Approaches to the Primary Prevention of Posttraumatic Stress Disorder in the Military: A Review of the Stress Control Literature

Laurel L Hourani, PhD, MPH; Carol L Council, MSPH; Robert C. Hubal, PhD; Laura B. Strange, PhD

ABSTRACT
Numerous studies are underway, using data collected from clinical studies and data collected from surveys of combat troops, to determine the most efficacious treatment options for those diagnosed with posttraumatic stress disorder (PTSD). In contrast, little is known about the effectiveness of predeployment training in preventing or mitigating the impact of combat-related stressors on the development of PTSD. We conducted a comprehensive review of literature pertaining to primary prevention efforts to stem the advent of PTSD and other combat and operational stress injuries in military populations using databases from the peer-reviewed literature as well as online searches and colleague referrals. Results show that, as with treatment for PTSD, the most promising preventive approaches appear to utilize exposure strategies, especially those in conjunction with education and stress reduction skills training.

INTRODUCTION
The costs of posttraumatic stress disorder (PTSD) and other stress disorders associated with the wars in Iraq and Afghanistan are substantial not only for military personnel and their families but also for force readiness and society at large. Individuals with PTSD are at risk for other psychiatric diagnoses (e.g., substance abuse and attempted suicide), have higher rates of unhealthy behaviors (e.g., smoking, unsafe sex), and have higher rates of physical health problems, absenteeism, reduced productivity, impaired relationships, and homelessness. It has been estimated that the 2-year PTSD and depression-related costs for the approximately 1.6 million troops who have deployed since 2001 could range from $4.0 to $6.2 billion. Huge amounts of government resources are being expended on the treatment and recovery of combat-related stress disorders, while relatively little attention has been paid to their prevention.

In 1998, Deal reviewed approaches to reducing or lessening PTSD. One approach suggested a focus on selecting lower-risk recruits. With the onset of the wars in Iraq and Afghanistan and the increasing pressure to keep and recruit new troops, such a suggestion was neither feasible nor practical. More recently, Stetz et al. reported that of a sample of troops who were medically evacuated for psychiatric reasons, 21% had psychiatric histories prior to deploying to a combat zone, suggesting that the military may be able to identify high-risk personnel before deployment. Although over the past several years the military has had service members returning from deployment complete a self-report Postdeployment Health Assessment and a Re-Assessment after 3 months and 6 months to determine who has developed PTSD and other physical and psychological illnesses, predeployment health screenings have been cursory at best and rarely find a service member unfit for deployment.

The U.S. Department of Defense (DoD) has implemented a broad set of research programs designed to deal with PTSD in its Army, Navy, Air Force, and Marine personnel and to address their significant and growing needs. Most studies have focused primarily on PTSD treatment and reduction of long-term disability after a traumatic event or combat exposure. Such tertiary preventive measures have included psychotherapy, pharmacotherapy, and various exposure therapies. Some secondary preventive approaches have focused on early intervention for the reduction of symptoms among those at risk for developing full PTSD such as critical incident stress debriefing and disrupting memory consolidation. In contrast, little is known about practical primary preventive efforts that would include predeployment training designed both to prepare all personnel to cope with potential deployment or combat-related stressors and to lessen the likelihood that they will develop PTSD.
As personnel continue to be engaged in combat and stressful operational situations, and as increasing numbers of personnel are diagnosed with PTSD, attention is now beginning to turn to predeployment efforts to reduce the harmful effects of trauma exposure. Given the cost-effectiveness of a preventive rather than a treatment model and using the public health notion of primary prevention as a strategy to prevent the disorder itself, this review focuses on those efforts that are implemented before the onset of the disorder. As such, we sought to bring together all peer-reviewed studies relevant to predeployment training or efforts during deployment to help military personnel mitigate the effects of traumatic exposures that may in turn reduce the risk of PTSD and other stress-related injuries. In addition, we describe a new work toward primary prevention efforts with an emphasis on pretraumatic exposure efforts.

METHODS

The first step in garnering such information was to identify key areas of research that might pertain to predeployment combat and operational stress control (COSC) training. We conducted electronic searches to identify recently published articles in a number of peer-reviewed literature databases, including Defense Technical Information Center Science and Technology, EBSCOhost, MEDLINE, PILOTS, PsychInfo, PubMed, Science Direct, and Web of Science (Science Citation Index Expanded and Social Sciences Citation Index). We also searched government Web sites and any Web sites identified using search criteria entered into the Google and Yahoo search engines. Searches included English-language references from 1990 to the present and previously published relevant review articles. Military Medicine and several preventive medicine journals were also manually searched. Searches for research articles were limited to references dealing with U.S. or non-U.S. military personnel (Army, Navy, Air Force, Marine Corps, and National Guard) and more generic terms such as “military,” “combat,” “war,” and “armed forces.” Specific search terms used included the following:

(1) prevention of PTSD
(2) combat and operational stress
(3) stress and coping behavior
(4) stress and inoculation
(5) stress and predeployment
(6) stress and prevention
(7) stress control
(8) stress management
(9) resilience
(10) mental readiness

Among over 40 initial articles, most were found to address the secondary prevention of previously combat-exposed or referred/symptomatic personnel. We specifically excluded studies that were treatment oriented or included patients or personnel who already had PTSD symptoms. Only 14 remaining articles could be broadly interpreted as including a primary prevention approach with a nonclinical or nonreferred sample prior to combat exposure and utilized a military population (American or British). These are shown in Table I and included anecdotal reviews, surveys, and program descriptions and evaluations and are divided into studies conducted during deployment and those conducted predeployment.

RESULTS

PTSD Prevention Efforts During Deployment

Several different approaches to mitigating the effects of combat stressors in the field of operation have been developed. Underlying these approaches are elements of Deahl’s suggestion that teaching soldiers the physiological basis of PTSD, providing them with anxiety-reducing techniques, using strategies to minimize identification with victims, and maintaining social supports can reduce the emotional impact of trauma. Four studies utilizing these approaches are outlined in Table I. Time-driven Battlemind Psychological Debriefing (PD) is designed to occur at intervals during deployment and is intended to reduce the level of mental health symptoms for the unit overall. Five phases of the debriefings are described that reinforce Battlemind principles of steel your battlemind, trust your training, listen to your leaders, and be a buddy. Systematic research on the efficacy of this program is not yet available, although anecdotal reports suggest that it has been well received and is considered helpful.

In the United Kingdom, the Royal Marines have developed a Trauma Risk Management system known as TRiM, which builds on the use of peer group practitioners who have been trained to assist personnel managers to deal with the psychological aspects of traumatic events. TRiM is a postincident management protocol implemented by trained individuals working under a strict code of practice. Although designed as a randomized controlled trial, no studies on the effectiveness of this approach have yet been reported. However, a survey of Royal Navy TRiM participants evaluated exposure to stress education and inquired if shipboard personnel had received any in-service stress education briefs and, if so, when and whether it was useful. Results showed that only briefs that were remembered and perceived as useful were associated with better mental health.

One intervention, presented in the combat zone and intended to moderate the effects of combat stress, attempts to inoculate military personnel by providing specialized resilience training. This training is designed to equip individuals with cognitive exercises, such as role plays and live demonstrations, to mitigate the effects of traumatic events that may be experienced in combat. Anecdotal evidence suggests that soldier responses to the training were positive. Another intervention to enhance coping skills in the combat zone is described by Riva et al., who developed a protocol based on “mobile narratives.” Their intent was to enable soldiers experiencing combat stress to relax by engaging in audio-visual experiences delivered via cell phones. However, no studies have been
<table>
<thead>
<tr>
<th>Author and Publication Year</th>
<th>Name/Type</th>
<th>During Deployment/Predeployment</th>
<th>Population</th>
<th>Design</th>
<th>Aims, Methods, and/or Measures</th>
<th>Staffing</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adler et al., 2009</td>
<td>Time-driven Battlemind Psychological Debriefing</td>
<td>At intervals during deployment</td>
<td>U.S. military personnel; platoon level</td>
<td>Review article: Debriefing in five stages: Introduction, Events, Reactions, Self- and Buddy-Aid, Battlemind Focus</td>
<td>Debrief uses specific set of questions to guide participants to acknowledge combat experiences and review common reactions to combat-related stressors</td>
<td>Two facilitators with preestablished relationships with population</td>
<td>Anecdotal, potentially biased evidence that debriefings in theater are well received and helpful</td>
</tr>
<tr>
<td>Greenberg et al., 2005</td>
<td>Trauma Risk Management (TRiM)</td>
<td>During deployment</td>
<td>Royal Navy personnel on 16 ships</td>
<td>Proposed RCT (data not reported): Traumatic stress management peer support programme (risk assessment) vs. standard care</td>
<td>Aims to equip non-medical personnel to manage psychological aspects of incident site management, how to plan for post-event psychological needs, how to conduct a semi structured risk assessment interview, how to conduct basic psychoeducational briefings</td>
<td>Non-medical personnel in junior management positions who have been trained in the system</td>
<td>Program description: no results published to date</td>
</tr>
<tr>
<td>Greenberg et al., 2009</td>
<td>Psychoeducation/&quot;any in-service stress education&quot;</td>
<td>During deployment</td>
<td>Royal Navy personnel (N = 1559) serving on 12 operational warships</td>
<td>Cross-sectional survey data</td>
<td>Respondents reported on any in-service stress education, and if so on when briefings occurred and whether they had been useful.</td>
<td>N/A</td>
<td>Only stress education briefs perceived as useful to target audience related to less distress</td>
</tr>
<tr>
<td>Jarrett and Barnett, 2007</td>
<td>Warrior Resilience Training cognitive exercises</td>
<td>During deployment, weekly sessions</td>
<td>U.S. Army; anecdotal evidence only</td>
<td>Role plays, didactic instruction, Socratic questioning, live demonstrations</td>
<td>An integration of Rational Emotive Behavioral Therapy with concepts from Stoic philosophy</td>
<td>Instructor</td>
<td>An informal estimate suggests at least a 60% increase in referrals when the program was advertised as warrior resilience vs. standard therapy; soldier responses to the training were generally positive</td>
</tr>
<tr>
<td>Baker and Armfield, 1996</td>
<td>Stress inoculation training and debriefing</td>
<td>Predeployment</td>
<td>U.S. military</td>
<td>Anecdotal/review</td>
<td>Reviews primary and secondary prevention guidelines and stress inoculation therapy</td>
<td>N/A</td>
<td>Using SIT prior to casualty handling and providing for CISD may reduce incidence of combat casualty-induced stress disorders</td>
</tr>
<tr>
<td>Bartone, 1999</td>
<td>Hardiness survey</td>
<td>Mixed deployed to Persian Gulf (N = 239) or Germany (N = 145) and not deployed (N = 236)</td>
<td>Army National Guard and Reserve medical units in three states</td>
<td>Hardiness survey</td>
<td>Survey covered three general areas: (a) sources of stress, (b) coping resources, and (c) health</td>
<td>N/A</td>
<td>Hardiness interacted with combat-related stress and stressful life events to predict psychiatric symptoms</td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th>Author and Publication Year</th>
<th>Name/Type</th>
<th>During Deployment/Predeployment</th>
<th>Population</th>
<th>Design</th>
<th>Aims, Methods, and/or Measures</th>
<th>Staffing</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benedek and Ritchie, 2006</td>
<td>Mental health training</td>
<td>Predeployment</td>
<td>Project Hope: 50 volunteers from all over the United States on a mission to Southeast Asia in the aftermath of the December 2004 tsunami.</td>
<td>Discussions of (1) basic needs, (2) psychological first aid, (3) monitoring the recovery environment, (4) outreach/information dissemination, (5) fostering resilience/recovery, (6) technical assistance/consultation/training, (7) triage, and (8) treatment</td>
<td>Predeployment/postdeployment form to quantify previous military and civilian deployment and disaster-relief experience, including previous exposure to psychological stressors.</td>
<td>Mission leadership</td>
<td>Evidence from a pre/postdeployment survey showed no changes in overall health status or in rates of depression, PTSD, or risk behaviors; many found predeployment orientation and training helpful</td>
</tr>
<tr>
<td>Brushe, 2007</td>
<td>COSC</td>
<td>Predeployment</td>
<td>U.S. military</td>
<td>Historical and current review of COSC</td>
<td>COSC activities include: routine screening when recruited, continued surveillance and continual assessment and consultation with medical and other personnel</td>
<td>Military leadership</td>
<td>COSC is an effective combat multiplier which is continuing to evolve. It requires leadership integration and support of medical providers and religious support assets. Authors indicate that the training package may have contributed to low rates of PTSD</td>
</tr>
<tr>
<td>Deahl et al., 2000</td>
<td>Operational stress training package (SIT)</td>
<td>Predeployment</td>
<td>British U.N. peacekeeping troops (N = 106)</td>
<td>Soldiers received an operational stress training package before going to Bosnia</td>
<td>Package involved critical incident stress management support services to assist with strong reactions to a traumatic event</td>
<td>N/A</td>
<td>Prior deployed Marines appear to be more aroused by the stressor environment than never-deployed; participants preferred the didactic training</td>
</tr>
<tr>
<td>Hourani et al., 2009</td>
<td>Predeployment SIT</td>
<td>Predeployment</td>
<td>U.S. Marines (N = 68)</td>
<td>Controlled pilot test: interaction within video-based stressor environment, breathing and relaxation exercises vs. combat operational stress control procedures</td>
<td>Arousal measured by heart rate variability, behavior measured by joystick responses to stimuli presented in video</td>
<td>Instructor, support staff</td>
<td></td>
</tr>
<tr>
<td>Maguen et al., 2008</td>
<td>Risk and Resilience factor survey</td>
<td>Predeployment</td>
<td>Air Force medical personnel before deployment to Iraq (N = 328)</td>
<td>Survey of personnel on day of deployment</td>
<td>Survey included life events, stressors, PTSD scale, resilience scale and positive appraisals of military experiences and emotionality</td>
<td>NA</td>
<td>Positive military experiences predicted fewer PTSD symptoms predeployment and had implications for screening</td>
</tr>
<tr>
<td>Author and Publication Year</td>
<td>Name/Type</td>
<td>During Deployment/Predeployment</td>
<td>Population</td>
<td>Design</td>
<td>Aims, Methods, and/or Measures</td>
<td>Staffing</td>
<td>Results</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------</td>
<td>---------------------------------</td>
<td>------------</td>
<td>--------</td>
<td>-------------------------------</td>
<td>----------</td>
<td>---------</td>
</tr>
<tr>
<td>Sharpley et al., 2008</td>
<td>Operational stress education</td>
<td>Predeployment</td>
<td>British Navy and Marines; survey administered to N=4000</td>
<td>Controlled, non-randomized, parallel group study comparing those who received a pre-operational stress briefing and those who did not.</td>
<td>Brief covering the role of the mental health team; available medical facilities; definitions of stress, pressure and strain; types of stressors (physical, social, occupational and traumatic); effects of stress on individuals; advice on handling human remains; managing stressful thinking in a chemical or biological environment; the importance of morale; levels of support available</td>
<td>Naval mental health team deployed with forces</td>
<td>2-3 years post-operational deployment, no apparent effect of having a stress brief prior to combat operations; no differences between the two groups (stress briefing attendees or not) for common mental health disorders, PTSD, alcohol misuse; no differences between the two groups for experiencing problems during or postdeployment or for marital satisfaction</td>
</tr>
<tr>
<td>Stetz et al., 2007</td>
<td>Virtual reality (VR) SIT</td>
<td>Predeployment</td>
<td>U.S. Army first responders (N = 25) from flight medic course or medical clinic at Ft. Rucker</td>
<td>Navigation and interaction within combat medic and flight medic virtual reality scenarios</td>
<td>VR-SIT efficacy assessed by VR game play and coping training (CT), VR only, CT only, or neither (control); presence, psychological stress, and biochemical stress (salivary amylase test) measured</td>
<td>Research team</td>
<td>Preliminary findings suggest the VR environment was natural, enjoyable, and leads to minor or no discomfort while navigating; technique appears to induce a level of stress high enough to potentially produce an &quot;inoculation&quot; effect; VR environment increased levels of posttreatment anxiety and dysphoria, compared to coping training only</td>
</tr>
<tr>
<td>Warner et al., 2007</td>
<td>Predeployment education and communication</td>
<td>Predeployment and during deployment</td>
<td>U.S. Army; more than 22,000 contacts with Soldiers by division mental health services</td>
<td>Predeployment education briefings for senior and company-level leaders regarding the effects of behavioral health aspects of combat; during deployment delivery of prevention, treatment, and restoration services</td>
<td>Majority of contacts outside of clinic, some resulted from clinic visits by soldiers for combat operational stress reactions or psychiatric disorder</td>
<td>Division mental health staff members</td>
<td>N/A</td>
</tr>
</tbody>
</table>
reported to assess the value and impact of this protocol, and it is not included in Table I because its preliminary test was conducted among Italian train commuters.

Overall, these few studies represent the beginnings of the military's efforts to include some mental health training while in theater or underway. The lack of rigorous evaluations of these programs may be understood in light of the challenges of conducting these programs at all under such circumstances. Preventive efforts prior to deployment may have greater opportunities for assessment and evaluation and are described in the following section.

PTSD Prevention Efforts Predeployment

Predeployment prevention efforts are geared toward providing preparatory information before a stressful event with the intent of helping mitigate the emotional and behavioral impact of the event. For organizational purposes, we have divided predeployment prevention efforts into two groups: those efforts that have used primarily psychoeducational approaches (i.e., a passive presentation of information generally imparted in briefings, informational leaflets, videos, or the Internet) and those that have used more hands-on, didactic efforts aimed at training specific coping skills. Unfortunately, most evaluations examining the impact of preparatory information prior to encountering a stressful event have been undertaken in the civilian sector. This research suggests that receiving preparatory information before a stressful event can reduce negative responses to stress. For example, Inzana et al. examined the effects of providing preparatory information on how to adapt to changes or reactions incurred through a stressful event to determine whether three types of such information (sensory, procedural, and instrumental) actually could reduce stress reaction and enhance performance on a realistic decision-making task. They report that those participants receiving preparatory information reported less anxiety, were more confident, and made fewer performance errors than those who had not received preparatory information. However, they found no effect of either stress or preparatory information on speed of performance. Inzana et al. suggest that the provision of preparatory information be considered as one component of stress training intervention addressing how the individual may feel in a stress setting.

Although many resources have been used to develop such programs, few studies have examined the efficacy of these educational briefings and stress control techniques, particularly with respect to the incidence and long-term prevalence of PTSD.

Coping skills training has also been successfully utilized in nonmilitary settings to work with medical and dental patients prior to their procedures to reduce negative stress reactions. Although coping skills training results have been promising, little research has examined the efficacy of preparatory information in nonclinical environments. Eiksson et al. examined trauma exposure and PTSD symptoms in international relief and development personnel and report that the interaction between social support and exposure to life-threatening events accounts for a significant amount of the variance in PTSD severity. The authors suggest that predeployment training, risk assessment, and contingency planning may better prepare personnel for the challenges they face. Table I also shows that both psychoeducational and coping skills training prevention efforts have been undertaken in predeployment venues in the military sector.

Predeployment Psychoeducational Approaches

Psychoeducational approaches have been based on the philosophy that if people are given information about what symptoms they may experience after trauma, then they may find these experiences to be less disturbing and recognize that these symptoms are normal reactions. Recognizing their symptoms may also help facilitate help-seeking and introduce corrective action that modifies a trauma survivor's negative perceptions and encourage empowerment and self-help activities.

Initially, two studies were found that used surveys to examine specific potential preventive measures aimed at reducing deployment-related stress. Bartone used a 1999 survey to examine personality hardness, a personality variable describing persons with a high sense of life and work commitment, a greater feeling of control and who are more open to change and challenges in life, in 384 deployed and 236 nondeployed Army Reserve forces, and found that hardness protected against the ill effects of multiple stress conditions. In their survey of 328 Air Force medical personnel being processed through Lackland Air Force Base before deployment to Iraq, found that positive military experiences predicted PTSD symptoms.

Knowing that it may take several months for trauma-induced symptoms to emerge, especially in chronically stressful situations such as combat deployment, and that early intervention may mitigate the onset of stress-related symptoms, the U.S. military has sought preventive strategies to target predeploying troops who may be at risk for PTSD. Preparing military personnel to meet operational demands has traditionally involved some combat stressor preparation training and the provision of educational information during boot camp. Lewis describes such combat stress control as "actions by leaders and mental health activities provided to soldiers through the deployment cycle, from predeployment activities in garrison environments, to deployment activities in the field, and then postdeployment activities upon return from combat or peacekeeping operations." Lewis claims that such interventions are intended to "reduce or prevent" the development of combat and operational stress reactions and ultimately reduce the development of PTSD. As shown in Table I, six studies have discussed such efforts in print. Other studies discussed below have only begun, and little information is available on them to date.

In terms of specific prevention programs to prepare military personnel for deployment in a combat arena, the military has provided precombat educational briefings to reduce anxiety and increase stress coping skills. These include
In the United Kingdom, predeployment training generally has focused on stressors related to operations, on simple methods for managing stress (in oneself and others), and on information regarding when and how to access additional support. Sharpley et al. conducted a controlled, nonrandomized parallel group study of the effect of a predeployment operational stress education (approximately 50–60 minutes in length) to 4,062 Royal Naval and Royal Marine personnel being deployed to the Persian Gulf. Mental health outcomes postdeployment were compared between those who received a preoperational stress briefing and those who did not. Results indicated that there were no significant differences between the two groups for the health outcomes of common mental health disorders, PTSD, or alcohol misuse. The authors found no evidence that a predeployment stress briefing reduced subsequent medium-term psychological distress.

Overall, these studies are consistent with Wessely et al.’s review of the PTSD psychoeducational literature, which found that there is a need for rigorous research that evaluates psychoeducational interventions and that there is little evidence to suggest that education per se has led to better adjustment in trauma survivors. It should also be noted that although one of the goals of psychoeducation is to help facilitate help-seeking, it has been widely demonstrated, particularly among military personnel, that the primary barrier to receipt of services is stigma rather than lack of knowledge.

Predeployment Coping Skills and Stress Inoculation Training Approaches

The Army Center for Enhanced Performance (http://info.armydev.com/projects.php?id=24), a program targeting warriors in transition and cadets to improve study strategies and life skills using applied educational techniques first developed in sports psychology to build mental and emotional skills, is currently being evaluated. Army Center for Enhanced Performance is used at the U.S. Military Academy to train cadets in stress resilience. Like Battlemind, its intent is to increase resilience in future officers to the challenges of leadership and war, but it goes beyond Battlemind in that it also trains skills such as arousal control and attentional control.

The most widely acknowledged preventive approach relevant to military-related PTSD is stress inoculation training (SIT). Vaccination has been employed in medicine since 1796. Most vaccinations involve inoculating individuals, that is, exposing them to weaker strains of viruses that produce antibodies to protect the body against stronger strains of the virus. By analogy, SIT is an effective method of reducing arousal levels in response to powerful stressors by “inoculating” individuals to potentially traumatizing stressors. SIT, which has been used predeployment and postdeployment, derives from models, such as that proposed by Lazarus and Folkman, that posit that stress occurs when the perceived demands of a situation exceed an individual’s ability to cope. SIT enables individuals to manage stressors when they occur at a low level so as to increase their ability to manage them under more intensive, acute, or chronic demands (e.g., when the stressors are uncontrollable or unpredictable). Meichenbaum discusses three stages to SIT: psychoeducation (learning about stress responses and the need to control them), training (learning...
a skill, such as arousal control, in order to mitigate the deleterious effects of stress), and implementation (utilizing these skills in the stressful context).

According to Meichenbaum, SIT is designed to intervene with humans at the psychosocial level to provide experience (exposure) with minor stressors, thus fostering psychological preparedness and promoting resilience to more major stressors. By training the individual in stress coping skills and then exposing the individual to milder forms of stress, coping mechanisms and confidence in use of coping skills is promoted. Meichenbaum characterizes SIT as a tailored form of cognitive behavioral therapy involving education, skills acquisition and consolidation, and application phases. Although SIT provided to predeploying personnel intuitively appears to have value in preparing military personnel to better cope with all the sources of stress they will encounter when deployed, few studies of predeployment SIT effectiveness in preventing PTSD have been undertaken.

Deahl et al. suggest that there is evidence that SIT and PD can reduce PTSD. A group of 106 British soldiers preparing for a 6-month tour of duty in Bosnia received predeployment stress training, including SIT. A randomized group also received postdeployment PD. In the immediate postdeployment period, a drastically reduced incidence of PTSD was observed in both groups compared to other military samples. Both groups demonstrated significant alcohol misuse in the immediate postdeployment period; however, those who received PD demonstrated decrease in alcohol use at the follow-up periods. Although these findings suggest a positive influence of SIT and PD, several methodological issues warrant caution in interpreting these outcomes.

Wiederhold and Wiederhold at the Virtual Reality Medical Center were recently funded to continue Phase II work on conducting SIT for combat medics to practice skills in a virtual world, with stressors added, before deployment to Iraq. Phase I results suggest that those trained in a simulation while having stressors added (being shot at while tending to a wounded) were able to perform skills more effectively in the test phase of the study compared to those trained in a “sterile” virtual environment (with no shooting). Those receiving SIT were able to develop divided attention skills and learned to moderate physiological responses to stress while staying focused on the task at hand. Those not receiving SIT were pulled off task and experienced much more physiological arousal during the test phase (being shot at), which caused mistakes to be made (simulated patients died or medics were killed in action).

Virtual reality SIT has also been provided to aeromedical personnel at Fort Rucker, Alabama. Preliminary findings with a sample of 25 medics suggest that those who learned coping techniques in the Virtual reality training exhibited lowered levels of stress than the control group. Spira et al. report that enhanced stress resilience is associated with a protective physiologic stress response. Although no formal studies of primary prevention for PTSD have been published, successful efforts to reduce arousal associated with PTSD symptoms have been made. The biological foundation for primary prevention efforts is based on studies suggesting that a reduction of physiological arousal shortly after trauma exposure may prevent or reduce the likelihood of developing psychological distress, including PTSD symptomatology, and that methods to reduce arousal levels, such as relaxation training and stress management techniques, play a role in reducing the risk of combat stress casualties.

Although such arousal reduction has been associated with PTSD treatment postdeployment, at least one effort is underway to examine the potential to prevent mental health casualties by training groups of deploying personnel to reduce their own arousal levels soon after trauma exposure. Predeployment efforts, including focusing on prevention, combining the provision of information, providing instruction in stress reduction techniques, and practicing these techniques to better prepare military personnel to effectively deal with combat-related stressors form the basis of the Predeployment Stress Inoculation Training (PRESIT) program. As a prevention strategy, PRESIT can be easily taught and learned, often in a single session, and can be incorporated into current predeployment training schedules. Moreover, PRESIT instructors can easily be trained to provide training to other personnel. Unlike many interventions, SIT can be provided in a group format, potentially making the training efficient and inexpensive. Training all personnel in a unit in these techniques can enable them to support one another in their practice. This may also reduce the need for and potential stigma associated with separation from the unit to seek a combat stress control intervention and/or mental health–related evacuation or both. Although SIT has been primarily studied among civilian populations, evidence seems to support the trial of PRESIT among military personnel.

**DISCUSSION**

The costs of PTSD to the military may include loss of trained personnel in the combat arena, long-term resources needed to provide psychiatric services to veterans, and adverse impact on military families. The costs to military personnel include social, economic, and other quality of life impacts. To mitigate these costs, the military is devoting substantial resources for identifying the best approaches available to prevent or mitigate the traumatic events encountered in combat areas. To date, most of these efforts have focused on secondary prevention efforts of reducing the impact of stressors and subsequent PTSD among symptomatic personnel while in the field and postdeployment. Although primary prevention for those at risk for developing PTSD is worthy of greater attention, insufficient efforts have been made thus far, despite the obvious applications to military personnel, emergency responders, police, and others where those at risk can be readily identified. On the other hand, this review has shown that several promising efforts at prevention are underway and the overwhelming anecdotal evidence suggests that such efforts are being well-received by military personnel. Although few studies have
been published in the peer-reviewed literature and many have significant methodological limitations, a number of recent efforts are currently being evaluated. Rigorous program evaluation and intervention studies are needed to move these efforts forward. The strongest strategies to date appear to be those utilizing a combination of education, skills training, and stress reduction techniques to enhance resilience. Continued support for such efforts has the potential to reduce both the personnel and financial costs of war. Although specific programmatic recommendations should await further studies, this overview suggests that the prevention programs that may provide optimal benefit to at-risk personnel are those that integrate knowledge about factors that enhance resilience via effective procedural training before exposure to stressful events with group support during the operation itself. We also make the overall recommendation that as new preventive efforts are deployed, they be accompanied by rigorous scientific evaluation studies that can test their effectiveness from the onset. While it is unrealistic to expect that PTSD and other stress-related disorders can be completely prevented, especially in a military culture, programs that nudge a cultural change to accept that the protection the mental health is as important as physical health will likely help mitigate and manage the negative effects of deployment and combat exposure.

ACKNOWLEDGMENTS

We thank Dr. James Spira and Ms. Greta Kilmer for their technical assistance and Mr. Justin Faerber for his editorial assistance. This study was funded by the Department of Defense under W81XWH-08-1-0334 and N000014-08-C-0504.

REFERENCES


Primary Prevention of PTSD


