

# Center for the Intrepid: Providing Patients POWER

1LT Catrinna R. Amorelli, SP, USA  
1LT Matthew L. Baumann, SP, USA  
LTC Kathleen E. Yancosek, SP, USA

Benjamin M. Keizer, PhD  
MAJ Daniel J. Stinner, MC, USA  
Jason M. Wilken, PhD, MPT

*Never underestimate your POWER to change yourself...*  
H. Jackson Brown, Jr

The Center for the Intrepid (CFI) at Fort Sam Houston, San Antonio, Texas, officially opened in January 2007. The 4-story, 65,000 square foot facility is one of the premier outpatient rehabilitation centers for the Department of Defense. The CFI provides advanced prosthetic and rehabilitative care for individuals following amputation, burn, and/or functional limb loss.<sup>1</sup> The CFI staff uses an interdisciplinary approach to provide holistic care with the goal of positively impacting the physical, psychological, and behavioral functioning of injured military service members and veterans. Over the past 8 years, a variety of clinical challenges have shaped the progress of rehabilitative care. Advancements in surgery have prevented limb amputation; however, limb salvage procedures can result in unique complications and disadvantages that challenge providers and patients. Because service members and military veterans are accustomed to (and often drawn to) high intensity, physically demanding pursuits, the request was made to address the gap between the actual versus desired level of function after limb salvage. Healthcare professionals at the CFI met this request with a custom orthosis, the Intrepid Dynamic Exoskeletal Orthosis (IDEO).

## INTREPID DYNAMIC EXOSKELETAL ORTHOSIS

The IDEO is a carbon fiber, energy storing ankle-foot-orthosis which enhances plantarflexion power, ankle stability, and agility.<sup>2,3</sup> To maximize the rehabilitation and training outcomes of patients wearing the IDEO after limb salvage, physical therapy, orthotics/prosthetics, and orthopedic surgery worked to develop a “Return to Run” program at the CFI. The program is based on sports-medicine principles and embodies a traditional rehabilitation mindset of improving strength and conditioning.<sup>3</sup>

During the initial successful implementation of the IDEO and Return to Run program, deficits and issues that went beyond traditional physical rehabilitation were identified and a health psychologist Fellow at San Antonio Military Medical Center was engaged to augment

the existing program. Through creativity and collaboration, complementary components of health and wellness were incorporated into the Return to Run program. This professional collaboration transformed initial concepts into a comprehensive, performance-focused program titled POWER: Performance-Optimization Warrior Enhanced Rehabilitation.

## PERFORMANCE-OPTIMIZATION WARRIOR ENHANCED REHABILITATION

The POWER program is a play on words, built on the foundational belief that every individual has the personal power to act, achieve goals, make decisions, and triumph over life’s obstacles. While it focuses on human optimization through cognitive, nutritional, and fitness enhancements comparable to other programs (eg, the Army’s Tactical Human Optimization, Rapid Rehabilitation and Reconditioning program), the POWER program is unique in several ways:

- Focuses on improving self-efficacy
- Customized to the patient
- Injured service members and veterans are the target population
- Direct instruction from professionals across various disciplines is incorporated

The POWER program uses a practice-based evidence model to influence patients, seeking to apply the best available evidence-based research within clinical practice to achieve desired therapeutic milestones.<sup>4</sup>

Although the POWER program grew out of a desire to better meet the needs of patients with limb salvage, patients referred to the CFI with *any* diagnosis are eligible for enrollment. Patients are screened for POWER program eligibility during initial in-clinic treatment sessions; patient needs are then discussed weekly during interdisciplinary team meetings thereafter. The POWER program is recommended for patients with issues that may potentially interfere with recovery (eg, medication dependency, behavioral health issues, poor coping, low resiliency, or low self-efficacy). The timeframe for the program is dependent upon the patient and their individual needs.

## CENTER FOR THE INTREPID: PROVIDING PATIENTS POWER

### IMPLEMENTATION OF THE POWER PROGRAM

The POWER program is executed through professional collaboration. This interdisciplinary strategy inspires CFI staff to motivate, challenge, and support patients as they strive to regain prior levels of function and return to duty. At the CFI, the following disciplines contribute skills, knowledge, and expertise to create a team-oriented rehabilitation approach as illustrated in Figure 1:

- Case Management
- Dietetics
- Health Psychology
- Occupational Therapy
- Orthotics/Prosthetics
- Physiatry
- Physical Therapy
- Recreational Therapy
- Research

The interdisciplinary team is headed by 2 physicians: a physiatrist and an orthopaedic surgeon (the Medical Director of the CFI). They lead weekly interdisciplinary team meetings to discuss patients with CFI staff. The rehabilitation team monitors the progress of each patient with respect to his or her treatment plan, and decides whether or not the POWER program may enhance recovery. Open communication is encouraged at the weekly meetings, including effective consultation with other services at any time during the patient's rehabilitation process. Due to widely differing injury patterns and patient requirements, engagement in the POWER program may span anywhere from 4 to 52 weeks. The POWER program's lessons are systematically divided into 3 distinct modules—health psychology, nutrition, activity—with corresponding submodules as shown in Figure 2.

#### Power Program Modules

Health Psychology

Beyond the physical trauma of the injury itself, combat injuries often have profoundly negative consequences including loss of health and military achievement potential. Specifically, combat injuries have the potential to create numerous psychological disturbances, including increased anxiety, depression, insomnia, anger, tension, and diminished quality of life.<sup>5</sup>

Significant advances in physical medicine and rehabilitation have created situations in which an individual service member may be physically ready to return to duty, but not yet psychologically recovered. Successful rehabilitation programs have increasingly recognized this trend and have integrated psychological interventions (ie, relaxation, mindfulness-imagery, goal setting, stress management) into their programs.<sup>6</sup>



**Professions Integral to the POWER Program**

<b>Case Management</b>	Management of cases by coordination of all services and facilities transitions surrounding patient discharge.
<b>Dietetics</b>	One on one and group sessions to promote healthy eating, dietary modifications, and illness prevention through proper nutrition.
<b>Health Psychology</b>	One on one and group therapy sessions with a focus on education of behavioral health techniques to improve outcomes.
<b>Occupational Therapy</b>	Engages the patient in meaningful therapeutic activities to return to their highest level of function and quality of life.
<b>Orthotics &amp; Prosthetics</b>	Custom fabrication of prosthetic and orthotic devices.
<b>Physiatry</b>	Thorough and ongoing evaluation and holistic management of patients. Serves as the lead provider for the rehabilitation care of each patient.
<b>Physical Therapy</b>	Evaluation and treatment of neuromusculoskeletal conditions. Provides therapeutic exercises, modalities, and gait training.
<b>Recreational Therapy</b>	Facilitates emotional and physical health through leisure pursuits and community reintegration. Lead service for biofeedback training.
<b>Research</b>	Contributes to the objective assessment of outcomes to ensure/develop best practice.
Figure 1. An interdisciplinary approach provides specialized, holistic, practice-based patient care.	

The Optimal Performance Program (OPP) is integrated psychological skills training to reduce the negative psychological consequences of injury and teach new techniques that improve performance. Regardless of diagnosis, OPP, as a component of the POWER program, aims to produce autonomous, highly functioning military service members with improved coping skills, decreased reinjury anxiety, and improved psychological flexibility.

Incorporating techniques from sports psychology, rehabilitation psychology, and health psychology, OPP

THE ARMY MEDICAL DEPARTMENT JOURNAL

Health Psychology	Nutrition	Activity										
<ol style="list-style-type: none"> <li>1. Performance Education                             <ol style="list-style-type: none"> <li>a. Stress management</li> <li>b. Sleep</li> <li>c. Pain I</li> <li>d. Pain II</li> </ol> </li> <li>2. Skill Acquisition                             <ol style="list-style-type: none"> <li>a. Attention and self-talk</li> <li>b. Critical thinking and self-analysis</li> <li>c. Anger management</li> <li>d. Learned optimism</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>1. Nutritional Survey</li> <li>2. Laboratory Evaluation                             <ol style="list-style-type: none"> <li>a. CBC, iron-panel, sTfr</li> <li>b. Chem 7</li> <li>c. Lipid panel</li> <li>d. 25-OH d</li> </ol> </li> <li>3. The 5 Rs                             <ol style="list-style-type: none"> <li>a. Rehydrate</li> <li>b. Repair</li> <li>c. Rest</li> <li>d. Revitalize</li> <li>e. Reload</li> </ol> </li> <li>4. Individual Classes                             <ol style="list-style-type: none"> <li>a. Review Labs</li> <li>b. Body composition</li> <li>c. Review supplements</li> <li>d. Goal setting</li> <li>e. Follow-up as needed</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>1. Evaluation and Screening Tools                             <ol style="list-style-type: none"> <li>a. History and physical exam</li> <li>b. Biodex</li> <li>c. Biofeedback</li> <li>d. FCE-M</li> <li>e. Military performance lab</li> </ol> </li> <li>2. Restoration                             <ol style="list-style-type: none"> <li>a. Strength training</li> <li>b. BFR</li> <li>c. Motion</li> <li>d. AlterG</li> <li>e. Edema recovery</li> <li>f. Flowrider</li> </ol> </li> <li>3. Return to Run                             <ol style="list-style-type: none"> <li>a. Sprinting</li> <li>b. Plyometrics</li> <li>c. Cut dynamics</li> <li>d. Landing mechanics</li> <li>e. Power development</li> <li>f. Acceleration/deceleration</li> </ol> </li> <li>4. Return to Duty                             <ol style="list-style-type: none"> <li>a. FCE-M</li> <li>b. MOS specific training</li> <li>c. FATS</li> <li>d. WFSC Freedom Park</li> <li>e. CAREN</li> <li>f. Community outings</li> </ol> </li> </ol>										
<p>Glossary</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">BFR - blood flow restricted training</td> <td style="width: 50%;">FCE-M - Functional Capacity Evaluation-Military</td> </tr> <tr> <td>CAREN - Computer Assisted Rehabilitation ENvironment</td> <td>MOS - military occupational specialty</td> </tr> <tr> <td>CBC - complete blood count</td> <td>sTfr - soluble transferrin receptor</td> </tr> <tr> <td>Chem 7 - basic metabolic panel</td> <td>WFSC - Warrior and Family Support Center</td> </tr> <tr> <td>FATS - Firearms Training Simulator</td> <td>25-OH d - 25 hydroxyvitamin D</td> </tr> </table>			BFR - blood flow restricted training	FCE-M - Functional Capacity Evaluation-Military	CAREN - Computer Assisted Rehabilitation ENvironment	MOS - military occupational specialty	CBC - complete blood count	sTfr - soluble transferrin receptor	Chem 7 - basic metabolic panel	WFSC - Warrior and Family Support Center	FATS - Firearms Training Simulator	25-OH d - 25 hydroxyvitamin D
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<p>Figure 2. The main modules and corresponding submodules of the POWER Program.</p>												

consists of 8 distinct, 2-hour treatment modules that are administered over a 4-week period at a rate of 2 treatment sessions per week. Each 2-hour treatment group ends with a 15-minute group clinical hypnosis session. Before receiving a fabricated IDEO brace and entering the program, patients receive a 60-minute intake and program introduction that prepares them for the group treatment modules. During this initial group, patients complete baseline assessment forms and receive basic information about hypnosis, heart-rate variability biofeedback, physical self-regulation, the physiology of stress, and chronic pain management. All treatment modules are led by the CFI's health psychologist.

Concurrently, patients are issued a personal biofeedback device that measures heart rate variability, a key indicator of physiological resiliency and behavioral flexibility.<sup>7</sup> A trained biofeedback provider supervised by a health

psychologist works with the patients both individually and collectively. Additionally, patients practice biofeedback training and the results are tracked digitally through the biofeedback device and logged by the biofeedback provider. Patients also attend individual appointments to address each patient's progress in the program, reinforce previous treatment interventions, and make goals for future progress.

Group treatments of OPP are divided into 2 distinct, primary subject areas: performance education and skill acquisition. Performance education specifically focuses on teaching preventive strategies to manage illness/disease in the midst of practicing and maintaining healthy behaviors. In an efficient and structured manner, patients are active contributors to their recovery. Performance education contains standalone submodules on 4 separate topics: stress management, sleep, pain I, and pain II.

## CENTER FOR THE INTREPID: PROVIDING PATIENTS POWER

Stress management is the first module addressed under performance education. During the stress management module, the physiology of stress response is discussed, including the role of cortisol and oxytocin, cultural-unique military stressors, the stress diathesis theory of disease/illness, and stress resilience. Patients learn energy conservation techniques and power posing, in addition to various practice strategies to apply and promote energy management including inducing the relaxation response through physical self-regulation.

Because poor sleep can impair quality of life, decrease the progression of the recovery process, and increase one's risk for other diseases,<sup>8,9</sup> patients in the POWER program learn the physiology of sleep, including the management of circadian rhythms, social and biological zeitgebers, and the connection between sleep and memory. The importance of maintaining healthy sleeping patterns along with the causes and types of insomnia and the effects of drugs on the sleep cycle are discussed. Recommendations for proper sleep hygiene are shared (eg, creating a relaxing routine before bed, developing a regular sleep-wake cycle) and strategies for how to manage intrusive, negative, anxiety-producing thoughts at nighttime are taught. At the completion of the treatment module, patients develop a sleep performance plan.

The first pain module explains pain as a subjective, multifaceted experience. Physiology of the pain response is reviewed, the biopsychosocial model of pain is introduced, and the differences between acute versus chronic pain are distinguished. Patients learn the biological purpose of pain, the role of emotions/thoughts in the pain experience, while also recognizing methods for better management of pain (eg, biofeedback, relaxation training, distraction, pacing, cranial electrical stimulation/Alpha-Stim).

The second pain module focuses on the neuroscience of pain and managing fear and avoidance following an injury. Patients learn about how pain is often a disconnect between the real body and the virtual body, the role of mechanoreceptors in a pain experience, introduction to the concept of proprioception, body maps, pain neurotags, mirror neurons, and the physiology of inflammation and stiffness.

Alongside performance education, skill acquisition is the second portion of the health psychology module. Skill acquisition uses a comprehensive, multimodal approach to teach patients how to consciously attend to and regulate individual thoughts, emotions, and behaviors. Patients are taught to be mindful of their circumstances, and are empowered with the ability to employ

well-known psychological strategies to overcome environmental stressors. Skill acquisition contains submodules on 4 separate topics:

- ◆ Attention and self-talk
- ◆ Critical thinking and self-analysis
- ◆ Anger management
- ◆ Learned optimism

In the attention and self-talk module, the physiology of the brain in improving attention is discussed, and the sequence of information-processing within the human body is highlighted. Additionally, patients are lead through sports psychology grid training drills to improve their selective attention. The POWER program teaches patients how to better guide, regulate, and evaluate thought processes through the implementation of learned metacognitive skills, including monitoring and changing self-talk to improve performance.

The module on critical thinking and self-analysis asks each patient to thoughtfully consider his or her own self-concept (or the collection of beliefs a person holds about him or herself). This process includes evaluating past, present, and future self-identity, as well as the effects of the injury on the new self-identity. Therapists work with patients through this process to help detect thoughts, cognitive errors, and realistic versus idealistic thinking. Self-concept constructs are individually analyzed as they may function as reinforcement for certain undesirable behavior(s).

The mood and anger management training module challenges patients to critically analyze several adaptive and maladaptive responses to anger. Patients are educated on the physiology of anger, distinguishing between adaptive and maladaptive anger, consequences of those who demonstrate hostility/aggression towards self and others, and managing both anger directed at self and/or others. Problem solving, cognitive restructuring, relaxation activities, and interpersonal communication strategies are all discussed.

The learned optimism and performance module focuses on the science of optimism and performance. Optimism (dispositional versus situational) is defined, patients learn how to apply optimism in improving physical and emotional performance, how to use defensive pessimism to manage anxiety, fear, and worry, and how to use positive psychology techniques to enhance dispositional optimism.

### Nutrition

The second component of the POWER program encompasses nutritional health and wellness. A dietician

conducts a nutritional survey to gather baseline information regarding the patient's diet. Also, blood is analyzed in the lab to provide information on vitamin deficiencies, cholesterol levels, and body system functions. The baseline survey and lab values are essential aspects of the program as they can be key identifiers of factors contributing to fatigue, weight gain, depression, and poor healing after injury. Furthermore, the information can assist the dietician in identifying nutritional needs and addressing deficiencies.

Education is delivered on the "5 Rs" of recovery nutrition (rehydrate, repair, rest, revitalize, and reload). Rehydration focuses on individual fluid needs before, during, and after rehabilitation. This component should always be individualized, establishing rehydration requirements on the physical exertion demands of each patient.<sup>10</sup> Repair emphasizes to patients the importance of consuming high quality protein, both prior to and after rehabilitation. Rest highlights sleep as a major factor in the recovery process; it is crucial to obtain 7 to 9 hours of sleep daily to maximize rest of exhausted muscles and minimize mental fatigue in preparation for the following day's training. Revitalize emphasizes the need to extract vitamins and minerals from whole grains, fruits, and vegetables to energize the body's systems. Similar to repair, patients are taught methods to reload their muscles with carbohydrates and protein for muscle recovery, growth, and heightened performance.<sup>11</sup> In addition to the 5 Rs, education is continually provided to ensure knowledge of healthy food choices, effective shopping habits, and importance of fueling the body with clean, nutritional food. Throughout the POWER program, patients routinely meet with a dietician to discuss the 5 Rs, identify areas for improvement, devise strategies to regain health, establish attainable goals, and follow-up with a provider as necessary.

#### Activity

Physical activity is necessary to optimize health and performance of desired activities. The mission of the POWER program is to restore an injured service member or veteran, regardless of injury, to duty and/or highest level of independence. To accomplish this aim, focus is placed on achieving adequate endurance, strength, flexibility, and mobility necessary to perform daily activities.<sup>12</sup> Without these key components, the likelihood of reinjury may increase. The activity module consists of 4 distinct categories—comprehensive evaluation and screening, restoration, Return to Run, and return to duty—each of which includes 6 subdivisions of select treatment options for patient care.

The first module involves a comprehensive evaluation with additional screening tools (as deemed necessary) to obtain a holistic view of the patient's areas of movement dysfunction. A thorough medical history and physical examination is conducted. Supplementary measures may also be requested, such as biofeedback, Biodex (Biodex Medical Systems, Inc, Shirley, NY), functional movement screen, gait lab analysis, and/or a functional capacity evaluation-military (FCE-M).

The second module focuses on restoration and advancing the patient towards his or her prior level of function. Strength, endurance, joint range of motion, dynamic balance, and edema are addressed through means of blood flow restriction therapy, AlterG (AlterG, Inc, Fremont, CA), and Flowrider (Flowrider, Inc, San Diego, CA). One unfortunate reality of rehabilitating trauma patients is that they need strength training, but are often not able to withstand the high loads required to build strength in the typical fashion. Blood flow restricted training is a technique used to address this significant clinical challenge. It is important because it allows a patient to obtain muscle hypertrophy at 20% of his or her one rep maximum, thus allowing the individual to reap the benefits while performing significantly less work.<sup>13</sup> The AlterG Anti-Gravity Treadmill is an additional tool which requires less physical demand, decreasing the forces generated through the lower extremities while exercising and possibly enhancing recovery time.<sup>14</sup> Furthermore, the Flowrider incorporates excitement and entertainment alongside functional (dynamic) balance and core strengthening.

Return to Run is the third module under the scope of activity. Pairing the IDEO with a structured Return to Run clinical pathway addresses the need to return to basic activities of daily living as well as the high-level rehabilitation goals of limb salvage patients who aspire to attain or exceed the functional mobility of patients with transtibial amputations. While this module is implemented by a physical therapist and physical therapy assistant, orthopaedic and orthotic/prosthetic staff serve as interdisciplinary partners. The physical therapy practitioners engage and educate the patients in plyometric exercises, proper landing mechanics, sprinting, cut dynamics, power development, and acceleration/deceleration techniques. Objective data<sup>15</sup> and patient reports suggest that without the assistance of the IDEO, mobility and ambulation remain limited. The IDEO and Return to Run module allow patients to maximize use of their salvaged limb.

To complete the physical activity module, return to duty is addressed through 6 submodules of evaluation and

## CENTER FOR THE INTREPID: PROVIDING PATIENTS POWER

training, with each submodule systematically assessing patients' capabilities, both physically and mentally. In this part of the POWER program, a patient's military occupational specialty is scrutinized to identify the primary skills, roles, duties, and job tasks that are essential to perform within the identified military profession. A FCE-M, specifically designed for service members, may be completed for personnel who wish to return to duty. While wearing a Kevlar tactical vest, helmet, 35-pound rucksack, and carrying an M-4 carbine, patients are timed and graded on their ability to perform tasks such as dragging a 160-pound sled (to simulate a casualty), climbing walls, clearing stairs, and running a one-mile ruck. The components within the FCE-M are specifically designed to simulate the realistic demands of active duty service. Physical abilities are also tested and assessed through the Warrior and Family Support Center Freedom Park trail. The park contains fitness stations of varying difficulty and a trail that can be utilized for training and assessment.

The Firearms Training Simulator and Computer Assisted Rehabilitation ENvironment (CAREN) are used to assist with FCE-M evaluations. Firearms training in a simulated environment allows patients who wish to return to duty the opportunity for skill acquisition, remediation, and refinement through simple and complex scenarios.<sup>1</sup> In addition, the CAREN offers a multisensory virtual reality simulation where service members feel safe while being immersed in highly demanding scenarios that are comparable to those encountered in combat.<sup>16</sup> Finally, recreational therapy opportunities for outings are used to engage patients in leisure pursuits, reinforcing comradery, unity, and reintegration into the community.

Enhancing functional independence both physically, psychologically, and behaviorally requires a multimodal form of rehabilitation. Establishment and implementation of the POWER program encourages a holistic view of a patient through an interdisciplinary approach, building relationships between healthcare professionals and demonstrating to patients a model system of care.

### EVALUATION OF THE POWER PROGRAM

Researchers in the CFI's Military Performance Laboratory are well into a multiyear effort to establish robust and clinically relevant assessments and outcome measures that allow objective determination of patient ability, support the prediction of outcomes trajectories, and allow validation of the various modules of the POWER program. Although assessments can include technologically sophisticated tools,<sup>17</sup> an emphasis is placed on

assessments that are time-efficient, easy to implement, reliable, valid, and capture the effects of the clinical interventions in the POWER modules. As stated earlier, the POWER program is an extension of the Return to Run program, a specialized training program which has robust scientific evidence demonstrating its ability to return limb salvage patients to a higher level of functional independence.<sup>15</sup> For example, a retrospective analysis of limb salvage patients who had participated in the Return to Run program was conducted from October 2009 to June 2010. Researchers discovered 10 patients who met the inclusion criteria. Results reported that all 10 patients had resumed a weight-lifting program, eight returned to running (one completed a full and half marathon while two completed a minitriathlon), and three were redeployed with elite units.<sup>3</sup> It is the desire to equally demonstrate the effectiveness of the POWER program and its interdisciplinary approach to rehabilitation in returning individuals to their highest level of functional independence.

In addition to a range of objective measures of physical function, measures that characterize an individual's psychosocial makeup are also being actively pursued. Due to the interdisciplinary approach to care within the POWER program, and a growing body of literature supporting the importance of nonphysical factors on resulting recovery, areas such as self-efficacy, resilience, anger, and depression are being evaluated. By better understanding service member's nonphysical makeup, such as an individual's readiness to engage in the various components of the POWER program, intervention type and timing can be optimized to ensure maximal benefit in an individualized manner.

### VALUE TO THE MILITARY

In 2013, Army Surgeon General LTG Patricia Horoho, spearheaded a campaign to advance Army Medicine from a healthcare system to a "System for Health." LTG Horoho described the transition thusly:

This means shifting the focus to prevention of disease, injury, and disability. More importantly, it means advocating a cultural shift to Soldiers and beneficiaries by encouraging them to develop a mindset that drives them to optimize their own health.<sup>18</sup>

LTG Horoho asked Soldiers and beneficiaries to take active roles in maintaining their own physical health through fitness and injury/illness prevention strategies.

Also during 2013, the Army introduced the Performance Triad to support Army Medicine's transition to a System for Health. Focusing on sleep, activity, and nutrition, the Performance Triad provides a comprehensive plan for

healthy, sustainable life roles and routines. The aims of the Performance Triad are for individuals to engage in daily physical activities, improve personal nutrition, and increase quality sleep.<sup>19</sup>

The CFI POWER program is congruent with the Performance Triad and resonates with Army Medicine's System of Health. The POWER program seeks to empower patients with a "skill toolbox" to positively affect their life space.\* Various components of health psychology, nutrition, and activity are taught for patients to improve individual functioning levels while reducing negative psychological, emotional, and physical consequences often associated with injury. As the POWER program is individualized, each plan of care is tailored to fit the patient's needs.

#### CONCLUSION

The CFI implemented POWER as an innovative, comprehensive, interdisciplinary rehabilitation program to leverage clinician and patient assets to optimize individual functional performance. Although POWER is in the early implementation phase, researchers integral to the CFI continue to identify, evaluate, and implement measures to assess the program's effect on patient outcomes. Although it is the CFI's desire to demonstrate the program's unique contribution to patient healing, research is necessary to demonstrate the clinical effectiveness of POWER.

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\*Life space is defined as the physical and psychological environment of an individual or group. Source: *Merriam-Webster Medical Dictionary*.

## CENTER FOR THE INTREPID: PROVIDING PATIENTS POWER

### AUTHORS

ILT Amorelli and ILT Baumann are Senior Fellows in the Army-Baylor University Doctor of Science in Occupational Therapy Program, Joint Base San Antonio Fort Sam Houston, Texas.

LTC Yancosek is the Director of the Center for the Intrepid, Joint Base San Antonio Fort Sam Houston, Texas.

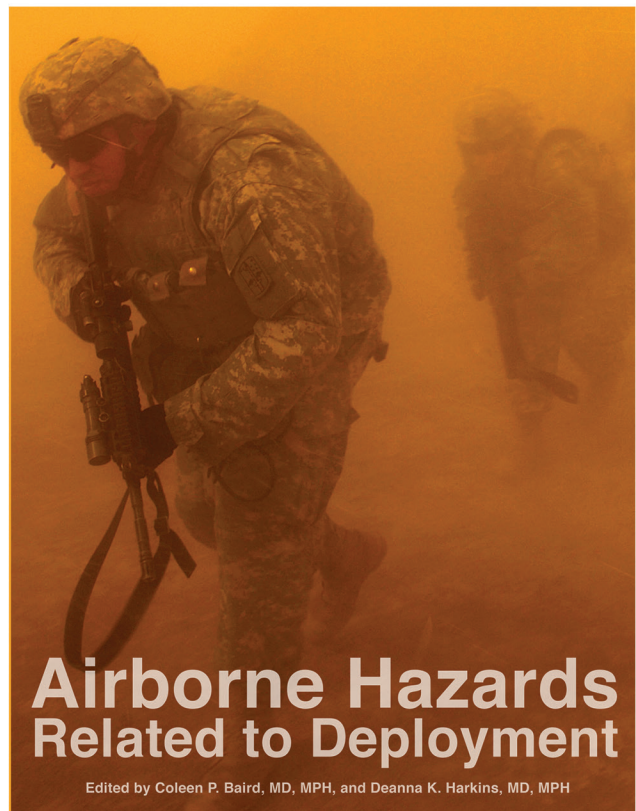
Dr Keizer is a Clinical Psychologist at the Brooke Army Medical Center, Joint Base San Antonio Fort Sam Houston, Texas.

MAJ Stinner is the Medical Director of the Center for the Intrepid, Joint Base San Antonio Fort Sam Houston, Texas.

Dr Wilken is the Director of the Military Performance Laboratory, Joint Base San Antonio Fort Sam Houston, Texas.

## AIRBORNE HAZARDS RELATED TO DEPLOYMENT

Developed from the Airborne Hazards Symposium held in Washington, DC, in August 2012, this book covers such topics as diagnosis and workup of symptomatic individuals, exposure characterization, current epidemiology, the potential role of pulmonary function testing (spirometry) in surveillance, strategic research planning, clinical follow-up and registries, risk communication, etc. Symposium presentations were delivered by a diverse group of scientific experts and contain valuable veteran perspectives. This book represents a compendium of what is currently known regarding the potential long-term health consequences of exposure to airborne hazards during Operation Enduring Freedom, Operation Iraqi Freedom, and Operation New Dawn deployments. *Airborne Hazards Related to Deployment* presents a balanced, comprehensive approach to furthering the understanding of airborne hazards during deployments and other military operations, ultimately improving airborne hazard prevention, protection, and avoidance while improving healthcare and minimizing adverse health outcomes of our service members and veterans.



This book and others  
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