

# Bringing the War Back Home

## Mental Health Disorders Among 103 788 US Veterans Returning From Iraq and Afghanistan Seen at Department of Veterans Affairs Facilities

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**Background:** Veterans of Operations Enduring Freedom and Iraqi Freedom (OEF/OIF) have endured high combat stress and are eligible for 2 years of free military service–related health care through the Department of Veterans Affairs (VA) health care system, yet little is known about the burden and clinical circumstances of mental health diagnoses among OEF/OIF veterans seen at VA facilities.

**Methods:** US veterans separated from OEF/OIF military service and first seen at VA health care facilities between September 30, 2001 (US invasion of Afghanistan), and September 30, 2005, were included. Mental health diagnoses and psychosocial problems were assessed using *International Classification of Diseases, Ninth Revision, Clinical Modification* codes. The prevalence and clinical circumstances of and subgroups at greatest risk for mental health disorders are described herein.

**Results:** Of 103 788 OEF/OIF veterans seen at VA health care facilities, 25 658 (25%) received mental health di-

agnosis(es); 56% of whom had 2 or more distinct mental health diagnoses. Overall, 32 010 (31%) received mental health and/or psychosocial diagnoses. Mental health diagnoses were detected soon after the first VA clinic visit (median of 13 days), and most initial mental health diagnoses (60%) were made in nonmental health clinics, mostly primary care settings. The youngest group of OEF/OIF veterans (age, 18-24 years) were at greatest risk for receiving mental health or posttraumatic stress disorder diagnoses compared with veterans 40 years or older.

**Conclusions:** Co-occurring mental health diagnoses and psychosocial problems were detected early and in primary care medical settings in a substantial proportion of OEF/OIF veterans seen at VA facilities. Targeted early detection and intervention beginning in primary care settings are needed to prevent chronic mental illness and disability.

*Arch Intern Med.* 2007;167:476-482

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**R**ECENT MILITARY OPERATIONS in Iraq and Afghanistan represent the most sustained ground combat operations involving American forces since the Vietnam era.<sup>1,2</sup> The majority of military personnel experience high-intensity guerrilla warfare and the chronic threat of roadside bombs and improvised explosive devices.<sup>1,2</sup> Some soldiers endure multiple tours of duty, many experience traumatic injury, and more of the wounded survive than ever before.<sup>3-5</sup> Reports have suggested high rates of mental health disorders including posttraumatic stress disorder (PTSD), depression, and alcohol use disorders among active duty military personnel and veterans of Operation Iraqi Freedom (OIF) and, to a lesser extent, Operation Enduring Freedom (OEF).<sup>3,5-7</sup>

Separated OEF/OIF veterans are eligible for 2 years of free military service–

related health care through the Department of Veterans Affairs (VA). Nevertheless, there have been no recent detailed reports in the medical literature to describe the prevalence of single and co-occurring mental health diagnoses and psychosocial problems among OEF/OIF veterans seen at VA facilities after returning from Iraq and Afghanistan. This information is critical to developing targeted programs for early detection and intervention to prevent chronic mental illness among OEF/OIF veterans. The aim of this study was to (1) describe the proportion of OEF/OIF veterans seen in VA facilities who have received single or multiple mental health and/or psychosocial diagnoses and the timing and clinical setting of first mental health diagnoses and (2) identify subgroups of OEF/OIF veterans at high risk for receiving mental health diagnoses after returning from military service in Iraq and/or Afghanistan.

## STUDY POPULATION

The present study includes OEF/OIF veterans who are new users of the VA health care system and included in the VA OEF/OIF Roster database (N=165 351 as of November 1, 2005, when we accessed the OEF/OIF Roster).<sup>8</sup> For an OEF/OIF veteran to be included in the VA OEF/OIF Roster, the veteran must (1) be listed in the most recent enrollment file provided by the VA Health Eligibility Center or have had a VA clinic visit and/or (2) be included in the US Department of Defense, Defense Manpower Data Center database. The Defense Manpower Data Center database of the Department of Defense lists veterans separated from OEF/OIF service, and as of November 2005, 29% had accessed VA health care.<sup>9</sup> Approximately half of the VA OEF/OIF Roster derives from both sources (Defense Manpower Data Center and VA Health Eligibility Center), and about half derives from Defense Manpower Data Center only.

More than half (53%) of the veterans included in the roster lacked OEF/OIF service separation dates. Because we were interested in mental health diagnoses and psychosocial problems associated with military service in Iraq and Afghanistan, we defined our study population as veterans first seen at a VA facility after September 30, 2001 (the date of the US invasion of Afghanistan) through December 31, 2005, but excluded veterans listed in the VA OEF/OIF Roster if they (1) were listed in the VA Health Eligibility Center database only (n=6369) (because OEF/OIF service could not be corroborated with Department of Defense data), (2) had a visit to a VA facility before September 30, 2001 (n=24 172), or before to their OEF/OIF service separation date (n=16 087), and (3) had not been seen at a VA facility by September 30, 2005 (n=14 810). The study was approved by the Committee on Human Research, University of California, San Francisco, and the San Francisco VA Medical Center.

## SOURCE OF DATA

The VA OEF/OIF Roster includes information on veterans' sex, race, date of birth, service separation date, and armed forces component (National Guard or Reserve vs active duty). Both components are voluntary, although active duty members join as full-time personnel, whereas members of the National Guard and Reserve join as part-time personnel who then become full-time when called to duty.

Encrypted social security numbers of 103 788 OEF/OIF veterans listed in the OEF/OIF Roster database were used to link to VA administrative and clinical data contained within the VA National Patient Care Database (NPCD) and Fee Basis records. National VA databases have been used extensively in epidemiological studies to describe patterns of disease and health care utilization among veterans.<sup>10,11</sup> Clinical data contained within the VA NPCD are derived from outpatient and inpatient visits to any of the nearly 1300 VA health care facilities nationwide, and fee basis records represent care rendered at other health care facilities reimbursed by the VA. For all VA visits, an electronic record is generated that includes the date of the visit, outpatient clinic or inpatient type, and the diagnosis(es) associated with the visit coded using the *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)* codes. Mental health clinic visits were defined as all outpatient and inpatient visits to mental health and substance abuse services, while nonmental health visits were either outpatient visits or inpatient admissions to nonmental health services. Currently, available VA databases lacked data regarding income, education, duration of military service, military rank, branch, and pay grade for OEF/OIF veterans.

The ICD-9-CM codes associated with specific VA inpatient and outpatient visits were used to categorize mental health diagnoses as they accrued from the date of the first VA visit to December 31, 2005. We allowed for up to 10 distinct ICD-9-CM codes for each inpatient or outpatient encounter. Mental health diagnoses were defined as any ICD-9-CM diagnosis from 290.0 to 319.0, corresponding to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Revised (DSM-IV-R)*.<sup>12</sup> In addition, we examined several individual ICD-9-CM mental health diagnostic categories that have been associated with military service<sup>2,3,5,13</sup>: anxiety disorders, PTSD, depressive disorders, substance use disorders (which included alcohol and illicit drug abuse and dependence but excluded nicotine dependence), acute stress reaction, adjustment disorders, and other mental health diagnoses. The category "other mental health diagnoses" comprised all ICD-9-CM mental health diagnoses excluding the military service-related categories listed previously. The category "psychosocial or behavioral problems" consisted of selected ICD-9-CM V-codes, a supplementary classification used to describe problems that are a focus for mental health treatment but are not considered mental health diagnoses.<sup>14,15</sup> Because ICD-9-CM codes may be considered provisional or "rule-out" diagnoses, we evaluated the proportion of diagnoses that were assigned on 2 or more separate clinical encounters. Also, if a mental health diagnosis was initially made in a nonmental health care setting, we determined the proportion that subsequently received the same mental health diagnosis at a follow-up mental health visit.

## STATISTICAL ANALYSES

This was a descriptive analysis of the prevalence, clinical setting, and timing of mental health diagnoses among OEF/OIF veterans who were new users of VA health care. We also determined the relative risks (RRs) and 95% confidence intervals (CIs) of receiving mental health diagnoses associated with various sociodemographic and military service characteristics. Because of the large sample size, nearly all comparisons between subgroups were statistically significant, and for this reason, we examined effect sizes to determine what constituted clinically meaningful differences between subgroups. Moreover, because the measured demographic characteristics (eg, age) may serve as markers for other unmeasured characteristics (eg, combat exposure) and the relationships between measured and unmeasured covariates are complex, multivariable adjustment has the potential to mislead. Instead, we calculated stratum-specific RRs (using strata defined by combinations of observed characteristics), enabling us to identify subgroups of OEF/OIF veterans at increased risk for receiving mental health and PTSD diagnoses. All statistical analyses were conducted using STATA software, version 8.2 (StataCorp, College Station, Tex).

## RESULTS

## CHARACTERISTICS AND VA HEALTH SERVICES UTILIZATION OF OEF/OIF VETERANS

**Table 1** gives the sociodemographic and military service-related characteristics of 103 788 OEF/OIF veterans seen at VA facilities nationwide. A substantial minority were women (13%); more than half were younger than 30 years (54%); nearly one third were members of ethnic minority groups; and nearly half were veterans of the National Guard or Reserve components.

Service separation data were available for 47% of the study population, and of these, the median time from OEF

**Table 1. Characteristics of OEF/OIF Veterans Seen at VA Health Care Facilities**

Characteristic	No. (%) of Veterans (n = 103 788)
Sex	
Male	90 117 (87)
Female	13 652 (13)
Age, y	
18-24	27 167 (26)
25-29	29 185 (28)
30-39	22 230 (22)
≥40	25 206 (24)
Race	
White	68 765 (69)
Black	18 165 (18)
Hispanic	11 410 (11)
Other*	2 155 (2)
Marital status†	
Never married	35 249 (47)
Married	32 434 (43)
Divorced	7 124 (10)
Separated or widowed	267 (0.4)
Service type	
Active duty	54 387 (52)
National Guard/Reserve	49 401 (48)
Service end date‡	
Oct 2001–Nov 2002	282 (0.6)
Nov 2002–Oct 2003	4 803 (10)
Nov 2003–Oct 2004	24 239 (50)
Nov 2004–Oct 2005	19 165 (40)

Abbreviations: OEF/OIF, Operations Enduring Freedom and Iraqi Freedom; VA, Department of Veterans Affairs.

\*Race categories in the OEF/OIF Roster are crude. "Other" refers to ethnic minority groups other than blacks and Hispanics.

†A total of 28 714 veterans (28%) lacked data for marital status.

‡A total of 55 299 veterans (53%) lacked data for service end date.

or OIF service separation to the first VA clinic visit was 2.9 months (intraquartile range [IQR], 1.3-6.0 months). Among all 103 788 OEF/OIF veterans, the median time in the VA system from the first VA clinic visit until the study end date (December 30, 2005) was 7.8 months (IQR, 2.9-14.5 months). Most (103 520 [99.7%]) had a clinic visit to a VA facility, while 9941 (10%) had visits to outside facilities reimbursed by the VA. Nearly all OEF/OIF veterans (103 734 [99%]) had an outpatient visit, while 3213 (3%) also had an inpatient visit.

#### MENTAL HEALTH SERVICES UTILIZATION AND TIME TO FIRST MENTAL HEALTH DIAGNOSIS

Of 103 788 OEF/OIF veterans, 25 396 (25%) had an outpatient mental health visit during the study period. Of note, 5059 OEF/OIF veterans (5%) were seen in mental health clinics but did not receive a mental health diagnosis. Of the 3213 OEF/OIF veterans with an inpatient visit, 1390 (43%) were admitted with the primary diagnosis of a mental health disorder. The median time from the first VA visit to the first mental health diagnosis was 13 days (IQR, 0-118 days). Of those receiving mental health diagnoses, 10 394 (41%) received mental health diagnoses on their first VA clinic visit.

#### MENTAL HEALTH DIAGNOSES AMONG OEF/OIF VETERANS SEEN AT VA FACILITIES

**Table 2** gives the mental health diagnoses among 103 788 OEF/OIF veterans. Overall, 25 658 (25%) received 1 or more distinct mental health diagnoses. The median number of different diagnoses was 3 (IQR, 1-7); 44% had a single mental health diagnosis, 29% had 2 different diagnoses, and 27% had 3 or more different mental health diagnoses. Of those receiving mental health diagnoses, 18 582 (72%) had the same diagnosis made at 2 or more separate encounters. The single most common mental health diagnosis was PTSD, coded in 13 205 OEF/OIF veterans, representing 52% of those receiving mental health diagnoses and 13% of all OEF/OIF veterans in our study population. When we broadened our definition of "mental health problems" to include those with a mental health diagnosis and/or those receiving a V-code, representing a psychosocial problem, overall, 32 010 OEF/OIF veterans (31%) were coded as having "mental health problems."

#### CLINICAL SETTING OF MENTAL HEALTH DIAGNOSES AMONG OEF/OIF VETERANS

Table 2, columns 2 and 3, gives the proportions of veterans with mental health diagnoses and psychosocial problems (V-codes) that were assessed in mental health vs nonmental health settings. The majority of all mental health diagnoses (60%) were first made in nonmental health settings; 42% were made in primary care settings; and 18% were made in other settings.

Table 2, column 4, gives the proportions of veterans having a subsequent mental health visit if the initial mental health diagnosis occurred in a nonmental health setting. Column 5 shows the proportion of these subsequent mental health visits that resulted in the same mental health diagnosis as first assigned in the nonmental health setting. Overall, of veterans first receiving mental health diagnoses in nonmental health settings, the majority (61%) subsequently had a mental health visit, and 92% of these veterans received the same mental health diagnosis first made in the nonmental health setting.

#### PREDICTORS FOR RECEIVING MENTAL HEALTH DIAGNOSES

**Table 3** shows that, with the exception of age subgroups, differences across subgroups of OEF/OIF veterans regarding risk for receiving mental health or PTSD diagnoses were minimal. **Figure 1** illustrates that the absolute mean difference among racial subgroups and between male and female veterans varied by no more than 2%. When stratified by component (active duty vs National Guard and Reserve), **Figure 2** shows that among veterans of active duty service, those in the younger age groups were at higher risk of receiving mental health and PTSD diagnoses compared with those in the oldest age group (≥40 years) (*P* value for trend, <.01). The youngest group of active duty veterans (age, 18-24 years) had a significantly higher risk of receiving 1 or more mental health diagnoses (RR, 3.32; 95% CI, 3.12-3.54) and PTSD

**Table 2. Mental Health (MH) Diagnoses and Psychosocial/Behavioral Problems Among OEF/OIF Veterans Seen at VA Health Care Facilities\***

Diagnosis	OEF/OIF Veterans (N = 103 788)	OEF/OIF Veterans With First MH Diagnosis in Non-MH Setting	MH Visit If First MH Diagnosis in Non-MH Setting	Same MH Diagnosis on MH Visit If First Diagnosis in Non-MH Setting
≥1 MH diagnosis(es)*†	25 658/103 788 (25)	15 347/25 658 (60)	9287/15 347 (61)	8543/9287 (92)
1 MH diagnosis	11 319 (44)	...	...	...
2 MH diagnoses	7342 (29)	...	...	...
≥3 MH diagnoses	6997 (27)	...	...	...
MH diagnosis‡	...	...	...	...
PTSD	13 205 (13)	5844 (44)	4198 (72)	3925 (94)
Anxiety disorder	6267 (6)	3131 (50)	2014 (64)	1897 (94)
Adjustment disorder	5936 (6)	1451 (24)	857 (59)	780 (91)
Depression	5405 (5)	1456 (27)	1018 (70)	966 (95)
Substance use disorder	4878 (5)	2419 (50)	1396 (58)	1310 (94)
Other MH diagnosis(es)§	12 447 (12)	8141 (65)	5157 (63)	4795 (93)
V-code diagnosis(es)	13 211 (13)	9333 (71)	3172 (34)	2683 (85)
Total with MH and/or V-code diagnoses	32 010 (31)	21 447 (67)	10 386 (48)	9302 (90)

Abbreviations: OEF/OIF, Operations Enduring Freedom and Iraqi Freedom; PTSD, posttraumatic stress disorder; VA, Department of Veterans Affairs.

\*Data are given as number (percentage) of veterans. The first row shows denominators to demonstrate how the table is constructed. Column 1 gives MH diagnoses among 103 788 OEF/OIF veterans. Column 2 gives row percentages to describe the proportion of OEF/OIF veterans who received their first MH diagnosis in a non-MH setting. The last 2 columns give row percentages to describe the proportion of OEF/OIF veterans who had a follow-up mental health visit if the first mental health diagnosis occurred in a nonmental health setting and the proportion of these who received the same mental health diagnosis as in the nonmental health setting.

†Based on *International Classification of Diseases, Ninth Revision, Clinical Modification* codes 290.0 to 319.0 that correspond to *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Revised (DSM-IV-R)* diagnostic codes for mental illness.

‡(1) "PTSD," 309.81; (2) "anxiety disorders," 300.00 to 300.09, 300.20 to 300.29, and 300.3; (3) "adjustment disorder," 309.0 to 309.9 (excluding 309.81); (4) "depressive disorders," 296.20 to 296.35, 296.50 to 296.55, 296.90, and 300.4; (5) "substance use disorders," 304 (drug dependence), 303 (alcohol dependence), and 305 (nondependent abuse of drugs and/or alcohol) (excludes codes for nicotine dependence).

§All MH diagnoses included in the *DSM-IV-R* other than the MH diagnoses listed in the double dagger footnote: "psychoses," 291 to 298 (11%); "schizophrenia," 295 (2%); "affective disorders," 924 (6%); "neurotic disorders," 300 (3%); "personality disorders," 301 (5%); "sexual disorders," 302 (7%); "depressive disorders not elsewhere classified," 311 (56%); and other mental health diagnoses (10%).

||Includes V-codes (see "Source of Data" subsection of the "Methods" section) indicating a psychosocial or behavioral problem: V15.40 to V15.49; V60.0 to V60.2; V60.4; V61.0 to V61.22; V61.80 to V61.83; V61.90; V62.0; V62.2; V62.5; V62.80 to V62.89; V63.0; V63.9; V65.2; V65.5; V69.2 to V69.8; V70.1 to V70.2; V71.0 to V71.01; V71.5; V71.81; and V79.0 to V79.1.

(RR, 5.04; 95% CI, 4.52-5.62) compared with active duty veterans 40 years or older. Stratified RR analyses revealed that this inverse trend between age and risk for mental health and PTSD diagnoses persisted when veterans of active duty service were further stratified by race and sex, with the highest risk occurring in the youngest white male active duty veterans followed by the youngest black active duty male veterans, compared with veterans of each group 40 years or older (**Table 4**).

#### COMMENT

Of 103 788 OEF/OIF veterans first seen at VA health care facilities following OEF/OIF service, a quarter received mental health diagnoses, and more than half of these veterans were dually or multiply diagnosed. The most common military service-related mental health diagnosis was PTSD. When psychosocial problems were considered, overall, nearly a third of OEF/OIF veterans were classified as having either mental health diagnoses and/or psychosocial problems. Of veterans receiving mental health diagnoses, the majority were diagnosed on or within days of their first VA clinic visit. Most initial mental health diagnoses occurred in nonmental health settings, particularly in primary care settings. These results indicate a large burden of co-occurring mental health disorders associated with service in Iraq and Afghanistan. This bur-

den will likely increase with time as new cases emerge and unresolved disorders become chronic, posing logistical and fiscal challenges for VA and non-VA mental health as well as primary care medical services.<sup>16-18</sup>

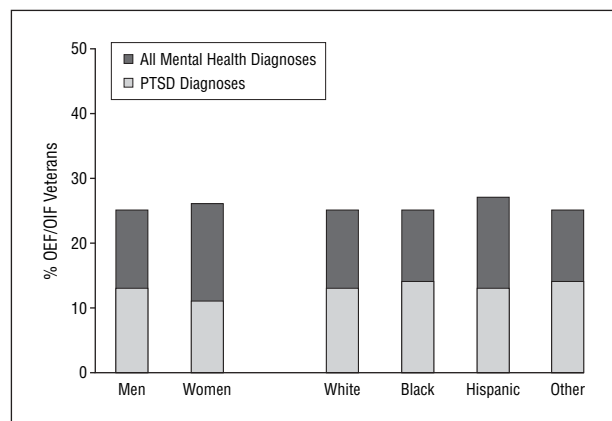
Roughly 29% of returned OEF/OIF veterans have already enrolled in VA health care, a historically high rate compared with 10% of Vietnam veterans.<sup>9,19</sup> Moreover, the median time from OEF or OIF service separation to the first VA clinic visit was short (<3 months) and from the first VA clinic visit to first mental health diagnosis even shorter (13 days). Of note, the majority of mental health diagnoses occurred in nonmental health settings, most commonly primary care settings. This relatively high rate of VA enrollment and the speed with which separated OEF/OIF veterans are seen and diagnosed provide the opportunity to implement early evidence-based interventions<sup>20</sup> in both mental health and primary care settings to decrease chronic military service-related mental illness and disability.

Central to effective early intervention, however, is early and accurate detection. Our results show that most initial mental health diagnoses among OEF/OIF veterans were made in nonmental health settings, particular in primary care. Of note, of the majority referred for mental health follow-up from a nonmental health setting, more than 90% received the same mental health diagnosis. The prevalence of mental health diagnoses among OEF/OIF

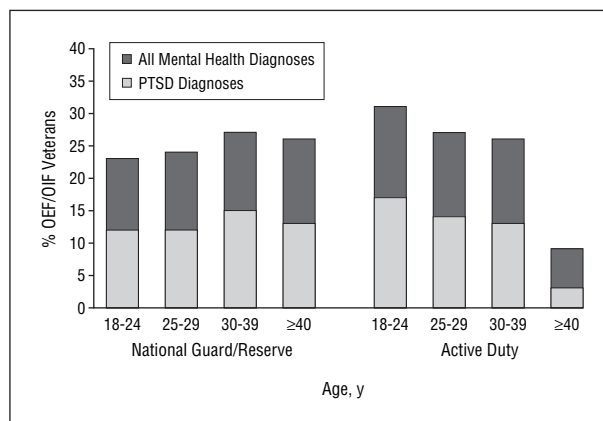
**Table 3. Prevalence and Relative Risk of Receiving 1 or More MH and PTSD Diagnoses**

Characteristic	≥1 MH Diagnoses, No. (%) of Veterans	RR (95% CI)	PTSD Diagnosis, No. (%) of Veterans	RR (95% CI)
<b>Sex</b>				
Female	3552 (26)	1 [Reference]	1550 (11)	1 [Reference]
Male	22 105(25)	0.94 (0.91-0.97)	11 654(13)	1.14 (1.08-1.10)
<b>Age, y</b>				
18-24	7558 (28)	1.47 (1.43-1.52)	4069 (15)	1.72 (1.63-1.80)
25-29	7525 (26)	1.37 (1.33-1.41)	3769 (13)	1.48 (1.41-1.56)
30-39	5827 (26)	1.39 (1.35-1.44)	3167 (14)	1.63 (1.55-1.72)
≥40	4748 (19)	1 [Reference]	2200 (9)	1 [Reference]
<b>Race</b>				
White	16 830(25)	1 [Reference]	8597 (13)	1 [Reference]
Black	4574 (25)	1.03 (1.00-1.06)	2504 (14)	1.10 (1.06-1.15)
Hispanic	3034 (27)	1.09 (1.05-1.12)	1465 (13)	1.03 (0.98-1.08)
Other	529 (25)	1.00 (0.93-1.08)	294 (14)	1.09 (0.98-1.22)
<b>Marital status</b>				
Never married	10 813(31)	1 [Reference]	5258 (15)	1 [Reference]
Married	9933 (31)	1.00 (0.98-1.02)	5537 (17)	1.14 (1.10-1.19)
Divorced	2572 (36)	1.18 (1.14-1.22)	1276 (18)	1.20 (1.14-1.27)
Separated or widowed	11 (44)	1.44 (1.26-1.65)	48 (18)	1.21 (0.93-1.56)
<b>Component</b>				
National Guard/Reserve	12298 (25)	1 [Reference]	6370 (13)	1 [Reference]
Active duty	13360 (25)	0.99 (0.97-1.01)	6835 (13)	0.98 (0.94-1.01)

Abbreviations: CI, confidence interval; MH, mental health; PTSD, posttraumatic stress disorder; RR, relative risk.



**Figure 1.** Posttraumatic stress disorder (PTSD) and mental health diagnoses by sex and race. OEF/OIF indicates Operations Enduring Freedom and Iraqi Freedom.



**Figure 2.** Posttraumatic stress disorder (PTSD) and mental health diagnoses by age group stratified by military component. OEF/OIF indicates Operations Enduring Freedom and Iraqi Freedom.

veterans reported herein is consistent with recent reports.<sup>3,6</sup> The frequency of ICD-9-CM PTSD diagnoses observed among OEF/OIF veterans in our study (13%) was only slightly lower than the current prevalence of PTSD several decades after returning from Vietnam as reported in the National Vietnam Veterans Readjustment Study (15.2%), but it was substantially higher than the 3.5% current prevalence reported in a recent national survey of a representative sample of the US population using standard assessments.<sup>21,22</sup>

We found minimal absolute differences between men and women, racial and ethnic subgroups, and component types regarding risk for receiving mental health and PTSD diagnoses. In contrast, similar to another recent study, we found both an absolute and statistically significant trend toward increased risk for mental health and

PTSD diagnoses with younger age, with the youngest group of OEF/OIF veterans (age, 18-24 years) at the highest risk compared with veterans 40 years or older.<sup>23</sup> This trend was magnified when the sample was first stratified by service component and further stratified by sex and race. Our analyses were limited by the fact that we lacked information on important potential confounders and/or effect modifiers of age such as military branch, rank, and combat exposure. Men serving in the active duty component are generally younger than members of the National Guard and Reserve. Because they are young, they are more likely to be of lower rank and more likely to have greater combat exposure than their older active duty counterparts. Degree of combat exposure has been associated with military service-related mental health disorders, particularly PTSD.<sup>3,6,16,18,19</sup> Our findings suggest

**Table 4. Relative Risk of Receiving 1 or More MH or PTSD Diagnoses Among White and Black Male Veterans of Active Duty Service by Age Group\***

Age, y	≥1 MH Diagnoses	PTSD Diagnosis
White active duty male veterans		
≥40	1 [Reference]	1 [Reference]
30-39	3.55 (3.20-3.94)	6.07 (5.05-7.28)
25-29	3.94 (3.59-4.33)	6.91 (5.82-8.21)
18-24	4.70 (4.28-5.16)	8.88 (7.49-10.54)
Black active duty male veterans		
≥40	1 [Reference]	1 [Reference]
30-39	1.90 (1.63-2.21)	2.17 (1.73-2.73)
25-29	2.07 (1.81-2.37)	2.47 (2.01-3.03)
18-24	2.18 (1.90-2.50)	2.64 (2.15-3.25)

Abbreviations: MH, mental health; PTSD, posttraumatic stress disorder; RR, relative risk.

\*Data are given as relative risk (95% confidence interval).

that enhanced prevention, detection, and treatment should be targeted at the youngest OEF/OIF veterans younger than 25 years, particularly those in the active duty components.

Our findings are not generalizable to all veterans of OEF/OIF service. We had no data on veterans who have not accessed VA care. Furthermore, because we lacked service separation dates on half of the veterans listed in the VA OEF/OIF Roster, we restricted our study population to veterans listed in the VA OEF/OIF Roster who were new users of VA health care after the invasion of Afghanistan and/or who had accessed VA services after their OEF/OIF service separation date (among those with a separation date). We excluded veterans who had VA contact prior to OEF/OIF because our aim was to describe mental health disorders associated with OEF/OIF military service, not with prior military conflicts. Consequently, our results may overestimate the burden of mental health disorders because veterans with mental health disorders may be more likely to seek treatment at a VA facility than those without<sup>19,24</sup> and because we excluded more National Guard and Reserve and older veterans with prior VA contact who had the same or fewer mental health diagnoses than active duty and younger veterans (Table 1). Nevertheless, our findings, based on more than 100 000 OEF/OIF veterans who are new users of VA health care following OEF/OIF military service, may inform targeted prevention and treatment efforts within or outside the VA system.

Another limitation is that OEF/OIF veterans were not assessed systematically with validated self-report measures or structured diagnostic interviews. We captured clinical mental health diagnoses based on ICD-9-CM codes in VA administrative databases.<sup>25</sup> Thus, our results are subject to misclassification. Nevertheless, ICD-9-CM diagnostic codes have been found to be a valid proxy for estimating disease.<sup>26,27</sup> Furthermore, our own findings of a greater than 90% diagnostic concordance among veterans first diagnosed in nonmental health settings subsequently diagnosed in mental

health settings, as well as the high proportion of veterans receiving the same mental health diagnosis on 2 or more clinical encounters, support our results based on the use of ICD-9-CM codes.

Our results signal a need for improvements in the primary prevention of military service-related mental health disorders, particularly among our youngest service members. Furthermore, early detection and evidence-based treatment in both VA and non-VA mental health and primary care settings is critical in the prevention of chronic mental illness, which threatens to bring the war back home as a costly personal and public health burden.

Accepted for Publication: December 7, 2006.

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**Financial Disclosure:** None reported.

**Funding/Support:** This study was funded by a VA Health Services Research and Development (HSR&D) Career Development Award and a grant from the VA Seattle Epidemiological Research and Information Center.

**Role of the Sponsor:** The funding agencies had no role in the design, data analysis, writing, or approval of the manuscript.

**Previous Presentation:** Data from this study were presented in part as a Plenary Talk at the Society for General Internal Medicine Conference; April 29, 2006; Los Angeles, Calif.

**Acknowledgment:** We acknowledge the service of the veterans of Operations Enduring Freedom and Iraqi Freedom, those killed in action, and those with physical as well as psychological wounds. We also acknowledge the support of members of the San Francisco HSR&D Research Enhancement Award Program.

## REFERENCES

- Friedman MJ. Veterans' mental health in the wake of war. *N Engl J Med.* 2005;352:1287-1290.
- National Center for Post-Traumatic Stress Disorder and the Walter Reed Army Medical Center. *Iraq War Clinician Guide.* Washington, DC: Dept of Veterans Affairs; 2004.
- Hoge CW, Castro CA, Messer SC, McGurk D, Cotting DI, Koffman RL. Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *N Engl J Med.* 2004;351:13-22.
- Gawande A. Casualties of war—military care for the wounded from Iraq and Afghanistan. *N Engl J Med.* 2004;351:2471-2475.
- United States Army Surgeon General. Mental Health Advisory Team (MHAT-II): report. Washington, DC: Dept of the Army, Office of the Surgeon General; 2005: 1-30.
- Kang HK, Hyams KC. Mental health care needs among recent war veterans. *N Engl J Med.* 2005;352:1289.

7. Hoge CW, Auchterlonie JL, Milliken CS. Mental health problems, use of mental health services, and attrition from military service after returning from deployment to Iraq or Afghanistan. *JAMA*. 2006;295:1023-1032.
8. OEF/OIF Roster (RMTPRD.MED.SAS.OEFOIF.ROSTER) [database online]. Washington, DC: Department of Veterans Affairs. National Data Systems; 2005. Updated September 30, 2005.
9. Department of Veteran Affairs. Analysis of VA Health Care Utilization Among Southwest Asian War Veterans Combined—Operation Iraqi Freedom Operation Enduring Freedom. Washington, DC: VHA Office of Public Health and Environmental Hazards; February 14, 2006.
10. Ashton CM, Soucek J, Petersen NJ, et al. Hospital use and survival among Veterans Affairs beneficiaries. *N Engl J Med*. 2003;349:1637-1646.
11. Boyko EJ, Koepsell TD, Gaziano JM, Horner RD, Feussner JR. US Department of Veterans Affairs medical care system as a resource to epidemiologists. *Am J Epidemiol*. 2000;151:307-314.
12. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision*. Washington, DC: American Psychiatric Association; 2000.
13. Schlenger WE, Caddell JM, Ebert L, et al. Psychological reactions to terrorist attacks: findings from the National Study of Americans' Reactions to September 11. *JAMA*. 2002;288:581-588.
14. Prophet S. V codes: supplementary classification of factors influencing health status and contact with health services. *J AHIMA*. 1996;67:16-25.
15. Hoge CW, Lesikar SE, Guevara R, et al. Mental disorders among U.S. military personnel in the 1990s: association with high levels of health care utilization and early military attrition. *Am J Psychiatry*. 2002;159:1576-1583.
16. Kessler RC, Sonnega A, Bromet E, Hughes M, Nelson CB. Posttraumatic stress disorder in the National Comorbidity Survey. *Arch Gen Psychiatry*. 1995;52:1048-1060.
17. Jordan BK, Schlenger WE, Hough R, et al. Lifetime and current prevalence of specific psychiatric disorders among Vietnam veterans and controls. *Arch Gen Psychiatry*. 1991;48:207-215.
18. Kang HK, Natelson BH, Mahan CM, Lee KY, Murphy FM. Post-traumatic stress disorder and chronic fatigue syndrome-like illness among Gulf War veterans: a population-based survey of 30,000 veterans. *Am J Epidemiol*. 2003;157:141-148.
19. Kulka RA, Schlenger WE, Fiarbank JA, et al. *Trauma and the Vietnam War Generation: Findings From the National Vietnam Veterans Readjustment Study*. New York, NY: Brunner/Mazel; 1990.
20. Watson PJ, Friedman MJ, Ruzek JI, Norris F. Managing acute stress response to major trauma. *Curr Psychiatry Rep*. 2002;4:247-253.
21. Kessler RC, Chiu WT, Demler O, Walters EE. Prevalence, severity, and comorbidity of 12-month *DSM-IV* disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry*. 2005;62:617-627.
22. Dohrenwend BP, Turner JB, Turse NA, Adams BG, Koenen KC, Marshall R. The psychological risks of Vietnam for US veterans: a revisit with new data and methods. *Science*. 2006;313:979-982.
23. West AN, Weeks WB. Mental distress among younger veterans before, during, and after the invasion of Iraq. *Psychiatr Serv*. 2006;57:244-248.
24. Rosenheck R, Fontana A. Do Vietnam-era veterans who suffer from posttraumatic stress disorder avoid VA mental health services? *Mil Med*. 1995;160:136-142.
25. Maynard C, Chapko MK. Data resources in the Department of Veterans Affairs. *Diabetes Care*. 2004;27(suppl 2):B22-B26.
26. Movig KL, Leufkens HG, Lenderink AW, Egberts AC. Validity of hospital discharge *International Classification of Diseases (ICD)* codes for identifying patients with hyponatremia. *J Clin Epidemiol*. 2003;56:530-535.
27. Borzecki AM, Wong AT, Hickey EC, Ash AS, Berlowitz DR. Identifying hypertension-related comorbidities from administrative data: what's the optimal approach? *Am J Med Qual*. 2004;19:201-206.