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Traumatic Brain Injury and Military Families

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The current common combat era casualties have been posttraumatic stress disorder (PTSD), head injuries, hearing loss or impairment, and polytrauma. This combat era has been notable for increased survivability of such injuries, attributed to advances in armor technology, medical technology, telecommunications, and transportation. Traumatic brain injuries, also known as acquired brain injury or closed/open head trauma, in the mild range of severity (mTBI or concussion) have been estimated to affect approximately 15% of active duty combat troops deployed to Iraq and/or Afghanistan (Hoge et al., 2008). Common causes of military TBI are blasts, falls, vehicular accidents, and penetrating fragments or bullets.

Focal point injuries may occur when the head strikes or is struck by an object, or when there is a penetrating injury (open head wound). The brain may also hit the skull at multiple points without external force to the head because of acceleration/deceleration movement in response to a blast shock wave or violent motion that causes the head to come to a sudden stop. This type of injury can cause focal or diffuse damage. Less commonly, explosive forces may cause injury to the brain without apparent acceleration/deceleration. Such injuries affect both brain chemistry and brain tissue. Focal injuries involve contusions primarily in the basal frontal and anterobasal temporal regions of the brain, but have also been associated with delayed neuronal injury similar to what occurs in diffuse damage, resulting in secondary effects to broader frontal regions. Microscopic

shearing of axons and contiguous blood vessels is often diffuse, involving deep frontal white matter and thus subcortical structures that project into the frontal and prefrontal cortices (e.g., the ventral tegmental midbrain area and anterior/medial thalamus). Resulting prefrontal hypometabolism from this type of injury has been associated with persisting executive, behavioral, and memory impairments (Cicerone, Levin, Malec, Stuss, & Whyte, 2006). The first mTBI sets up a risk trajectory of increased odds for future TBIs ($\times 3$ after the first, $\times 8$ after the second), and increasing likelihood of persistent problems with each additional TBI.

Mild TBIs may be characterized at the time of injury by:

- no loss of consciousness (LOC) or brief LOC of less than 30 minutes duration;
- partial LOC experienced as disorientation, confusion, slowed thinking fatigue, or a dazed feeling;
- impaired balance, clumsiness, or loss of physical abilities (e.g., weakness or paralysis, changes in vision or other senses, and changes in speech abilities), headache, or insomnia; and
- memory loss for less than 24 hours of events immediately before or after the injury (posttraumatic amnesia).

Mild TBIs usually are not detectable by lab tests or scans, which typically show normal results. Ideally, TBI is assessed in theater within 24 hours of injury with a medical examination and the Military Acute Concussion Evaluation (MACE), and the MACE is readministered periodically to monitor cognitive functional status. Usual care for an mTBI is psychoeducation, rest, low sensory stimulus environment, regular meal and sleep schedules, headache management, and cessation of caffeine, tobacco, and alcohol use (Department of Veterans Affairs/Department of Defense, 2009; French, Parkinson, & Massetti, 2011). While most mTBIs appear to resolve with usual care within a few weeks, an unknown number (estimates range from 10% to 30%) will be associated with persistent symptoms and even a permanent change in personality, memory, and attentionality (Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury [DCoE] and Defense and Veterans Brain Injury Center [DVBIC], 2010). Some research suggests that comorbidity of PTSD and mTBI may increase the risk of persistent symptoms of mTBI (Institute of Medicine, 2012). The effect of comorbidity of military sexual trauma and mTBI among female service members is unknown.

Persistent postconcussive symptoms most commonly include mood dysregulation, balance and coordination problems, and impaired executive functions of the brain (i.e., slowed cognitive processing, impaired attentionality and memory, impaired metacognitive processes, impaired activation regulation, and behavioral dysregulation). Service members returning from an overseas deployment are screened (Milliken, Auchterlonie, & Hoge,

2007) initially using the Post Deployment Health Assessment (PDHA) and rescreened 3 to 6 months later using the Post Deployment Health Reassessment (PDHRA). Items on TBI were added to these instruments in 2008 (United States Government Accountability Office, 2009).

Increased longevity and survival rates of returning combat veterans with disabling conditions are likely to increase the numbers of military spouses who are caring for both their children and the veteran spouse with disabilities, as well as military parents who are caring simultaneously for their young adult veteran children with disabilities and their own elderly parents (Brown, Shulkin, Casey, & Pitt-Catsoupes, 2007). Further, the size, increased longevity, and delayed marriage and child-bearing characteristics of the baby-boomer cohort are likely to lengthen their tenure as a “sandwich generation” (American Association of Retired Persons, 2001; Seaward, 1999), and to lead to expansion of the sandwich generation construct to include their nondisabled adult children as cocaregivers for their veteran siblings with disabilities and their grandparents (Smith, Greenberg, & Seltzer, 2007; Spillman & Pezzin, 2000). Generational cohort theory has addressed a macro-level view of shared, common developmental characteristics that characterize an age cohort with defined ranges of birth dates and historical/cultural periods of primary influence on development (Strauss & Howe, 1991). Social work theory advanced the formulation of the construct of the “sandwich” generation (Miller, 1981; Raphael & Schlesinger, 1994) to apply to the emerging generational cohort of caregivers, most often middle-aged women, who were caring for maturing children and aging parents simultaneously. Heightened family stress levels and associated increases in symptoms of psychopathology and both positive and negative health effects have been found in this family type (Neal, Chapman, Ingersoll-Dayton, & Emlen, 1993; Schlesinger, 1989; Singer & Irvin, 1991; Tebes & Irish, 2000) as well as among spouses caring for a spouse with disabilities (Beach, Schulz, Yee, & Jackson, 2000). As predicted during the period in which these theories were formulated (Riche, 1991), increasing numbers of American families have been faced with the demands of caring for family members in multiple generations across health status and disability conditions (Seaward, 1999).

This especially vulnerable subgroup of the sandwich generation and their family type in the military population has received limited attention in the literature and in life span theory development (Smith-Osborne, 2007). Social workers face with these families the challenge of identifying and cultivating resources and services to enhance resiliency in this caregiving population as well as their veteran relatives (Smith-Osborne, 2009).

PRACTICE IMPLICATIONS

The most common assessment instrument used for TBI is the Glasgow Coma Scale, which scores eye opening responses, motor responses, and verbal

responses (Teasdale & Jennett, 1974). Mild TBI cases generally receive a score on that scale of 13 to 15, but it is actually more common to use the scale in moderate to severe cases than in the initial postinjury assessment of mTBI. For military personnel, the MACE may be used in the immediate postinjury period. Civilian personnel are often more familiar with the Mini-Mental Status Exam (MMSE) and the Neurobehavioral Cognitive Status Exam (COGNISTAT) (Schwamm, Van Dyke, Kiernan, Merrin, & Mueller, 1987), which are general cognitive status screeners not specific to TBI. Other standardized self and collateral-report measures used in assessing severe brain injuries that may be used also for persistent postconcussive syndrome lasting 3 months postinjury include the Neurobehavioral Rating Scale, the Neurobehavioral Functioning Inventory, the Neurobehavioral Symptom Inventory, the Neuropsychology Behavior and Affect Profile, the Key Behaviors Change Inventory, the Head Injury Behavior Scale, and the Ruff Neurobehavioral Inventory (DCoE/DVBIC, 2010; Wood, Alderman, & Williams, 2008). An observational scale, the revised International Classification of Impairments, Diseases, and Handicaps (ICIDH-2), has been found useful in classifying the range of functional impact on the person in their environment (Wade, 2005). These instruments are to be used as part of a comprehensive interdisciplinary cognitive evaluation, preceded by a comprehensive neurological evaluation, which is available from the rehabilitation departments at most large Veterans Health Administration (VHA) facilities, Department of Defense (DoD)/VA Polytrauma Centers, and large military treatment facilities.

TBI treatment for persistent symptoms may include sleep hygiene, medications for symptom management and pain management, behavioral health interventions to reduce symptoms, cognitive rehabilitation, driving rehabilitation, assistive technology for cognitive functions, and, experimentally, early use of a hyperbaric chamber (Schneiderman, Braver, & Kang, 2008). Intensive brief intervention emphasizing family support and group psychosocial rehabilitation (cognitive remediation plus social skills training, supported education, and supported employment) has been found to be effective at increasing community integration, self-efficacy, and satisfaction with cognitive functioning (Cicerone, Mott, Azulay, & Friel, 2004). Further development of lower-cost functional brain imaging for applications in monitoring intervention response to cognitive remediation and psychosocial rehabilitation for veterans with comorbid PTSD and mTBI may improve the cost effectiveness of extending these programs to larger numbers of injured veterans (Tian, Smith-Osborne, Yennu, & Liu, 2012). This population may be particularly responsive to complementary and adjunct interventions that utilize therapies that do not rely on cognitive reflection and insight enhancement (e.g., animal-assisted therapy, therapeutic horseback riding, yoga or therapeutic martial arts, acupuncture, massage). Interventions aimed at improving insight may not be useful, as improved insight has been associated with lowered self-esteem and increased emotional distress in persons with TBI (Wood et al., 2008).

Adaptation of caregiver resilience intervention models found effective with caregivers for other populations may be useful in family support interventions for families of military personnel with persistent postconcussive syndrome and comorbid conditions. However, the literature in this area is still emerging. Forthcoming evaluations of new VHA initiatives to provide home-based health care for veterans with disabilities and their caregivers, as well as newly expanded direct services for caregivers, are expected to build the knowledge base in this area (Amdur et al., 2012). Findings of effectiveness of psychosocial rehabilitation models for civilians with TBI and their families (Cicerone et al., 2004) suggest that developing models of supported education and employment for injured veterans may be similarly helpful (Smith-Osborne, 2012a, 2012b).

POLICY IMPLICATIONS

Given the range of severity and recoverability of TBI, it is likely that increasing numbers of military families will be eligible for and take advantage of recent policy expansions in pensions, benefits, and VHA services for caregivers of injured service members (Arno, 2006). Recent policy initiatives have also targeted increased civilian mental health services access for military families through federal services and training funding mechanisms, as well as increased access to civilian assistive technology repositories. Policy enactment provide, reimburse, and address policy conflicts (e.g., rental housing policies not allowing companion and service animals for persons with cognitive-behavioral disabilities) for additional assistive services, particularly those of human and animal personal assistants who are trained to compensate for the impact of reduced cognitive abilities on brain injured service members' activities of daily living (American Association of Retired Persons, 2005). There are also complex policy implications due to changed composition of the armed forces, with more women, higher proportion of Reserve/Guard components, shorter-term military careers, dual career military couples, and more married service members with children. One implication of the changing demographics is that policies affecting service members with TBI must continue to take women and family structure and needs into account. Social workers can have an important role in documenting the need for such policies and advocating for their sustainability.

For many service members with TBI returning to communities distant from large VHA facilities, policy-mandated availability of culturally competent, well-integrated civilian systems of care are essential. Policy is needed to ensure that these civilian systems include adequate social supports, complementary and adjunct therapies, and community-based psychosocial rehabilitation programs targeting employment, education, and family resilience. Further, the need for policies and policy analysis to aid civilian caregivers (Brown et al., 2007) and civilians with severe and

persistent mental illness (Bazelon Center, 2004) may be spotlighted by the increased demand and urgency for these same policies in the military population, thus benefitting all.

However, current policy directives mandating civilian agencies to identify military families in their communities and to prioritize culturally competent services to military families must be taken seriously, not just receive “lip service” before going on with business as usual. This policy implication pertains to constructs of differential, discretionary policy implementation at the agency level, identified in Lipsky’s street-level bureaucracy theory (Lipsky, 1969, 1980). This theory posits that as demand for services rises, street-level bureaucrats may abandon proper implementation of policy to adapt by rationing resources and screening and instrumentalizing clients. This theory predicts, then, that perception of an impending influx of newly identified military family clients would cause agency workers to adapt by ignoring the new priority to identify and “privilege” the new population, by routinizing the new clients so as to avoid the effort to acquire the necessary expertise to serve them, or by raising additional eligibility barriers so as to ration services to them (Evans & Harris, 2004). Ensuring appropriate implementation of civilian policies to serve military families may require the early action of a military specialist to advocate for the population within civilian agencies and to train civilian street-level bureaucrats in military culture and evidence-based practice for the new population.

RESEARCH IMPLICATIONS

The current combat era’s differences in the All-Volunteer armed forces’ composition, deployment cycle, types of injuries, and increased survivability of injuries, particularly head injuries and polytrauma, have posed new challenges to develop knowledge for practice rapidly. These changes have spurred rapid expansion of research into TBI long-term effects and treatment, enabled by neuroimaging advances and the explosion of the scientific knowledge base about the central nervous system. Simultaneously, there has been an accumulation of prevalence data on the longer-term effects of repeated sports-related concussion that has contributed to understanding of prognosis and risk for service members with TBI. Many new questions about the effects of blast exposure on military troops immediately and across the life course are just beginning to be explored. Among these research questions are:

1. For service members experiencing mTBI before the age of 35, as compared to service members who do not experience mTBI before the age of 35, will there be a higher risk for depression and anxiety as evidenced by increased scores on robust clinical instruments such as the Beck Depression Inventory and the Beck Anxiety Inventory?

2. For service members with self-reported blast exposures deployed to combat areas at least three times as compared to service members deployed to combat areas only one time, will there be significantly higher incidences of depression, anxiety, and family conflict as indicated by client self-report, extended family report, and scores on robust clinical instruments such as the Beck Depression Inventory, the Beck Anxiety Inventory, and the Fear Avoidance Belief Questionnaire (FABQ)?
3. For blast-exposed women survivors of military sexual trauma that receive psychological intervention within 90 days of the traumatic event, as compared to blast-exposed women survivors that do not receive psychological intervention within 90 days of the traumatic event, will there be a higher incidence of depression, anxiety, and chronic health conditions as evidenced by client self-report and scores on robust clinical instruments, such as the Beck Depression Inventory and the Beck Anxiety Inventory? How do women service member survivors of military sexual trauma who do not report blast exposure compare on those scores with and without intervention within 90 days?
4. As this population ages, will there be a significant difference in cognitive abilities as evidenced by scores on client self-report, caregiver report, and scores on the ICIDH-2 and cognitive status screening instruments such as the MMSE and COGNISTAT?
5. For elderly blast-exposed veterans over the age of 60 who report positive nurturing family relationships, as compared to those over the age of 60 who do not report positive nurturing family relationships, will there be less incidence of chronic health problems (including dementia and depression), and higher levels of life satisfaction for those who report positive nurturing family relationships as indicated by client self-report, caregiver report, child report, medical record, and scores on the ICIDH-2 and MMSE or COGNISTAT, Conflict Tactics Scales (CTS), Geriatric Depression Inventory (GDI), and the Life Satisfaction Inventory (LSI)?
6. For elderly blast-exposed veterans over the age of 60 who report being happily married, as compared to those over the age of 60 who do not report being happily married, will there will be less incidence of chronic health problems, higher levels of life satisfaction, and less incidence of depression for those that report being happily married as indicated by client self-report, caregiver report, and scores on the ICIDH-2, MMSE or COGNISTAT, LSI, and GDI?

These questions are descriptive, exploratory investigations that are basic to an understanding of effects of TBI for veterans and their families over the life span. Work is also needed in many additional domains of critical research pertaining to this population beyond these. Basic science projects beginning with animal studies are already in progress to elucidate the long-term effects of mTBI comorbidity, possible heritability of the associated brain changes, and any countervailing effects of enriched

environments. Technology studies are underway to develop and test advanced robotics, telecommunications, human–technology interface, and integrated computer systems as assistive accommodations or prosthetics to support brain-injured troops in “smart” homes and offices. Combined technology/intervention studies are underway to develop less intrusive and more cost-effective brain imaging, targeting higher cognitive functions affected by both PTSD and TBI, for the purpose of monitoring intervention outcomes of global interventions as well as specific cognitive remediation (Tian et al., 2012). Studies to evaluate the impact of and funding mechanisms for personal assistants, both human and animal, in providing substitute executive functions for brain-injured troops are urgently needed; such assistants are currently being trained and are in use, but controlled outcome studies are sparse and access is limited because of health insurance restrictions and rental housing restrictions on animals (LaPlante, Harrington, & Kang, 2002).

In the domain of intervention research, quasi-experimental work followed by clinical trials is needed to develop and test a range of interventions with this population. Studies of complementary and adjunct therapies for service members with TBI should be undertaken. Integrated physical and behavioral health interventions for service members with TBI and comorbid conditions are being put in place, and must be investigated for outcomes and cost-effectiveness. Intervention models for military caregivers and intervention models for children of service members with TBI need to be adapted to take into account the nature of service-connected TBI interacting with the military family’s strengths and challenges associated with the lifestyle demands of the military as an occupation. Existing civilian practice guidelines (e.g., United States Substance Abuse and Mental Health Services Administration, n.d.) and treatment manuals may offer timely opportunities for adaptation and implementation for military populations, using emerging principles of translational and implementation science (Cole & Gary, 2012).

ETHICAL/LEGAL ISSUES

Like social work, the U.S. Armed Forces constitute a value-based occupation. Each service branch has core values to which its members swear to adhere. For example, the Army core values are:

- Loyalty—Bear true faith and allegiance to the U.S. Constitution, the Army, your unit, and other soldiers.
- Duty—Fulfill your obligations.
- Respect—Treat people as they should be treated.
- Selfless Service—Put the welfare of the nation, the Army, and your subordinates before your own.

- Honor—Live up to all the Army values.
- Integrity—Do what's right, legally and morally.
- Personal Courage—Face fear, danger, or adversity (physical or moral).

Thus, culturally competent, ethical practice would require that social workers working with military members with TBI understand the core values of each service branch and inform their practice with these cultural beliefs. As in any culture, degree of acculturation and degree of assimilation back into mainstream civilian culture (or the culture of origin prior to military service) will vary, and social workers must assess for these ranges as part of case assessment.

Challenges posed in treating the injuries of the current conflicts have raised several other prominent ethical issues. DoD studies report that military treatment facilities' (MTF) interventions are not uniformly consistent with reported best practices. Use of other practices may be harmful, not just neutral/null effect. Many military personnel experience spontaneous remission of PTSD symptoms within 3 months postdeployment; some research suggests that treatment too soon may be harmful or not cost effective. The lack of response to military suicide prevention and surveillance efforts also presents both ethical and legal concerns relating to the military's duty to maintain mission preparedness and fitness for duty. Active duty suicides are occurring even in protected situations where the member is in care and weapons removed. This is an urgent issue, as active duty suicide rates continue to rise and have now exceeded civilian rates for the first time in recent history. Stigma, military stoicism, mTBI-related executive function compromise, and PTSD-related avoidance symptoms are barriers to care for neurological disorders, but disclosure of care is still perceived as possibly leading to loss of career or current employment, both among active duty and veterans. This perception has persisted despite DoD efforts to reduce stigma and introduce flexible duty assignments to allow for psychotropic medication and behavioral health treatment, rather than immediate fitness for duty medical evaluation.

Case Study

This case consists of a military family with a "sandwich generation" (Seaward, 1999) mother caring for a parent with bipolar disorder, a veteran spouse with PTSD, substance abuse, and TBI, and two children, her adolescent daughter and her preschool-aged son by a previous relationship. Ms. A initially presented to a civilian community mental health center to obtain posthospitalization aftercare for her mother.

The center social worker facilitated the grandmother's entry into an aftercare group and psychosocial rehabilitation day program, and then assessed the overall family functioning and the mother's caregiver roles. The caregiving literature may suggest that, on the one hand, the caregiver

of a parent with mental illness needs to plan for the elder's medication adherence and relapse prevention while maintaining mutual aid relationships, while on the other hand, the caregiver of a partner with a TBI, PTSD, and substance abuse needs to avoid enabling while supporting recovery, medication adherence, and relapse prevention. As a member of the sandwich generation and of Generation X, the mother/caregiver is likely to value having material comforts and "a life," and have a flexible perspective on role interchangeability in fulfilling her responsibilities to all the generations represented in her family. This flexibility could function as a protective mechanism when applied with foresight and reflectivity (additional protective mechanisms).

The social worker built on this strength to help her plan to build on her mother's and spouse's periods of remission by working with her children and community resources to maintain a low-stress and substance-free environment, and by involving the other adults as coparents and household leaders/role models for the children during those times. Using harm reduction and motivational interviewing strategies in the manualized *Seeking Safety* intervention (Navajits, 2001), the social worker worked with the spouse and family to reduce his alcohol use and begin substance abuse treatment, while continuing his PTSD treatment, and supported changing the family narrative about his justification for bingeing. The social worker also provided family psychoeducation about TBI, brokered his treatment engagement with the neurorehabilitation unit at the local VHA facility, brokered his enrollment in a psychosocial rehabilitation program, and initiated sleep hygiene and memory interventions.

Conversely, the mother at times needed to prepare to shift back into "single head of household" mode should one or both of the other adults relapse, while supporting their recovery. The social worker helped her to plan and rehearse ways to articulate and interpret these shifts honestly and appropriately to the children, to maintain her energy and self-care, and to sustain her effort in meeting the developmental needs of her children in both phases. The social worker's referral and assistance to all the adults in initiating and maintaining involvement in targeted veteran mutual aid groups, another protective mechanism, could be essential to their resiliency. Equally important was the social worker's engagement in the family structure to collaborate with them in substituting open dialogue and the planned shifting of roles for the prior unreflective pattern of dysfunctional triangulation.

For example, if the grandchildren become ill during a period of stability for the grandmother and relapse for the spouse, the mother could arrange for him to stay with friends or in a treatment program so she can continue to go to work and work overtime, while the grandmother cares for the children, cleans the sickroom, does the laundry, calls the pharmacy, and takes them by cab to the doctor. During a period of instability for the grandmother and remission for the spouse (which the mother finds more stressful than the reverse), the mother could work fewer hours and arrange for her mother to be admitted to a day hospital or participate in a psychosocial rehabilitation program or attend more meetings of her peer support group, while the

spouse works more overtime or takes over more of the coparenting role. The social worker could help the mother/caregiver anticipate and locate additional support resources, such as respite services and co-op child care, for periods when both of the adults with disabilities are relapsing simultaneously.

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