

# **Mapping the Landscape of Deployment Related Adjustment and Mental Disorders**

A Meeting Summary of a Working Group to Inform Research

Convened by:

Department of Veterans Affairs Office of  
Research and Development

National Institute of Mental Health

United States Army Medical Research and  
Materiel Command

May 17-18, 2006  
Rockville, Maryland

## Introduction

The number of service members deployed to Southwest Asia theaters in Operations Iraqi Freedom and Enduring Freedom (OIF/OEF) continues to grow. Because of the nature of the conflicts and widely dispersed risks, many service members are exposed to traumatic stressors as well as the stressors of deployment and readjustment upon return. The current conflicts in Iraq and Afghanistan represent the most sustained combat operations for U.S. forces since the Vietnam War. In addition to the usual deployment risks, service members may experience risk to life and sustained threat of injury, actions such as roadside bombs, and other ambiguous or unknown civilian threats. Many of the mental health consequences of the current conflicts have been seen in other wars and in other trauma exposed populations. There is evidence that the high rates of trauma experienced by those stationed in the Southwest Asia theaters will result in increased demands on the Department of Defense (DoD), Department of Veterans Affairs (VA), and community healthcare systems as these service members return, move back to civilian status, and become eligible for VA health benefits. As the number of OIF/OEF veterans grows, their continued care is a national health care concern.

Due to these concerns, the VA Office of Research and Development, the National Institute of Mental Health (NIMH), and the United States Army Medical Research and Materiel Command invited experts on deployment related adjustment and mental disorders to participate in a working group with the purpose of considering past, present, and future research in five key areas as it relates to personnel involved in recent and on-going military conflicts. In so doing, participants were asked to identify major scientific questions that need to be addressed and areas where science is ahead of practice or behind public health demand/need. Participants also addressed the adequacy of ongoing research efforts and highlighted opportunities to coordinate and collaborate across relevant Federal research programs. The meeting was organized around five broad and overlapping thematic areas (referred to as “panels” during the meeting):

- I. Early detection and intervention
- II. Co-occurring health conditions
- III. Occupational, family, and social adjustment/functioning
- IV. Causes, correlates, and risk for PTSD
- V. Healthcare services within and across sectors

Participants represented NIMH researchers and research administrators; practitioners, researchers, and policy advisors from all branches of the Armed Forces; both Active and Reserve components; and practitioners, researchers, and research administrators from the VA. (See Appendix A.)

The meeting was organized with brief, targeted presentations intended to stimulate active discussion among participants. Participants agreed that a public summary of the discussions would be helpful for communication with other health care professionals,

researchers, research administrators, and policy makers. The following sections summarize each panel's content, discussions, and suggestions for research.

## **I. Early Detection and Intervention**

“Early Detection and Intervention” focused on the detection and intervention both in theater and immediately post-deployment, as well as emerging therapeutic strategies for successful early and long-term treatment. Six specific topics were addressed: (a) early access and identification, (b) accurate diagnosis and outcome measures, (c) early and long-term psychopharmacologic treatments, (d) early and long-term psychotherapy treatments, (e) social, family, and vocational interventions, and (f) dissemination. These topics are summarized below.

### **a) Early access and identification**

The need to develop and test mechanisms to improve early access to psychiatric evaluation and treatment in the first six months post-deployment period, identify and decrease barriers to care, reduce stigma, and improve engagement with treatment settings was discussed. This includes testing early interventions that address “adjustment disorders” [as opposed to frank acute stress disorder (ASD) or post-traumatic stress disorder (PTSD)], which might prevent the subsequent development of more chronic or severe psychopathology, such as PTSD or major depression. Such interventions might be targeted toward the reduction of symptoms (e.g., nightmares, exaggerated startle, hyperarousal symptoms, difficulty concentrating), rather than “disorders” per se. Descriptive studies are needed that focus on predictors of and barriers to utilization, processes of diagnosis and referral, and most important, interventions to increase utilization (including interventions focused on spouses and parents). Increased understanding is needed of self and family referral as well as provider referral, and such work should encompass how to increase adherence to referral, engage the client in treatment, and reduce dropout. Much has been said, without much evidence, regarding the possible pathological effects of labeling and early referral for intervention. This area requires additional research.

Many important programs are being implemented widely, and these should be subject to research evaluation [e.g., Combat Stress Control (CSC); “Resilience” messaging initiatives; Battlemind; Seamless Transition; the Post-Deployment Health Reassessment (PDHRA) Program; primary care in VHA, DoD mental health clinics; Military OneSource; VA Vet Centers, and VHA PTSD programs]. Studies are needed to develop and compare alternative forms of these programs (e.g., CBT informed CSC).

An important emerging area of research involves the study of persons with symptoms of a mental illness who are facing or experiencing redeployment. Studies are needed to determine how to reduce risk of long-term illness in the face of repeated exposure to stress and traumatic events.

## **b) Accurate diagnosis and outcome measures**

The panel underscored the need to develop and test more accurate, user-friendly, and clinically feasible means of diagnosis of a broad range of psychiatric diagnoses that present in post-deployment populations and that will enhance access to early treatment and recovery. A better understanding of the evolution from combat stress to acute stress and ultimately PTSD is needed. Also needed is a better understanding of how early diagnosis and treatment can alter the trajectory of recovery. Research is needed to operationalize combat stress disorders or adjustment disorders and their treatment and outcome.

Also, research is needed that examines the usefulness of psychophysiological measures and other biomarkers for guiding evaluation, treatment selection, and prediction and evaluation of treatment outcomes. For example, individuals who show a heightened startle response may benefit from selective pharmacotherapy; individuals who show heightened physiological reactivity while recalling a traumatic event may benefit from cognitive behavioral therapy (CBT) that targets that event.

Studies of certain subgroups would also be informative, including evacuees, survivors of military sexual assault, substance abusers (especially those with concurrent PTSD and alcohol problems), and treatment refusers, dropouts, and non-responders.

There is a critical need to develop, test, and translate practical outcome measures of PTSD and depression that can be embedded in the medical record system to be developed, tested, and translated into clinical use. These measures would provide fertile ground for larger, future studies of delivery of health services and population outcomes.

## **c) Psychopharmacologic treatment**

As an overall approach to identifying promising psychopharmacologic treatments, this panel positively viewed the strategy of multiple pilot or small scale early intervention (i.e., 1-3 months post trauma) treatment studies that would examine whether such interventions improve long-term outcomes (using similar or standardized outcome batteries). This approach could identify promising interventions that require larger scale testing in clinical trials.

Randomized controlled early intervention trials are needed to test pharmacologic treatments as an early intervention strategy to prevent PTSD and chronic illness. Of greatest practical need are trials testing combination therapies such as drug/drug or drug/psychotherapy. Such combination therapies might be targeted to different symptoms (or symptom clusters) as well as to develop a strategic algorithmic approach to therapy (e.g., what therapy should be tried when a first-line therapy fails). Studies of longer-term treatment and follow-up (e.g., 6-12 month outcomes) are needed in order to advance our understanding of long-term outcomes and inform the clinical treatment guidelines.

Research that supplements subjective measures of symptoms with objective measures of physiological/biological, occupational, and social functioning could be encouraged, as well as research that supplements symptom outcome measures with measures of functional outcomes (e.g., workplace and family functioning).

Research is needed to evaluate treatment in primary care systems using established treatment guidelines and alternative ways to deliver treatment (e.g., tele-health, web-assisted, and advanced practice nurses). There is great variability in PTSD specialty care, and research is needed to evaluate the implementation of more systematic treatment approaches in these specialty care settings. Such approaches can be studied when transferred into practice throughout VHA. Cost-effectiveness analyses are needed for various therapeutic approaches in the delivery settings.

#### **d) Psychotherapy treatments**

The panel considered ways to develop and test psychotherapies that would be most easily implemented by therapists and well-tolerated by patients. Current manualized therapies require extensive therapist training, can be difficult to implement, and may result in substantial patient dropout or non-compliance. Additionally, investigation is needed of methods that promote higher rates of patient completion.

Some important areas for design and testing of innovative behavioral interventions include: brief interventions in the war zone; evaluation of different therapies (e.g., exposure therapy, cognitive processing therapy, cognitive therapy, stress inoculation training, coping skills training approaches) and their components (e.g., education, self-monitoring, goal-setting, problem-solving) in active duty and veteran populations; group-based interventions; strengthening of different forms of social support; brief interventions to reduce alcohol consumption; interventions to enhance reintegration programs that reduce anger, violence in the community, and domestic violence; reducing social isolation; web- and telephone-delivered services; traumatic bereavement interventions; focal interventions targeting specific problems such as problematic driving behavior, weapons-keeping, social isolation/withdrawal, and family communication problems; self-help groups for veterans; and returnee and family training for reintegration.

Also needed are randomized controlled early intervention trials to test variants of CBT or novel combinations of therapies specifically designed to lessen provider and patient burden. CBT has been shown to work very effectively as an early intervention in civilian trials. Studies of CBT as a secondary prevention approach are needed with new veterans. Several drugs are known to affect conditioning and learning. For example, D-cycloserine (DCS) has been shown to facilitate extinction and has shown some promising results in combination with CBT in civilians with phobias. The promise of this work is that the number of sessions required and provider burden can be lessened considerably. Combination trials (e.g., DCS and CBT) are needed to target PTSD in new veterans.

Research is needed on novel delivery modalities and vehicles for CBT. When feasible, randomized controlled trials are preferable; however, if the research is unprecedented, alternative designs that strive to maximum internal validity would be valuable. Self-help, self-management, and provider-assisted self-help interventions based on CBT principles of behavior change also could be explored and tested.

#### **e) Social, family, and vocational interventions**

More studies are needed that inform the development of interventions to improve family and work outcomes. These studies include research on the process of return and impact of deployment-related disorders on family relationships (e.g., process/problems of family reintegration, divorce trajectories, impact on spouses and children). Work is needed to develop and test couples and family focused interventions.

Another major area of functioning is the workplace, and research is needed that examines returnees in work settings (e.g., processes/problems of work re-entry and impact of post-traumatic stress on work functioning). Intervention studies should focus on maintenance of workplace functioning. Broadly, it would be useful to better understand if and how some individuals function effectively in work roles despite significant levels of symptoms. Studies could describe returnee and family perceptions of needs and services.

Multimedia presentations that educate families and patients about the mental health impact of combat trauma, the services available at the VA, and the requirements and demands of different types of treatments could be developed and tested.

#### **f) Dissemination of evidence-based treatment**

There is a great need to develop and test methods for rapidly moving evidence-based therapies into practice. Research should be conducted that facilitates dissemination of effective treatments and best practices. Studies that describe provider perspectives and needs would be helpful in this regard, as would investigations of provider training methods (e.g., training practitioners in evidence-based interventions). Research resources could also be allocated to efforts to organize information and findings and to develop effective ways of communicating findings to clinicians and systems of care.

#### **Summary**

Overall, this panel identified the need for rigorous outcomes research that would produce rapid results that can be implemented in a systematic way across various settings. This is most important for the OIF/OEF combat veteran within the first six months post-deployment when mental health problems have not progressed to a chronic and perhaps more treatment-refractory state.

## **II. Co-occurring Health Conditions**

The “Co-occurring Health Conditions” panel addressed issues of comorbidity with deployment related stress conditions. The specific comorbidities addressed were: traumatic brain injury (TBI) and other physical injury, alcohol and substance abuse (including tobacco), and other co-occurring medical conditions. Pertaining to these comorbidities, the panel discussed areas of research related to: (1) epidemiology, including (a) psychiatric comorbidities (primarily mood and anxiety disorders), (b) impulse control disorders (addiction, eating, aggression, and self-harm), and (c) medical comorbidities and complications (neural trauma, toxin exposure, and long-term immunologic, endocrine, and cardiac impact); (2) models of etiology, including (a) gene by environmental factors and (b) neurodevelopment; (3) models of pathophysiology, including (a) stress systems (noradrenergic, serotonergic, glucocorticoid, corticotropin releasing factor, and glutamatergic), (b) stress counter-regulatory (or resilience) systems (GABA, neuropeptide Y, alpha-2 noradrenergic, and neurosteroid), (c) stress related hippocampal neurotoxicity/atrophy, neuro-immune and neuro-endocrine responses, and (d) neurocognitive models of impulse control problems; (4) and treatment, including (a) cognitive/behavioral therapy, (b) treatment of co-occurring addiction or behavioral dyscontrol, and (c) treatment of co-occurring neurologic deficits.

### **a) Traumatic brain injury and other physical injury**

The panel identified the need to continue to validate approaches for assessing TBI in service members. Current assessment approaches based on neuropsychological testing describe very high TBI rates (40%) in two samples of wounded service members and surprisingly high rates (10-15%) in returning service members who had not been wounded. There is a need to understand what features of TBI predict greatest adjustment-related problems. At a clinical level, longitudinal studies involving clinical and neuropsychological measures are needed. At a circuitry level, MRI volumetric studies and diffusion tensor imaging to map traumatic disturbances in white matter pathways and their recovery are needed to map functional impairments onto the brain. Functional magnetic resonance imaging studies are needed to define the cognitive operations disrupted by disturbances in pathway structure.

There is also a need to understand how TBI, PTSD, and substance abuse interact. All three disorders are associated with problems in attention, mood regulation, and impulse control. In the returning OIF/OEF service members, this combination of problems may be a serious and understudied triad of problems. Cognitive studies, perhaps involving functional MRI or cortical electrophysiology, are needed to map the interplay of these conditions.

Studies are needed to understand which groups of patients are most vulnerable to persisting deficits with TBI, in particular, studies that characterize who may be at higher risk for developing TBI after concussive events or who might recover more slowly. These studies could take the form of evaluations of gene by environment interaction

and could also evaluate the role of particular risk factors (alcohol dependence, smoking, level of psychosocial support, etc.) as moderating recovery.

Yet another area of inquiry is to understand what rehabilitative interventions can facilitate recovery from TBI. Rehabilitative techniques for TBI need to be developed and validated. Presumably, the rehabilitative strategy would be related to the disrupted pathway (perhaps defined by diffusion tensor imaging). One potential approach for study would be “cognitive remediation,” a strategy for “exercising” impaired circuits. Additional work could identify ways to integrate TBI assessment/rehabilitation and PTSD assessment and treatment.

Overall, there is a continued need to describe the natural history of recovery from military deployment-related TBI, to describe the interplay of TBI and PTSD with respect to adjustment problems, and to evaluate the impact of rehabilitative strategies aimed at reducing the impact of TBI upon overall adjustment.

### **b) Alcohol and substance abuse**

The panel noted that alcohol and substance abuse is a common and problematic barrier to readjustment in returning OIF/OEF service members. Further, panelists discussed the influence of deployment on increasing rates of tobacco smoking, a major threat to long-term health.

There is a need to understand better the natural history of substance abuse in deployed service members, as well as the period of risk for substance abuse. This should include longitudinal study of service members prior to, during, and following deployment to target the period for optimal preventive intervention.

The role of chronic pain syndromes in wounded service members as a risk factor for substance abuse is another area in need of research. Empirical studies are needed to describe the interplay of pain and substance abuse risk in deployed service members. Pain can also be a serious obstacle to post-deployment adjustment and comorbid with PTSD.

The panel suggested that individuals with a family history and individuals who develop PTSD/mood symptoms are at greatest risk for developing substance abuse problems. There are now molecular genetic markers that may predict substance abuse risk that might apply to this population. Relatively large scale studies are needed to understand the interplay of these factors.

Very little work has been done on the effectiveness of substance abuse preventive approaches in service members prior to, during, and following deployment. Substance abuse is viewed as a maladaptive response to stress. The panel highlighted the absence of studies of alcohol, smoking, and substance abuse prevention studies in service members. These could be readily researched given the prominence of prevention in other areas of substance abuse research.

There is also a paucity of data regarding the applicability of substance abuse treatment approaches used in other populations to recently deployed service members. Research is needed on the effectiveness of both pharmacologic and psychosocial treatments in this population. Further, there is a need to support and test the efficacy of treatment approaches that fully integrate PTSD and substance abuse treatment.

Overall, the panel suggested that the VA and DoD could engage other federal funding agencies, such as NIAAA and NIDA, as partners in pursuing further understanding of the comorbidity of alcohol and substance abuse and other deployment-related adjustment problems. The panel highlighted the need for studies that distinguish the impact of military deployment upon groups with varying levels of familial substance abuse risk. The panel also emphasized the need to initiate studies aimed at alcohol and substance abuse prevention, beginning prior to deployment. Lastly, the panel highlighted the need for studies of alcohol and substance abuse treatment in recently deployed populations, particularly those patients with comorbid PTSD and TBI.

### **c) Medical comorbidities**

The panel agreed that there is growing evidence that PTSD increases the prevalence of reported medical problems and may worsen the course of comorbid medical conditions. To study the long-term health risks of military deployment and how the risks are influenced by the presence of PTSD, a large scale study of Vietnam Theater veterans with PTSD and carefully evaluated medical status could be helpful.

More detailed research is needed on the processes initiated as a consequence of deployment related stress that account for both short-term and long-term health problems. A growing body of research suggests that a number of substances implicated in the immune/inflammatory processes may be influenced by stress exposure and, in particular, PTSD; however, the links to health status in recently deployed service members as well as aging veterans is an important gap in the literature. In both groups, it would be particularly important to characterize disease-related mechanisms in some detail. Identification of biological mechanisms linking PTSD and other health complaints might yield novel targets for the treatment of PTSD and for the clinical management of these other disorders.

There is a need to understand how alterations in attention and mood associated with stress response and PTSD alter the appraisal and recognition of other medical conditions and initiation of appropriate self-care. PTSD is well known to affect the appraisal of risk and to alter the investment of individuals in their long-term future. In fact, the sense of a “foreshortened future” is a symptom within the PTSD diagnostic criteria. Research studies are needed to explore cognitive factors that may contribute to poorer health in deployed service members. Further, these cognitive distortions may serve as targets for cognitively oriented psychotherapeutic treatments. Another understudied area is the impact of PTSD treatment on health outcomes and medical healthcare utilization.

Data indicate that PTSD impacts cardiovascular, gastrointestinal, dermatologic, and musculoskeletal disease. One suggested research area was for a nationwide sampling of Vietnam Era veterans to fully characterize the impact of stress-related psychological problems, particularly PTSD, on the long-term risk for and prognosis of medical disorders. One objective would be to determine which other medical conditions are associated with PTSD. A second suggested area was to identify cognitive and biological mechanisms that might link stress response, PTSD, and other medical problems. Identification of these mechanisms might provide novel targets for prevention or for the medical management of PTSD.

## **Summary**

The panel agreed that adjustment of service members following military deployment may be further impaired by the interacting impact of PTSD with other medical conditions that occur frequently in this population. The panel proposed that many service members could be viewed as having an array of interacting problems that impair adjustment (i.e., PTSD, TBI, physical trauma, substance abuse, etc.). While each condition has received extensive study in other populations, there is very little data with respect to the interplay of PTSD and other medical conditions in service members in the initial phase following deployment. The working hypothesis of the panel is that the optimum clinical support for service members returning from deployment would involve a complete assessment of the key domains influencing readjustment and treatment or rehabilitative programs aimed at the array of co-occurring medical conditions. The panel suggested a large scale epidemiologic study in which the adjustment of service members, TBI, alcohol/substance abuse, and other medical health conditions are considered as factors that might interact with stress exposure to influence adjustment.

## **III. Occupational, Family, and Social Adjustment and Functioning**

The “Occupational, Family, and Social Adjustment and Functioning” panel considered seven topics: children, families, readjustment, family violence, injury recovery, care burden, and community supports and recovery. The panel included attention to trauma response problems beyond the range of PTSD that would include other disorders, distress, and health risk behaviors. Thus, the burden of illness, including the cost of PTSD and other trauma responses, spans beyond symptoms to impairment, altered functioning, and disability, and crosses family, occupational, and social realms. This applies not only to those who have served in the military and suffer from deployment-related problems, but also to their spouses, partners, and children. These additional outcomes and interventions, while rarely studied, may be the most important for performance in work, family, parenting, and self-care.

The panel suggested undertaking theoretically grounded research that ties traumatic events and PTSD and other trauma responses to the “mechanisms” and pathways involved in this relationship and to the real-life correlates of this relationship. This includes the resources and risk and protective factors that are involved in risk and resiliency, as well as the way PTSD and psychological distress impact and are impacted

by people's health, work, social, and family lives. Discovering factors that prevent PTSD and foster family, occupational, and social function will be paramount in the next generation of research.

The panel suggested development of better measurement of function and impairment. Such measures are needed not only for research purposes, but are also important for use in clinical settings and benchmarking. Measures should be efficient, sensitive, and specific. The panelists also suggested increased use of operational (pragmatic) measures of function, such as bed days, attrition, days at work, absenteeism, and presenteeism.

There is a need to study the relationship of treatment intervention to changes in quality of life (objective, subjective, and functioning components), including determination of what aspects are responsive to which treatment interventions. In particular (and overlapping with the Co-occurring Disorders panel), does PTSD treatment improve health? And vice versa?

On a more subtle level, the relationship between symptoms and impairment, especially for early cases, needs to be elucidated. Understanding the time course and domains of impairment and its onset can inform important points for intervention and critical points of the illness/disease/function triad.

Children exposed to injured parents may be at particular risk of altered development, distress, or mental disorder. Little is known about this group. Needed are studies of children's' responses to and coping with: parental symptoms and impaired functioning; physical injuries of parents; and loss of parents. Related are studies of the relationship of child neglect and war deployment and the effect of altered parenting by both the spouse and service member before, during, and after deployment. It is also not known what effects (both positive and negative) repeated deployments have on family and child functioning.

Regarding family functioning, early intervention studies for preventing divorce or improving family function in conjunction with PTSD interventions targeted to specific symptoms and functioning are needed. The relationship between caregiver burden and PTSD disorder/impairment is unknown. Similar studies regarding TBI are in order. Certain comorbidities, such as alcohol abuse and depression, may be especially salient in effecting family and work function. Both explanatory and interventional studies of family violence, aggression, and irritability, and possible post-deployment and post-combat outcomes are needed. Family or couples therapy could be studied as an intervention for patients whose PTSD treatments are "stuck." Each of these perspectives is derived from considering the family as both a resource for and a barrier to seeking care, improved function, and recovery.

Understanding the psychological and behavioral responses to trauma other than PTSD is important. For example, understanding complex grief (formerly traumatic grief) in service members and family members of deceased may lead to interventions that will

improve overall functioning. Similarly, psychological responses to TBI and recovery and restoration of function are important to understand in both patients and family members. Research is needed on the psychology of “safety” (i.e., feeling safe) and how loss of that feeling with trauma exposure may relate to risk taking and restoration of future directedness.

In examining the trajectory of illness, functioning, and impairment, it will be important to focus on functioning rather than disorder, highlighting the differences across the event response, first episode, second episode, third episode, etc., and changes across time in functioning and symptom patterns. Altered substance use (not just abuse) patterns and subsequent behavioral effects may play into these trajectories. The panel suggested studies of the mechanisms (both behavioral and biological) through which PTSD leads to poor functioning and health. Pain is another important factor, as those with injuries are at high risk for PTSD; thus, understanding the contribution of pain to PTSD onset, recovery, and chronicity is key. Adherence and compliance with treatment and rehabilitation in PTSD and other deployment-related illnesses are also factors. Prevention of impairment and improved functioning (rather than symptom recovery) are appropriate outcomes for study and intervention. Strategies for effective health promotion will prove valuable in reducing and limiting functioning in this population.

Workplace functioning and interventions represent another gap in present knowledge. As people move back into the workplace or come back into their active duty at home, we need to understand the process and stages of successful (or unsuccessful) reintegration to occupational functioning. For those with PTSD, what are the additional issues? Prevention of job loss may be important to PTSD recovery independent of other variables. Interventions using occupational rehabilitation and counseling would be valuable.

Presently the rate of redeployment to combat theatre is high. Studies of these troops are needed, including the potential contribution of anticipatory stress and dread to trauma exposure outcomes and to family function. Studies of the effects of these redeployments and repeated exposures on health and mental health and to “return to normal” on return home are also needed.

A better understanding of pathways to care will provide knowledge important in the development of appropriate interventions. For example, how do family members get to care, where do they go for care (e.g., to religious leaders, friends, primary care, alternative medicine, self-help), and do they seek care with community or with military providers? How often do these pathways lead to appropriate and effective care (specialty care or primary care) ensuring that needs are met? Meeting these needs is not necessarily limited to treatment for symptoms related to specific diagnoses, but may also include various behavioral and social problems such as domestic violence and abuse. To what extent do other factors (e.g., poverty, ethnicity) influence pathways to care?

How communities function and interact with returning service members and veterans may help to explain successful transitioning, as well as entry into treatment and recovery. This may be especially important for those who transition into and out of military and civilian jobs (guard and reserve troops).

## **Summary**

This panel covered a wide variety of topics related to occupational, family, and social adjustment and functioning. To facilitate studies to address the gaps identified above, the panel suggested collection of morbidity data using physical exams and laboratory tests as a methodological issue. In addition, large, representative samples for epidemiologic studies could be developed, as well as smaller scale studies, prospective studies and randomized trials where appropriate. Finally, there was agreement that to ensure cross-agency dialogue around research priorities in this area, additional partners – in particular the National Institute on Alcohol Abuse and Alcoholism (NIAAA) and the National Institute on Drug Abuse (NIDA) -- would be helpful.

## **IV. Causes, Correlates, and Risk for PTSD**

This panel considered eight broad topics related to the causes, correlates, and risk for PTSD: (1) genetic factors and gene by environment interactions; (2) developmental/childhood factors; (3) neurobiological risk and resilience factors; (4) psychological risk and resilience factors (e.g., coping style, personality); (5) cognitive/behavioral risk and resilience factors (e.g., processing information and appraisal of information); (6) characteristics of the trauma; (7) peri-traumatic factors (e.g., level of arousal and dissociation); (8) social factors before, during, and after the trauma.

The panel identified six major research gaps, including the need for longitudinal studies, prospective studies, comprehensive studies with multiple variables, studies of the mechanisms of risk and resilience, studies that include expanded assessments, and interventional studies. Additionally, the panel stressed that research in this area should be theory driven; and, given the present state of knowledge, the field would benefit from a PTSD brain bank. Research is needed to build, integrate, and test theoretical models. Thus, the cycle should incorporate generating and testing theory, confirming or rejecting hypotheses, and appropriate revising of theory.

### **a) Longitudinal studies**

In order to study risk and resilience factors, large scale multi-wave longitudinal studies are needed rather than cross-sectional studies. These studies would be able to evaluate predictors of different hypothesized trajectories of adaptation to severe war-zone stress and adversity, such as resilience, recovery, delayed response, and chronicity. Such studies have the capability to address directionality of causal impact. Furthermore, these studies may provide data by which to better understand different causal pathways to traumatic stress and different pathways to adaptation and recovery.

## **b) Prospective studies**

Ideally, service members would be evaluated prior to their deployment so that a true prospective approach can be used. To advance the field, predisposing social, individual, and biological variables need to be collected prior to deployment. Prior predisposition research has typically been retrospective, thus suffering from the confounding influence of current psychiatric state, other motivational variables (e.g., the need for validation, cognitive dissonance, etc.), and recall bias.

## **c) Comprehensive studies with multiple variables**

Currently the field knows a good deal about individual risk factors; however, far less is known about how these factors interact with other risk and resilience factors, particularly factors from different domains (i.e., biological, psychological, social). Studies need to be comprehensive, and it will be important to study simultaneously multiple variables from a variety of domains and to aggregate risk and resilience factors to predict outcome.

## **d) Mechanisms or risk and resilience**

Although much is known about risk factors for PTSD, less is known about protective and resilience factors. Additionally, very little is known about the mechanisms by which risk and resilience factors affect outcomes. It is important to study to what degree these factors are mediators versus moderators. Further, if a risk or resilience factor is changed, how will that change influence outcomes? There was also considerable discussion concerning allostatic load and gene by environment interactions. Such studies would require large samples with banking of genetic material. When measuring risk factors, the panel suggested assessing the proximal (expressed) construct until the underlying construct is measurable (e.g., measure psychopathology until genetic load for disorder is measurable).

## **e) Expanded assessment**

Currently, most studies involving risk and resilience factors focus on PTSD and depression. Research is needed to assess the relationship between trauma, risk and resilience factors, and areas such as work, social, and family functioning, physical health, substance abuse, and quality of life. Additionally, guilt, shame, and anger are extremely important issues in trauma survivors and need to be more systematically studied in relation to risk and resilience factors.

## **f) Interventions**

Research is needed to develop and study interventions that can reduce risk factors and/or enhance resilience factors. For example, far more needs to be known about interventions such as stress inoculation. These interventions could be biological, social, or cognitive. For example, are there cognitive training programs that could be

administered before exposure that would reduce the likelihood of developing trauma-related psychopathology? Similarly, are there effective pharmacological interventions that could be administered before or immediately after exposure?

## **Summary**

Key research gaps identified by this panel relate to answering theoretically driven questions supported by methodologically appropriate study designs. While such studies may be expensive and time-consuming, the investment could be worthwhile.

## **V. Healthcare Services**

The health services research panel originally considered eight topics which included: (1) access to services; (2) rates of service use; (3) quality of care and outcomes (with special emphasis on employment and military retention as outcomes); (4) barriers and incentives for service use; (5) ethnic and gender differences in service use; (6) setting and timing specific outcomes (e.g., in theater, on active duty, in VA, in primary care, in specialty care); (7) modes of service delivery (e.g., primary care providers, nurse specialists, internet) and their accessibility, acceptability, and outcomes; (8) cost-effectiveness of screening and early intervention. Research themes and directions fell into eight major areas dealing with: (1) care and outcomes throughout different phases of the military lifespan and in different military and VA settings, (2) quality of care, (3) novel health care delivery modalities, (4) access to care, (5) equity issues, (6) staffing patterns, (7) economic analyses, and (8) implementation/dissemination research.

### **a) Research on care and outcomes throughout different phases of the military lifespan and in different military and VA settings**

The panel suggested a broad and encompassing program of research on PTSD and other deployment related adjustment disorders that covers care while on active duty; while transitioning from active duty to VA or private sector; and in the VA health system. Research on screening, recognition, and early treatment in theater as well as more research on the pre- and post-deployment health assessments (mass pre-clinical screening opportunities) was considered an important direction for future research. Additionally, studies to improve the effectiveness of screening, recognition, and treatment in primary care settings (both DoD and VA) were also considered to be extremely important. For example, PTSD screening cutoff scores that were normed on veterans whose combat experience was more distal than current OIF/OEF veterans may need to be re-evaluated for more accurate and meaningful results. Related to this is the need to understand better the normative trajectory for resolution of acute responses that should then provide context for interpreting screening results.

Not to be neglected are studies to improve treatment delivery in psychiatric specialty care settings (both DoD and VA). In particular, the VA will need to address a younger group of veterans with different characteristics than Vietnam veterans who have until now been the modal PTSD patients.

## **b) Quality of care**

The panel also identified a need for research to improve and measure quality of care for PTSD. Needed are valid benchmark measures for processes of care and outcomes. These measures will enable the development of a Health Plan Employer Data and Information Set (or HEDIS) style benchmarking system (as already exists for depression) that will allow comparisons with other health care systems and plans.

## **c) Novel delivery modalities**

The development of novel and cost-effective ways to engage service members and veterans in treatment would help to improve the numbers of treatment completers and thus improve success rates. For example, use of telemedicine technology could enable evaluation and treatment of patients located distally to main treatment centers. Web-based treatment could be used similarly, but with the added benefit of patients working through a professionally guided treatment program at their own pace and time, with regular professional monitoring of treatment progress and response. Additionally, use of new technology (such as audio-digital players or MP3's) appealing to younger patients could be tested for effectiveness in delivering health education messages.

## **d) Access to care**

Access to care is related to many of the issues described above. Studies on barriers to care and factors that facilitate access to care are needed. Particularly valuable would be interventional studies addressing barriers and facilitating factors. Stigma is still a concern for military populations, and may deserve special consideration. Barriers for impoverished and disadvantaged populations would also be addressed. Studies might also address incentives for care, such as disability compensation and access to free or low cost care by being vested in the VA. Ethnographic studies exploring military culture may be helpful in understanding attitudes about mental health care and the barriers that service members perceive. Additionally, there are provider, hospital, and system level factors that influence access to care. The impact of provider (e.g., process of care incentives for some conditions) and system incentives (e.g., capitation fees for certain diagnostic conditions) as exist in the VA would be important research topics.

Understanding and addressing these factors is an important area of research.

## **e) Equity issues**

Equity refers to equal access, treatment, and outcomes for both genders, all race and ethnicity groups, geographically remote groups, and elderly individuals. Gender related issues are particularly relevant to military and veteran populations. This is especially important when dealing with PTSD, as traumatic events differ by gender. Treatment considerations (in particular mixed gender groups versus same sex groups or individual treatment) may thus be an issue, and more research on gender-related treatments is needed. Similarly, studies and evaluations regarding equal access, treatment, and outcomes by race and ethnicity should be ongoing for continued assurance of equity in

this area. Equity by geographic residence (especially for rural and remote populations) and for elderly veterans also requires study and development of interventions.

#### **f) Staffing patterns**

The best treatments in the world cannot be delivered effectively without adequate staffing or the appropriate staffing mix. This includes linking staffing needs with epidemiologic studies to estimate treatment need. Such staffing needs could be examined from a systems perspective and take into account all levels of care, including primary care and specialty care. This would include coordinated care approaches, such as stepped care, as applied to PTSD treatment. Additionally, the effectiveness of innovative multi-disciplinary treatment teams could be studied. The effectiveness of providers other than physicians, for example nurses (especially advanced practice psychiatric nurses), physician assistants, and others, could be studied – particularly in the context of team approaches and alternative approaches (e.g., internet assisted treatment).

Given the size of the healthcare systems in both the DoD and the VA, both entities are positioned as leaders in studies in this area and have an investment in the results. Overall, conducting studies in this area is highly important.

#### **g) Economic analyses**

The panel endorsed the general concept of health economic studies related to PTSD and stress-related disorders. Of interest are studies of cost of care and cost-effectiveness that encompass screening, early intervention, and treatment in various health care sectors. Similarly, cost-effectiveness studies of care that make use of non-physician providers (e.g., advanced practice psychiatric nurses, physician assistants) are needed. Overall, while cost-effectiveness studies are important, the panel also noted that the treatment field is changing rapidly. Economic studies that address the cost of PTSD and related co-morbidity to the VA and to society in both the short and long range are greatly needed.

#### **h) Implementation/dissemination research**

The panel was extremely enthusiastic about the need to conduct research on implementation and dissemination of effective treatments and best practices. In particular, studies of how best to implement and disseminate cognitive behavioral therapy tailored to PTSD and other deployment related disorders are needed. PTSD treatment guidelines have been developed jointly by VA and DoD experts, and yet they have not widely been adopted. Research on the implementation of the guidelines and their effectiveness could help to lessen treatment variability.

#### **Summary**

This panel considered many different types of health services studies, but identified the highest need for treatment related studies that encompass quality of care and outcomes, taking into account systems of care. Additionally, the panel felt that the known effective treatments and treatment approaches were implemented too infrequently ; thus, dissemination and implementation research is much needed.

Clinical epidemiology and population-based approaches are extremely useful in terms of mapping problematic areas in a system of care and identifying points for optimal screening and intervention delivery. A population-based approach that encompasses both the DoD and VA would be helpful for all studies. Approaches such as those employed with the Army's Suicide Epidemiologic Consultation Team may have promise for quickly identifying factors associated with deployment related behavioral health problems and developing appropriate and relevant time-sensitive interventions.

## **Conclusions**

Participants agreed that it would be valuable for the three sponsoring agencies, NIMH, VA, and DoD, to continue to share and coordinate research and other activities relevant to deployment related behavioral problems. Other agencies (e.g., NIAAA, NIDA) could be included as appropriate.

In addition to the research needs identified by the various panels, participants noted that some very important topics for scientific investigation would face challenges in peer review of applications for research funding. These might be descriptive or evaluative studies, or those with extremely high budgets. Thus, agency officials may need to consider mechanisms that insure such data are generated and consider appropriate time lines for these studies in light of budgetary constraints.

Workshop participants also noted that it is impossible to prioritize the many needed research topics. Different agencies will clearly have different needs and priorities. The intention of this summary document is to provide a compendium of research directions from which each agency can develop its own research agenda and facilitate the identification of areas of mutual interest where collaboration can be fostered.

**Disclaimer Note: Points of view are those of the participant(s)/author(s) and do not necessarily reflect those of U.S. federal agencies including Department of Veterans Affairs, National Institutes of Health, and Department of Defense.**

## Workshop Participants

### **Participants**

**J. Douglas Bremner, M.D.**

Dept of Veterans Affairs, Atlanta VAMC  
Emory University - Emory Briarcliff Campus

**Eve Carlson, Ph.D.**

Psychiatry Service, National Center for PTSD  
Dept of Veterans Affairs, Palo Alto VAMC

**Stephen Cozza, M.D.**

Study of Traumatic Stress, Child and Family Programs  
Walter Reed Army Medical Center

**Panakkal David, M.D.**

Dept of State, Office of Mental Health  
M/MED/MH

**Lori Davis, M.D.**

Dept of Veterans Affairs, Tuscaloosa VAMC

**COL Charles C. Engel, Jr., M.D.**

Deployment Health Clinical Center  
Walter Reed Army Medical Center

**Stevan E. Hobfoll, Ph.D.**

Applied Psychology Center, Kent State University

**COL Charles Hoge, M.D.**

Dept of Behavioral Health & Epidemiology  
Walter Reed Army Institute of Research

**John Krystal, M.D.**

National Center for PTSD  
Clinical Neurosciences Division  
Psychiatry Service (116A)  
Dept of Veterans Affairs, West Haven VAMC

**Brett Litz, Ph.D.**

National Center for PTSD  
Dept of Veterans Affairs, Boston HCS

**Kathy Magruder, Ph.D.**

Dept of Veterans Affairs, Charleston VAMC

**CAPT William Nash, M.D.**

Combat and Operational Stress Control  
Headquarters, Marine Corps Manpower & Reserve Affairs

**Scott Orr, Ph.D.**

Massachusetts General Hospital  
Dept of Veterans Affairs, Research Service

**Murray Raskind, M.D.**

Dept of Veterans Affairs, Seattle VAMC

**COL Elspeth Cameron Ritchie, MD, MPH**

US Army Surgeon General

**Josef Ruzek, Ph.D.**

NCPTSD  
Dept of Veterans Affairs, Palo Alto HCS

**Paula Schnurr, Ph.D.**

White River VAMC  
Dartmouth Medical School  
National Center for PTSD

**Steven Southwick, M.D.**

Psychiatry Service (116A)  
Dept of Veterans Affairs, New England HCS

**Robert Ursano, M.D.**

Uniformed Services University of Health Science

**Jennifer Vasterling, Ph.D.**

Mental Health Service  
Dept of Veterans Affairs, New Orleans VAMC

**Deborah Warden, M.D.**

Defense & Veterans Brain Injury Ctr  
Uniformed Services University

**Douglas Zatzick, M.D.**

Department of Psychiatry and Behavioral Sciences  
Harborview Injury Prevention and Research Center  
University of Washington

### **Organizers**

**Terri Gleason, Ph.D.**

Clinical/Biomedical R&D Services  
Dept of Veterans Affairs, ORD

**LTC Carl Hover, Ph.D.**

Military Operational Medicine Research Program  
United States Army Medical Research and Materiel Command  
HQ, USAMRMC

**Kathy Magruder, Ph.D.**

Dept of Veterans Affairs, Charleston VAMC

**Farris Tuma, Sc.D.**

National Institute of Mental Health

**Robert Ursano, M.D.**

Uniformed Services University of Health Science

### **Invited Guests**

**Kelley Ann Brix, M.D.**

Office of the Assistant Secretary of Defense for Health Affairs  
Deployment Health Support Directorate

**Martha Bryan, Ph.D.**

Health Services Research and Development  
Dept of Veterans Affairs, ORD

**Wayne S. Fenton, M.D.**

National Institute of Mental Health

**John Frazier Glenn, Ph.D. (SES)**

U.S. Army Medical Research and Materiel Command  
HQ, USAMRMC

**Stephen J. Grate, D.V.M.**

Consultant to Military Operational Medicine Research Program  
HQ, USAMRMC

**Robert Heinssen, Ph.D., ABPP**

National Institute of Mental Health

**Thomas Insel, M.D.**  
National Institute of Mental Health

**COL Robert Ireland, M.D.**  
Office of the Assistant Secretary of Defense (Health Affairs)/Clinical and Program Policy

**Michael E. Kilpatrick, M.D.**  
Office of the Deputy Assistant Secretary of Defense  
(Force Health Protection and Readiness)

**Bart Kuhn**  
Biomedical Science & Technology  
Office of the Director of Defense Research & Engineering

**COL Mary S. Lopez, Ph.D.**  
Occupational Therapy Section, USACHHPM  
MCHB-TS-OER, ERGO

**LTC Sharon McBride, Ph.D.**  
Cognitive Assessment Branch  
Division of Psychiatry and Neuroscience  
WRAIR

**Richard K. Nakamura, Ph.D.,**  
National Institute of Mental Health

**Timothy J. O'Leary, M.D., Ph.D.**  
Clinical Science/Biomedical Laboratory Research and Development Services  
Department of Veterans Affairs

**CDR Russell Shilling, Ph.D.**  
Naval Warrior Applications Division  
Office of Naval Research

**Timothy Wells, M.D.**  
Biomechanics Branch  
Biosciences and Protection Division  
Human Effectiveness Directorate  
Air Force Research Lab, WPAFB