

Chapter 44

WOMEN, MENTAL HEALTH, AND THE MILITARY

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INTRODUCTION

Before the military operations in Afghanistan (Operation Enduring Freedom [OEF]) and Iraq (Operation Iraqi Freedom [OIF]), reproductive and gynecological issues dominated the medical concerns of most women in uniform. What was important to female soldiers was how to juggle family and career, with the occasional deployment to Korea, Somalia, or Kosovo, for a period of 6 to 12 months. "How do I manage with a baby? How do I figure out breastfeeding when I go to the field? How do I keep clean when the porta potties are all stinky and I'm having my period in the field? How do I deal with that?"

Since the terrorist attacks of September 11, 2001, the world for female soldiers has changed. Women still constitute about 15% of the military. In the US Army, women are not still assigned in technical combat units, such as infantry and artillery. However, they are definitely and clearly in combat. Women are military police and truck drivers, as well as involved in a wide range of other fields where they have to be prepared to defend themselves. In the other military services, they do have technically combat roles. Because there are no safe lines anymore and no rear areas, women are increasingly being wounded and killed, although clearly not as frequently as men.

PSYCHOSOCIAL STRESSORS FOR WOMEN IN MILITARY SERVICE

It is no surprise that life in the military brings a unique set of psychosocial stressors to women who serve. A multitude of expectations need to be met to succeed in the military, including a high level of physical fitness, extended work hours, a far-reaching network of rules and regulations, and 24-hour availability for duty. Service members can also be deployed at short notice, for varying lengths of time, and to almost any continent around the globe. Many potential benefits to military service also exist, such as employment stability, financial incentives for higher education, a unique camaraderie, and family support. The following section addresses unique challenges that can affect female service members and can have a significant impact on their mental health.

Physical Fitness

All service members are expected to maintain physical fitness to perform their jobs. Although each service has its own particular standards of fitness, there are more similarities than differences. Physical aptitude is measured in an annual or semiannual formal fitness test that evaluates muscular endurance and aerobic capacity.

Each service also has standards established for varying categories of height and weight of each member.¹ This is also based on age and gender. If service members exceed the maximum allowable weight, they must meet a standard body fat percentage. Soldiers, both male and female, will frequently use various methods to meet the weight standards. Some of these methods involve physician-approved diet and exercise regimens. However, various other methods are used, to include crash diets, extreme exercise regimens, and alternative approaches, such as body wraps and wearing sauna suits. In some cases, this can result in development of an eating disorder, which is addressed

in more detail in other chapters.

Physical fitness is an obvious requirement for successful military service, with different jobs requiring different levels of physical strength and endurance. Generally speaking, male soldiers are expected to run faster and have greater muscular strength than female soldiers. This is based on the physical differences in muscle mass and distribution between the sexes. However, male and female soldiers are often required to complete the same physical tasks. For example, soldiers on jump status are expected to bear a certain load when they exit an aircraft, and that load is the same whether the parachutist is male or female. During deployments, female soldiers are required to wear the same load of combat gear as male soldiers. Completing these tasks is generally more difficult for female soldiers than for male soldiers, again because of the differences in body composition, muscle mass, and average size of each gender. This often becomes an added stressor for female soldiers, expected to meet the same standards as their male counterparts, but beginning with a different physiological makeup.

If service members exceed the maximum allowance for body fat percentage, they are enrolled in a weight control program, which can include monthly weigh-ins, mandatory classes and meetings with a nutritionist, and a specialized physical fitness regimen. If they fail to meet the standards for the physical training test, they can be enrolled in specialized physical training regimens. For physical training failure, soldiers can be barred from favorable actions, which can prevent them from being promoted, going on leave, or receiving awards. Soldiers can also be administratively separated from the service if they consistently fail to meet physical fitness standards.²

However, compared to their civilian counterparts, female soldiers may actually have an advantage by being expected to be physically fit. Studies have shown

that regular exercise regimens decrease the incidence or severity of symptoms of depression and anxiety.^{3,4} Exercise can be a very valuable coping skill to deal with the other stresses that the military imposes, both in and of itself, as well as in its role in improving sleep.

Job Assignment

For enlisted service members, military job opportunities are often assigned based on a test score resulting from the Armed Services Vocational Aptitude Battery (ASVAB).⁵ Many enlistees enter the service with an idea of the type of job they would like to have, but there is no guarantee the service will offer them the specific job they desire. Many soldiers are offered a limited number of jobs, and it can be quite upsetting when it is not something they are interested in. This often sets the stage for how soldiers will either look forward to, or dread, the time for which they have committed to serve. This is in contrast to employment in the civilian world, where most people are able to turn down the job they do not want or simply interview with a different employer.

These same job assignment constraints also apply to commissioned officers. Officer candidates are given the opportunity to submit a preference list for their branch assignment. These assignments, however, are first and foremost based on the needs of the military; officer preferences are secondary. It can be a significant long-term stressor for someone who, for example, wants to be an aviator but is instead assigned to the Quartermaster Corps. Female soldiers are restricted to the noncombat arms branches with a few exceptions—such as aviation and field artillery. For some women this is frustrating because they believe that if they can meet the same physical and technical standards of the job as men, they should be given the opportunity to perform that job. For other women who do not desire these jobs, the restrictions are a relief because they, unlike their male counterparts, do not run the risk of being assigned to them.

Location and Social Support

The military is a culture in which its people are expected to adapt to change. This change appears in many different ways—living environment, daily routine, job assignments, command as well as peer composition, and structure. For some individuals, the change is welcomed, and for others the change is dreaded. For all, it poses a significant stressor.

Many people join the military as an opportunity to travel the world. Frequent moves are often experienced, whether desired or not. Soldiers can voice a preference in assignment location, but ultimately

service members are distributed according to the needs of the military. For young enlisted service members, basic training is often the first time away from home for an extended period of time. This removes them from everything that is familiar to them—families, friends, homes, daily routines, jobs, and ways of life. They are limited in their contact with their main social support network, and placed in an environment where they are told how to dress, how to walk, how to behave, and what to value. Most of these soldiers are relatively young, without a firm idea of who they are or their plan for their lives. This is a stressful time for all service members, male or female.

The nature of the military requires soldiers to be mentally and physically strong, bold, and aggressive. Society has traditionally reserved these characteristics for men, but recently women in the military have assumed an increased presence in customarily male roles, both as a result of changes in the country's social values and the needs of the military.⁶ In these surroundings, young female soldiers away from home for the first time all too often succumb to the temptation to engage in unhealthy behavior to fit in and be viewed as part of the team. This is their attempt to develop a new social support network in this stressful environment, as well as to be accepted by male colleagues.

Deployments

Deployments are another major source of change unique to military service. At short notice, soldiers can be taken from the daily routine they have been accustomed to and transported halfway around the world for months at a time. This usually includes time away from loved ones, although the military has greatly improved deployed soldiers' opportunities to communicate with loved ones back home.

Deployments can also mean harsh field conditions or climates to which the soldier is not accustomed. These austere conditions have an impact on personal privacy on a daily basis. Most significantly, deployments can place soldiers in situations of unpredictable or even certain danger with a threat to their lives. Any field situation, whether a training exercise at their home station or a deployment abroad, poses significant difficulties in the area of personal hygiene for female soldiers, who have to be prepared to deal with daily hygiene associated with menstruation even while in the field. Facilities for changing and disposing of hygiene products are not always available in the field, and time availability to take care of hygiene is often an issue as well. In addition to menstruation, urination is another stressor for female soldiers. During a field exercise, this becomes a matter of both privacy and convenience. However, during a deployment it

can be a significant safety issue as proper wear of protective gear and avoidance of hostile fire become considerations.⁷

Deployments have become more common and more frequent for military service members over the last few decades. Recent studies estimate that soldiers entering the service today will have an average of 14 deployments over a 20-year career.⁸ These include both combat deployments and peacekeeping missions. Studies have shown that service members generally want the opportunity to do what they have been trained to do, and most will find meaning in serving on a deployment.⁹ However, over time, the stressors of a deployment will begin to take their toll on the physical and mental well-being of soldiers.

Deployment length appears to be a factor in the development of mental health problems for service members. Several studies have indicated that the longer a deployment lasts, the more psychological stress soldiers will experience, which, in turn, leads to development of symptoms such as depressed mood, sleep disturbances, increase in anxiety, and impairment in concentration.¹⁰ Most of these studies, however, focused on male soldiers. A study done by Adler and colleagues demonstrated that this relationship between length of deployment and stress may not be true for female soldiers. This may be related to a physiologic difference in stress response between men and women, a topic that in itself needs further research.¹⁰

Pregnancy

Pregnancy is a major stressor to military and non-military women alike. There are physical changes, potential health problems, hormonal variations, and the adjustment to becoming a mother. In accordance with service-specific regulations, pregnant service members are given a medical profile, excluding them from regular unit physical training.¹¹ This makes them exempt from formal physical fitness testing during pregnancy and for 180 days after delivery of the baby.

Restrictions are placed not only on physical fitness requirements, but also on duty hours and tasks. This is to prevent potential complications in the pregnancy, for which the rate is already higher for women in the military than for their civilian counterparts.¹² For example, after the 28th week of pregnancy the Army limits female soldiers to 8 hours of work at one time and 40 hours of work in a week.¹² There are also restrictions that prevent working in motor pool areas, rifle ranges, from heights, or on aircraft. This can have varying effects on service members, depending on their assigned job and unit. For instance, for a female military physician, although this will reduce work hours and prevent being on call overnight, otherwise

there may be little change to the daily routine. For a mechanic, however, a temporary job reassignment may be needed. Not only would this require a service member to learn a new job and adjust to a new work schedule, but her work as a mechanic would still need to be done by someone else in the unit.

The scenario with the mechanic poses yet another stressor for pregnant service members—potential social conflicts with her unit mates. As service members can be overtasked and overworked at baseline, extra work left by a pregnant service member is rarely welcomed. This can lead to resentment of the pregnant soldier by the other soldiers in the unit. In some units, however, just the opposite can happen. In cohesive units, soldiers rally around teammates who are facing challenges, and the resulting support can be much greater than what is found in civilian workplaces.

The combination of a pregnancy and a pending deployment presents unique challenges. Because pregnancy precludes female service members from deploying,¹² there is sometimes a perception that the service member intentionally became pregnant to avoid deploying. Not only can this prevent deployment, but the military also offers administrative separation for enlisted members who become pregnant.¹³ This can be seen by other soldiers as an abandonment of duty and obligation, regardless of the true intent of the pregnancy.

After the baby arrives, if the pregnancy is without complications, the service member is allotted 6 weeks of maternity leave. After these 6 weeks, the service member is expected to return to regular duty hours with her assigned job, although she is still exempt from physical fitness testing for 180 days postpartum. If the delivery required a Caesarean section, she may have difficulties with sit-ups. Women may have additional challenges meeting the military's weight standards following pregnancy, even when given this 180-day recovery period.¹⁴

The US Army Center for Health Promotion and Preventive Medicine has now developed and disseminated a pregnancy physical training program for female soldiers. The "long-range goal of this program is to reduce the impact of pregnancy on individual soldier fitness and unit readiness by mitigating losses from attrition and reduced fitness."¹⁵ Service members also continue to be nondeployable for 6 months following delivery, after which time they are expected to deploy like any other service member. Soldiers can choose to waive this 6-month "bonding period" and deploy shortly after delivery.¹⁶

One psychiatrist related his experience of deploying with a unit that contained several female soldiers who had chosen to waive their option to remain behind during their allowed bonding pe-

riod.¹⁷ These female soldiers cited various reasons for their decisions, including not wanting to let their fellow soldiers down and wanting to perform the jobs they were trained to do. However, once deployed these women had significant problems, both mentally and physically. They experienced the expected emotional issues associated with being separated from their newborns. Physically they had not yet recovered from 9 months of pregnancy and subsequent childbirth. Many of these soldiers developed depression, and for some this led to

suicidality. Not only did this scenario have a significant impact on the individual soldiers, but in turn it became an additional stress to their units in the deployed environment.¹⁷

This section addressed some of the psychosocial stressors unique to women in the military; however, it is not comprehensive. Some female service members are readily able to adapt and cope with these stressors, but for others they can lead to development of a mental illness. The rest of this chapter will address specific diagnoses in further detail.

MENTAL HEALTH DISORDERS IN WOMEN

Although women are affected by the same major mental illnesses as men, there have been key differences noted in studies and a review of the literature of women's mental health. These differences, such as history of presentation and course of illness, have an important impact on diagnostic and treatment considerations for the female patient. Furthermore, pregnancy, breastfeeding, perimenopause, and menopause can complicate mental well-being. This section will first consider each major mental illness separately.

Schizophrenia

Even though the ratio does not differ between genders, the onset of the disorder occurs later in women than in men (20–29 vs 15–24). A small percentage of women have their first psychotic episode in their forties.¹⁸ Women are more likely to have a good premorbid functioning history prior to their illness and during the course of their illness, display more positive symptoms with affective signs, and experience fewer negative symptoms than men.

Treatment of schizophrenia in the female patient does not differ from the standard practice guidelines, but a few gender-specific situations do occur. Some antipsychotic medications (risperidone, haloperidol) can induce hyperprolactinemia (normal prolactin 5–25 ng/ml), thus causing menstrual irregularities or amenorrhea (prolactin over 60 ng/ml). In cases in which the medication cannot be switched or lowered, the hyperprolactinemia could be managed by adding the dopamine agonist bromocriptine (2.5–7.5 mg twice daily) or cabergoline (0.5 mg/week).¹⁹ Alternatively, oral contraceptives could be used to restore the menstrual regularity disrupted by the hyperprolactinemia, in addition to providing contraception.

Women with schizophrenia are at high risk for unplanned pregnancy because of ineffective use of contraception and high rates of sexual assault. Prevention should include counseling about preferred choice of birth control, sex education, and psychosocial

support. Patients with schizophrenia who do become pregnant require frequent monitoring. Reemergence of psychotic symptoms can lead to failure to obtain prenatal care, paranoid delusions about the medical team that prevent cooperation, poor self-care, and adverse pregnancy outcomes (ie, low birthweight, low Apgar scores, prematurity). These factors, in addition to previous functioning, must be considered when deciding treatment during pregnancy.

There are limited data on the effects of antipsychotic medications on the fetus. Some data showed no increased risk of congenital malformation with high-potency agents (haloperidol and trifluoperazine), although low-potency phenothiazines appear to have a higher incidence of nonspecific congenital anomalies and neonatal jaundice.²⁰ The newer atypical antipsychotics have only a few case reports. These do not indicate adverse effects; however, with their small numbers, these reports give the clinician little guidance. With either the decision to treat with medication or to watch symptoms, the patient will need close follow-up and involvement of any psychosocial supports that the patient has enlisted.

Depression

The prevalence of unipolar depression for women is statistically higher (10%–25%) compared to men (12%).²¹ Dysthymia is twice as prevalent in women as in men.²² Similarly, seasonal affective disorder is also more prevalent in women than men.²³ Although the symptoms of depression do not differ significantly between the sexes, women are at risk for depressive episodes during reproductive transitions such as premenstruation, pregnancy, postpartum, perimenopause, and menopause.

Premenstrual dysphoric disorder (PMDD) is listed as a mood disorder not otherwise specified in the fourth edition of the *Diagnostic and Statistical Manual (DSM-IV-TR)* of the American Psychiatric Association, which describes the severe spectrum of recurrent

physical and emotional symptoms associated with the late luteal phase of the menstrual cycle, which resolve with the onset of menstruation. The physical symptoms include headaches, cramping, breast tenderness, and bloating, while the emotional symptoms include depression, irritability, anxiety, and insomnia. After ruling out other causes of symptoms (including other medical and psychiatric disorders such as unipolar depression, dysthymia, and anxiety), PMDD can be monitored with daily symptom charting over a 2-month period. Treatment is based on the severity of symptoms and ranges from nonpharmacological approaches, such as sleep hygiene, relaxation therapy, and cognitive-behavioral therapy, to the addition of selective serotonin reuptake inhibitors (SSRIs) for the more severe cases.

Maternal depression during pregnancy creates risks for both the woman and her children, such as alcohol

abuse, poor nutrition, failure to obtain adequate prenatal care, and suicidal behaviors. Obstetrical complications have also been studied and have shown increased risk for slow fetal growth,²⁴ small infant head circumference,²⁵ and increased risk of preterm delivery.²⁶

The US Food and Drug Administration (FDA) uses a pregnancy rating system²⁷ to guide clinicians on potential safety of a medication during pregnancy or lactation (Exhibit 44-1). However, the rating system does not always reflect the available data. Also, there can be some lag time before new data are incorporated into the system. It is important to note that to date, in the absence of controlled trials, the FDA has not approved any medications for use during pregnancy or lactation. Thus, it is important to obtain informed consent with each patient about the risk-to-benefit ratio when using a psychotropic.

When medications are used in pregnancy, the

EXHIBIT 44-1

US FOOD AND DRUG ADMINISTRATION CATEGORIES AND LABELING REQUIREMENTS FOR DRUG USE IN PREGNANCY

Pregnancy Category:

- A Studies in pregnant women have not shown that (*name of drug*) increases the risk of fetal abnormalities if administered during the first (*second, third, or all*) trimester(s) of pregnancy. If this drug is used during pregnancy, the possibility of fetal harm appears remote. Because studies cannot rule out the possibility of harm, however, (*name of drug*) should be used during pregnancy only if clearly needed.
- B Reproduction studies have been performed in (*kind(s) of animal(s)*) at doses up to (x) times the human dose and have revealed no evidence of impaired fertility or harm to the fetus due to (*name of drug*). There are, however, no adequate and well-controlled studies in pregnant women. Because animal reproduction studies are not always predictive of human response, this drug should be used during pregnancy only if clearly needed.
- C (*Name of drug*) has been shown to be teratogenic (or to have an embryocidal effect or other adverse effect) in (*name(s) of species*) when given in doses (x) times the human dose. There are no adequate and well-controlled studies in pregnant women. (*Name of drug*) should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus.
- D (*Name of drug*) can cause fetal harm when administered to a pregnant woman. (*Describe the human data and any pertinent animal data.*) If this drug is used during pregnancy, or if the patient becomes pregnant while taking this drug, the patient should be apprised of the potential hazard to a fetus.
- X (*Name of drug*) may (*can*) cause fetal harm when administered to a pregnant woman. (*Describe the human data and any pertinent animal data.*) (*Name of drug*) is contraindicated in women who are or may become pregnant. If this drug is used during pregnancy, or if the patient becomes pregnant while taking this drug, the patient should be apprised of the potential hazard to a fetus.

Data source: Code of Federal Regulations, Title 21, Volume 4, Revised as of April 1, 2008 (21CFR201.57). Available at: <https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfCFR/CFRSearch.cfm?fr=201.57>. Accessed September 2, 2009.

minimal effective dose should be administered. That is, the dose that effectively treats a patient's symptoms without unduly exposing the fetus to higher than necessary doses. To date, the SSRIs, in particular fluoxetine, have the most extensive published data about their use during pregnancy. One study on the long-term neurobehavioral effects of SSRIs during pregnancy compared children exposed to fluoxetine, or a tricyclic antidepressant, or no antidepressant. No significant differences between the three groups were noted.²⁸ All SSRIs have FDA risk category of "C," with the exception of paroxetine, which has a risk category of "D" and is not recommended for use during pregnancy. In the United States, physicians have increasingly prescribed bupropion during pregnancy to treat depression, apparently as a consequence of its FDA "B" risk category. However, there are currently no published data regarding its safety or tolerability during gestation.

The postpartum period can be a particularly vulnerable period for a woman, with up to 85% of women experiencing postpartum "blues" within the first 2 weeks after giving birth. This condition usually remits spontaneously, and thus treatment is not required. However, psychoeducation of physician and patients to distinguish postpartum blues from a more serious condition, postpartum depression, is warranted. The prevalence of postpartum depression is about 10%. Any previous history of depression significantly increases the woman's risk dramatically. A history of PMDD prior to conception increases her risk for developing postpartum depression to 24%. An episode of depression endured during pregnancy increases the risk of postpartum depression to 35%. Any woman with a prior history of postpartum depression has a 50% to 60% risk of developing postpartum depression during subsequent pregnancies.²⁹ Treatment is multimodal and includes psychoeducation, individual and group psychotherapy, support (community resources), and pharmacotherapy. Breastfeeding should be discussed thoroughly as all psychotropic medications pass through breast milk and there are limited data establishing the effects on the infant. For the patient whose depression is complicated by psychosis or suicidality, hospitalization is generally required until the patient is no longer dangerous to self or others. Postpartum psychosis is considered an acute emergency and reason for acute admission, as it carries a risk of infanticide (1/1,000) if left untreated, in addition to the risks to the mother associated with psychosis.

Bipolar Disorder

Bipolar disorder occurs in 1% of the population and is equally prevalent in men and women. Women tend

to experience more depressive and mixed episodes than men, with fewer manic episodes. This may lead to diagnosis of unipolar depression and treatment with antidepressants, which then exacerbates the condition and results in rapid cycling—a condition seen more often in women than in men.³⁰ Another precipitation of rapid cycling is thyroid dysfunction, which can be caused by lithium-induced hypothyroidism. Women are at greater risk for thyroid dysfunction than men, thus levels of thyroid stimulating hormone should be checked every 6 months for any woman receiving lithium.

Management of bipolar disorder can be particularly challenging during the perinatal period because the current first-line agents either have known teratogenicities, are associated with congenital malformations, or have little data to support their safety during pregnancy or lactation. In particular, lithium has been demonstrated to increase the risk for Ebstein's anomaly (also called Ebstein's malformation, in which the tricuspid valve is abnormally formed) from 1 in 20,000 to 1 in 1,000 when the fetus is exposed during organogenesis.³¹ Exposure later in gestation can lead to fetal or neonatal cardiac arrhythmias, fetal hypoglycemia, nephrogenic diabetes insipidus, polyhydramnios, or premature delivery.^{32,33} The American Academy of Pediatrics discourages the use of lithium during lactation. This recommendation is based on a study that revealed that infant serum levels are double maternal serum levels postbreastfeeding. Lithium use during lactation is also correlated with adverse events such as lethargy, hypotonia, hypothermia, and electrocardiogram changes.³⁴

Prenatal exposure to valproate is associated with neural tube defects and craniofacial, cardiovascular, and limb anomalies.³⁵ A metaanalysis revealed the risk for neural tube defect during valproate exposure to be 3.8%—38 times greater than prevalence in the general population.³⁶ There is a paucity of data regarding the use of the atypical antipsychotics during pregnancy and lactation.

Anxiety Disorders

Overall, anxiety disorders are more prevalent in women than in men (with the exception of obsessive-compulsive disorder, which has equal prevalence). Compared to men, women are twice as likely to suffer from posttraumatic stress disorder (PTSD), three times as likely to experience panic disorder with agoraphobia, and four times as likely to have social phobia.^{37,38}

Although other comorbid psychiatric disorders occur in 91% of patients with panic disorder, and 84% of patients with panic disorder and agoraphobia, panic disorder with agoraphobia is more common in alco-

holic women than alcoholic men.³⁹ The treatment for panic disorder does not differ between the genders, with the most effective treatments consisting of cognitive behavioral-therapy and pharmacotherapy.

Comprehensive evaluation to rule out disorders that mimic anxiety, to include thyroid disorders, lu-

pus, iron deficiency anemia, cardiovascular disease, and perimenopause, should be included in the work up. Other causes of anxiety—such as alcohol use, nicotine, caffeine, nonsteroidal decongestants, herbal supplements, and appetite suppressants—should also be ruled out.

TRAUMATIC BRAIN INJURY IN WOMEN

Background

Traumatic brain injury (TBI) is one of the most complex conditions of high risk to military personnel, affecting physical, cognitive, and behavioral health. Rates of TBI in the general population and military are high, making this condition a major public and military health problem. In the current war on terror, brain injury has become a predominant injury for military men and women in a wide variety of roles. The focus on TBI has increased with the occurrence of such injuries in OIF and OEF. With regard to OIF, the Office of The Surgeon General of the Army notes that 64% of wounded-in-action injuries have occurred as a result of blast from improvised explosive devices, rocket-propelled grenades, land mines, and mortar or artillery shells.⁴⁰ Improvements in helmet design and body armor have resulted in reductions in penetrating injuries, including penetrating head trauma. As a direct result of the improved survivability of blast injuries, closed-head trauma has become the signature injury of these military operations.

The detailed review of military TBI—from moment of injury through medical and rehabilitation setting and finally to vocational and family outcome—has been addressed in a prior volume of the *Textbooks of Military Medicine*.⁴¹ Therefore, this section will only focus on familiarizing the reader with research findings regarding gender differences and their implications for women. Even though male TBI outnumbers female TBI approximately 2:1 in the general population, and men in the military population far outnumber women, the rates of female TBI and female service members have both increased over the past decade. Understanding the implication of female gender in all aspects of TBI has developed during this time, although it is still in its infancy.

Traumatic Brain Injury, Gender, and Outcome

The analysis of gender as a variable in neurotrauma is a fairly recent phenomenon, with discrepant results across a number of studies. Animal models suggest positive effects of hormone treatment (progesterone, estrogen) on outcome, and potential differential risk/benefit for women who are either pre- or postmeno-

pausal. Progesterone modulates gamma-amino butyric acid and inhibits apoptosis, gliosis, and production of inflammatory agents, thereby reducing brain edema. Estrogen is known as a powerful antioxidant with vasoprotective action. However, in animal models, although exogenous administration of estrogen was beneficial to males, administration to females was detrimental, and increased rates of injury-related mortality.⁴²⁻⁴⁴

Hormonal issues may also play a significant role in mild TBI diagnosis among perimenopausal, menopausal, and postmenopausal women, due to symptom overlap. For example, in examining population base rates, in excess of 20% of these women report concentration difficulties, sleep disturbance, anxiety, depression, and irritability, all symptoms common to mild TBI. In excess of 30% of these women also report fatigue and nervousness.⁴⁵

A metaanalysis on gender differences in TBI outcome identified only nine studies where data were reported based on gender. In analyzing these available studies, women were observed to have worse outcome on 85% (17 of 20) of the variables discussed.⁴⁶ Other individual studies, often with relatively small samples of women, present conflicting results wherein women demonstrated greater response to coma stimulation,⁴⁷ gains in postacute rehabilitation,⁴⁸ maintenance of cognitive level relative to age norms,⁴⁹ and lower risk for dementia.⁵⁰

Among those with moderate to severe TBI, female survivors were noted to have a 1.28 times higher mortality rate and a 1.57 times higher poor-outcome rate than male survivors.⁵¹ Research regarding the much more common concussion/mild spectrum of TBI demonstrates that female gender is associated with a greater likelihood of subjective cognitive complaints.⁵² Women were also noted to have significantly higher rates of postconcussive syndrome at 1-month postinjury, with continued trends in this direction at 3 and 6 months postinjury.⁵³ Women sustaining sports-related concussions demonstrated significantly greater decline in simple and complex reaction time and reported more postconcussion symptoms than male peers. In this sports-related concussion study, female subjects were cognitively impaired roughly 1.7 times more often than comparison male subjects. They also exper-

rienced more subjective and objective adverse effects from concussion, even with adjusting for helmet use (such as comparison male football players).⁵⁴ Thus, especially in mild TBI, it is critical that women have thorough evaluation and follow-up to reduce risk of complications, avoid repeat injury, and ensure optimal recovery.

Psychological Sequelae of Traumatic Brain Injury in Women

Results related to gender, overall outcome, and quality of life are also mixed, because few of the many TBI studies present results by gender. A recent larger sample study contradicts early findings of higher perceived quality of life among females post-TBI.⁵⁵ A number of studies specifically examining depression post-TBI demonstrate a significant association between female gender and post-TBI depression.⁵⁶⁻⁵⁸ The finding of higher rates of post-TBI depression among women is not unexpected given the higher rates of depression among them in the general population. Thus, detailed depression screening is strongly recommended.

TBI with concomitant PTSD is a particular concern in military settings. When experiencing the same trauma, women have higher rates of PTSD than men in the general population. This finding appears to hold true for PTSD post-TBI. A number of studies report that women manifest higher rates of post-TBI PTSD.⁵⁹⁻⁶¹ One study noted that symptoms increased over time, and that both the severity of the TBI and memory for the event were not associated with the PTSD diagnosis, which involved predominant intrusion and avoidance symptoms.⁶² Complicating factors associated with PTSD and female TBI survivors include a premorbid history of sexual trauma and abuse, which occurs at a significantly higher rate for women in population studies.

In some instances, the experience of TBI is noted to trigger reemergence of intrusive recollections and symptoms associated with abuse, at times after years of nonoccurrence. This PTSD-related complication can disrupt the rehabilitation process through flashbacks, behavioral and affective disturbance, nightmares, and hypervigilance. Issues related to prior sexual trauma and abuse should be proactively addressed in the history and treatment planning process.⁶² Also related to post-TBI psychological status and PTSD risk is the high rate of TBI from domestic violence, wherein women are more frequently the victims. Studies of battered women indicate extremely high frequency of blows to the head (92%) and loss of consciousness (40%), with a significant correlation between frequency of blows to the head and severity of cognitive symptoms.⁶³ Along

with blows to the head, battered women also may experience anoxic injuries from choking, and are very likely to suffer from multiple brain injuries. Women sustaining brain injuries in the context of domestic violence often present both cognitive impairment as well as psychological symptoms, including generalized distress, depression, anhedonia, worry, anxious arousal, and PTSD.⁶⁴ Screening for TBI following domestic violence, and for domestic violence risk among those women presenting with TBI, is advised.

Family and Vocational Issues for Women Following Traumatic Brain Injury

Examination of the burden of TBI on family members indicates spouses and primary caregivers typically experience the most stress. Divorce and family dysfunction are extremely common occurrences post-TBI. Research indicates that male caregivers of female relatives with TBI displayed more distress on clinical inventories than any other gender combination. Time since injury and days in coma (a measure of severity of injury) did not affect family caregiver distress ratings.⁶⁵ Thus, family treatment and support should be initiated as early and as intensely as possible, especially in those circumstances where the woman with TBI will likely be dependent to some degree on a family caregiver.

Women with TBI additionally may have difficulty functioning in their spousal role, as the injury may affect satisfaction with gender role, body image, self-esteem, and sexuality. Gender-role satisfaction relates to a woman's ability to engage in preinjury activities that defined and supported her sense of femininity and womanhood. It is particularly beneficial for women to reconnect with rites of passage and developmental life-stage transitions, such as partnership with another or parenting children, or both, as a means of expressing the ability to participate.⁶⁶ In moderate to severe TBI, rehabilitation may be extended and involve stays in various settings, all of which may separate the female service member from military, family, and gender roles—an experience associated with diminished personal satisfaction and self-esteem. Nontraditional rehabilitation and therapeutic activities may be needed to enhance ability to function in the multitasking role as mother for those service women with children at home and parenting responsibilities.

Body-image concerns and sexual dysfunction also adversely affect self-esteem and may contribute to depression. Following TBI, body image difficulties may influence feelings of attractiveness and comfort being seen by a partner; physical difficulties may impact sexuality through body positioning, sensation, and movement; and physiological problems may reduce energy for sex, sex drive, ability to initiate sex, and

ability to achieve orgasm. Predictors of women's sexual dysfunction post-TBI include degree of depression and evidence of endocrine disorders. Significant problems reported by women with TBI include difficulties with sexual arousal; pain with sexual activity; decreased ability to masturbate; diminished vaginal lubrication; and altered, delayed, or lack of orgasm.⁶⁷ Rehabilitation and psychotherapy professionals must be able and willing to engage in frank discussion of sexuality post-TBI. They must also have some familiarity with treatment approaches and resources, because problems in this area are associated with depression, loss of self-esteem, and increased family strain.

Successful recovery from TBI results in return to work for military personnel with TBI. Some soldiers are even able to return to active duty. Others may no longer be able to serve in such roles and may require vocational rehabilitation to achieve community reintegration. Studies have demonstrated worse vocational outcome for women post-TBI than for men. At times data suggesting good outcome for women are deceiving, in that successful vocational outcomes have included the category of "homemaker," often with minimal definition or analysis of tasks and function. Significantly fewer women return to work full-time post-TBI.⁶⁸ A review of state vocational

rehabilitation services was conducted comparing men and women with similar injuries, neuropsychological test results, and demographics. Women were noted to have vocational rehabilitation services terminated after being accepted, but before successfully initiating active services, almost 50% more often than men; women received vocational rehabilitation maintenance services half as often as men; and only 4.4% of women (vs 23.6% of men) were employed successfully through vocational rehabilitation.⁶⁹ The return-to-work outlook is challenging for anyone post-TBI. However, the vocational outlook for women is particularly disconcerting, and may necessitate extra efforts on the part of vocational rehabilitation counselors and advocates.

Thus, the sequelae of TBI are complex and may involve rehabilitation of cognitive, physical, and behavioral impairments. Women with TBI are especially vulnerable to cognitive complaints and problems such as depression and PTSD. It may be difficult for women post-TBI to return to family and vocational roles. The clinician is advised to be aware of, and proactive regarding, women's unique issues post-TBI, because early intervention may improve outcome and reduce risks of long-term disability and the emergence of comorbidities.

SUMMARY

This chapter has discussed the unique and challenging situation that women face in today's military. From childbirth to specific disease pathology, women's mental health needs are constantly changing with their ever-diversifying roles as service members. This is a new era for women, in both medicine and the military. Women are a significant part of the fighting force. However, for their true potential to be reached, the military must adapt to those needs that are gender specific. The ability of the military to be sensitive to these mental health issues will maximize the fighting force. It will also encourage more women to join, knowing that the services are "female friendly."

Although women are prohibited from joining certain branches of the military, there continue to be new and exciting opportunities. Importantly, it must be remembered that with new opportunities come new risks. This chapter has presented an overview of the different risk factors, presentations, and treatments of mental health issues unique to female service members. In this wartime era, it is important to be cognizant of the diverse pathological mental health illnesses and the unique differences among the sexes. With the help of providers and military leadership, utilization of these data should improve outcomes for female service members.

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