chronic pain, PTSD, and concussion is highly prevalent among OIF/OEF veterans and that each of these problems rarely occurs by itself, but the three conditions most often occur in combination with one another.¹ Animal models of pain rehabilitation have shown how vital movement is to sustained central nervous system stimulation and sustained recovery.² Our biopsychosocial rehabilitation incorporates a movement platform to address combat medical readiness concerns. These concerns are especially relevant for the highly mobile, advanced tactical forces of our elite military Special Operations Forces. Special Operations soldiers often experience a plethora of potential mechanisms of injury for neuro-musculoskeletal injury, traumatic brain injury and pain. Treating this injury trifecta timely and ensuring stability of rehabilitation and recovery requires a complex interdisciplinary treatment process that is responsive and proactive to therapeutic redress.^{2,3,4,5} Landstuhl Regional Medical Center's Traumatic Brain Injury Program together with the Intensive Pain Management Program has developed a comprehensive treatment program specifically to target the complex rehabilitation needs of these warfighters. Using CDC TBI Outcome measures that are responsive to the unique and comprehensive rehabilitation needs of these SOF soldiers, significant improvement in patient symptom sequelae was observed. This paper presents preliminary findings from two Special Forces Cohort Groups who received neuro-musculoskeletal rehabilitation and offers suggestions for coordinated care.

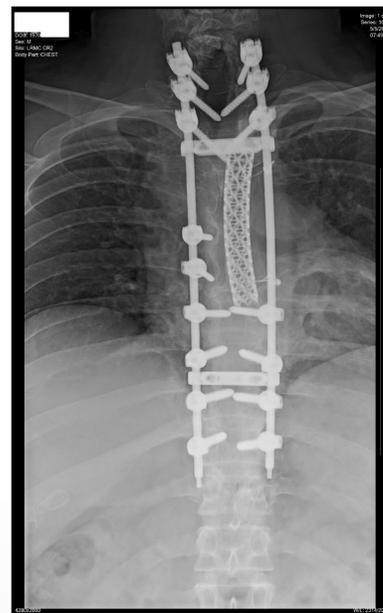
METHODS AND RESULTS

The intensive treatment program group consists of (n= 14) SOF service members with comorbid diagnoses of musculoskeletal pain and TBI who received six weeks of intensive outpatient TBI rehabilitation. The intensive outpatient treatment program consists of an consolidated treatment condition of enriched psycho-educational groups on topics of sleep, cognitive rehabilitation and memory skills and enhanced PT and OT performance task loading. Also included in the condensed group was concurrent participation in a Pain Management Functional Recovery Program. The intensive program was compared to treatment as usual patients consisting of (n=15) SOF participants who received standard Pain/TBI treatment over a prolonged period of time. Metrics used to evaluate their improvement included the NSI, WHO-QOL, TMT, PGIC, WAIS, Epworth, NeuroCom SOT, HIT-6, PCL-5, AUDIT and several additional functional performance metrics. The physical function of the Service member was tested using a FUNCTIONAL MILITARY EXERCISE (FME): (7-1 PYRAMID TEST = The improvement in number of repetitions of push-ups, prone rows, supine rows, squats, dips, burpees completed in a 20 min test cycle). Results indicate:

1. Address fear avoidance beliefs^{6,7}
2. Focus on functional improvement not diagnosis as a health fitness/injury prevention/ health maintenance model.
3. Concussion recovery is highly individual but can be greatly facilitated in a focused group treatment model emphasizing ability restoration and reducing fear of pain as a limiting factor.
4. Pain/ mTBI care emphasizing cognitive restructuring and neuroplasticity gets improved stronger sustainable results quicker.
5. Functional outcomes after multidisciplinary, integrated approaches improve overall function^{8,9} Civilian restoration programs show improvements in clinical outcome measures, return to work, reduced medication use, utilization of healthcare system and closure of disability cases.

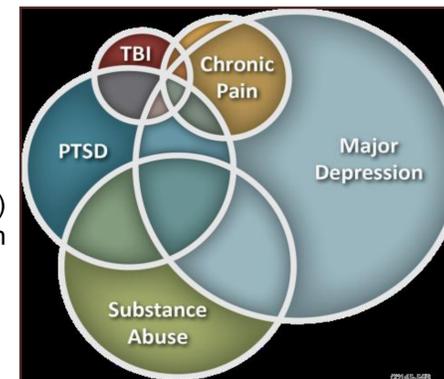
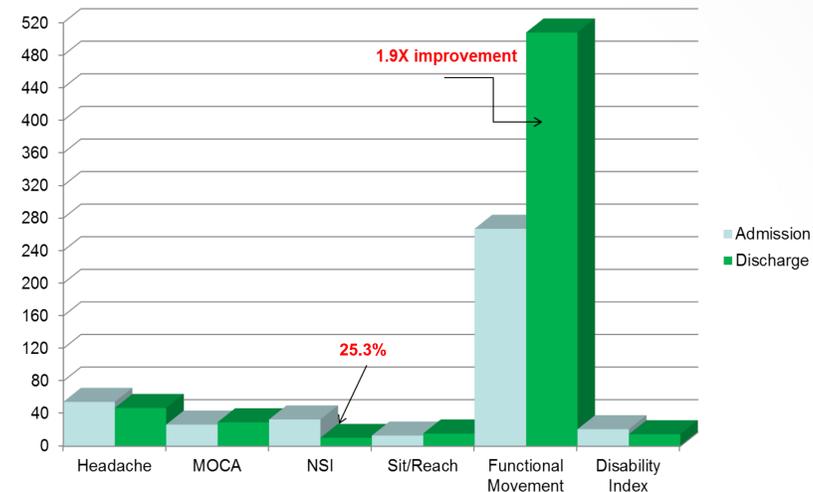
HISTORICAL FRAMEWORK

2010 Landstuhl Regional Medical Center had to triage a high volume (600+ weekly) of medically evacuated Iraq & Afghanistan service members wanting to return downrange. Physical therapist had to **physically overload** patients to determine **combat** medical readiness. After over 15,000+ Treatments the Finding? Overcoming Fear avoidance is key. **Pain is not a limiting factor to function!**

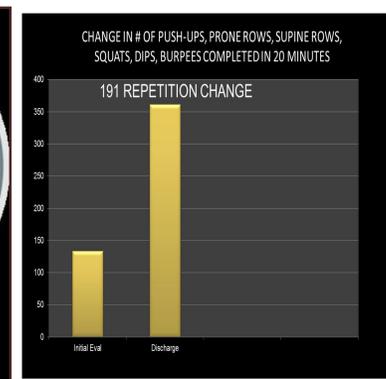


This SF soldier is running again!

Functional Improvement n=14



Overlapping of Multiple Health Issues from the Army Gold Book



References

1. Lew, H.L. et al. (2009) Prevalence of chronic pain, posttraumatic stress disorder, and persistent post concussive symptoms in OIF/OEF veterans: Polytrauma clinical triad, *Journal of Rehabilitation Research & Development*
2. Jang, S, Jung-Ho,L.(2015). Effects of physical exercise on the functional recovery of rat hindlimbs with impairments of the sciatic nerve as assessed by 2D video analysis. *Journal of Physical Therapy Science*, 27, 935-938.
3. Alberts J, Linder S, Euype S. (2014). Implementation of a multi-disciplinary concussion care path. Section on Neurology, Combined Sections, American Physical Therapy Association. <http://www.neuropt.org/docs/csm-2014-handouts/implementation-of-a-multi-disciplinary-concussion-care-path.pdf?sfvrsn=2> accessed on June 24, 2016.
4. Gatchel,R,J McGeary, D D, Lippe, B. (2014).Interdisciplinary Chronic Pain Management. *American Psychologist*, 69(2) 119-130 DOI:10.1037/a0035514
5. Leddy, JJ, Sandhu H, Sodhi V, Baker JG, and Willer B. (2012). Rehabilitation of concussion and post-concussion syndrome. *Sports Health*, 4, 147-154.
6. Rainville,J, Smeets, R, Bendix, T, Tveito,T, Poiradeau,S, Indaj,A.(2011). Fear avoidance beliefs and pain avoidance in low back pain-translating research into clinical practice. *The Spine Journal*. 11;895-903
7. Kozlowski KF, Graham J, Leddy, J, Devinney-Boymel L, Willer B. (2013) Exercise intolerance in individuals with post-concussion syndrome. *Journal of Athletic Training*, 48, 627-635.
8. Turk, D. C., & Monarch, E. S. (2002). Biopsychosocial perspective on chronic pain. In D. C. Turk & R. J. Gatchel (Eds.), *Psychological approaches to pain management: A practitioner's handbook* (2nd ed.,pp. 3-29). New York, NY: Guilford Press.
9. Turk, D. C., & Swanson, K. (2007). Efficacy and cost-effectiveness treatment of chronic pain: An analysis and evidence-based synthesis. In M. E. Schatman & A. Campbell (Eds.), *Chronic pain management: Guidelines for multidisciplinary program development* (pp. 15-38).

Oswestry Scoring Key (Validity / Reliability / Predictive Ability): Minimum Detectable Change (at 90% confidence) is 10% points. That means at least a 10% change is required to be clinically meaningful. Thus, change of less than this may be attributable to error in the measurement.												Assessment Exercises (7-1 Pyramid)	
Description: The Oswestry Disability Index (ODI) is one of the principal condition-specific outcome measures used in the management of spinal disorders. The ODI is the most commonly outcome measures in patients with low back pain. It has been extensively tested, showed good psychometric properties, and applicable in a wide variety of settings.												Push-up, Prone Row, Supine Row, Squat, Dip, Burpee, 1x Monster Walk	
0% to 20%: minimal disability: The patient can cope with most living activities. Usually no treatment is indicated apart from advice on lifting sitting and exercise.												Patient was able to complete:	
21%-40%: moderate disability: The patient experiences more pain and difficulty with sitting lifting and standing. Travel and social life are more difficult and they may be disabled from work. Personal care sexual activity and sleeping are not grossly affected and the patient can usually be managed by conservative means.												7-7's: 42 reps	
41%-60%: severe disability: Pain remains the main problem in this group but activities of daily living are affected. These patients require a detailed investigation.												7-8's: 42+38 = 78 reps	
61%-80%: crippled: Back pain impinges on all aspects of the patient's life. Positive intervention is required.												7-5's: 42+38+30 = 108 reps	
81%-100%: These patients are either bed-bound or exaggerating their symptoms.												7-4's: 42+38+30+24 = 132 reps	
FUNCTIONAL MILITARY EXERCISE (FME): (7-1 PYRAMID TEST = The percent improvement in number of repetitions of push-ups, prone rows, supine rows, squats, dips, burpees completed in a 20 min test cycle during 1st session compared to last session. The same exercise that patient modified the 1st day were modified on the last day.)												7-3's: 42+38+30+24+18 = 150 reps	
												7-2's: 42+38+30+24+18+12 = 162 reps	
												7-1's + 8's: 168+48 = 216 reps	
												7-1's + 8 & 9's: 168+48+54 = 270 reps	
												7-1's + 8, 9, & 10's: 168+48+54+80 = 330 reps	
												(calculation example: 7-7's = multiply 7 reps x 8 exercises = 42 reps)	
Name	Eval Date	Initial ODI %	INITIAL Tx Date	Initial FME Test # of 7-1 Reps	DC Date	DC ODI %	ODI % Improvement	DC Tx Date	Last FME Test # of 7-1 reps	% Improvement (last Rep # - initial rep # / initial rep # x 100)	Number of Reps increased in 20 min		
PT1	11-Jan-15	34	12-Jan-16	290	8-Feb-16	32	2	17-Feb-16	658	127%	368		
other pt's names deleted	11-Jan-15	24	22-Jan-16	284	8-Feb-16	24	0	17-Feb-16	535	88%	251		
	11-Jan-15	4	12-Jan-16	210	8-Feb-16	2	2	17-Feb-16	457	118%	247		
	11-Jan-15	50	12-Jan-16	192	8-Feb-16	18	32	17-Feb-16	552	188%	360		
	11-Jan-15		11-Jan-16	132	8-Feb-16		0	17-Feb-16	132	0%	0		
	11-Jan-15	24	12-Jan-16	184	8-Feb-16	16	8	17-Feb-16	468	154%	284		
	11-Jan-15	16	12-Jan-16	280	8-Feb-16	16	0	17-Feb-16	550	96%	270		
Average Disability %:		25			Average		9	Average Improvement:		129%	297		