

Fiscal Year 2011 VA Utilization Report for Iraq and Afghanistan War Veterans Diagnosed with TBI



Polytrauma/Blast-Related Injuries

*Improving Care for Veterans with
Polytrauma and Blast-Related Injuries*

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Disclaimer

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Abstract

This report was conducted by the VA Polytrauma and Blast Related Injuries (PT/BRI) Quality Enhancement Research Initiative (QUERI) to describe the prevalence, comorbidities, health service utilization and associated costs among Iraq and Afghanistan War Veterans with traumatic brain injury (TBI) during fiscal year (FY) 2011. The study population consisted of all Iraq and Afghanistan War Veterans who used inpatient or outpatient care in VHA in FY 2011. In 2011, 6.5% of the Iraq and Afghanistan War Veterans who used VA health care carried a diagnosis of TBI. However, 9.6% of Iraq and Afghanistan War Veterans who were seen over a three year period from FY 2009 to FY 2011 carried a diagnosis of TBI. The vast majority of patients with a TBI diagnosis also had a clinician-diagnosed mental health disorder and approximately half of those with clinician diagnosed TBI had both post-traumatic stress disorder (PTSD) and pain diagnoses. VA health care utilization and associated costs were higher in Veterans with a diagnosis of TBI compared to those without a TBI diagnosis. A substantial portion of this higher utilization was due to mental health, rehabilitation, and polytrauma health care utilization. While the overall number of Iraq and Afghanistan War Veterans using VA health care services has increased by around 20% in each of the past two years, the patterns and prevalence of diagnoses as well as the utilization of services has remained similar overtime.

BACKGROUND

This report was conducted as part of an annual series of reports by the VA Polytrauma and Blast Related Injuries (PT/BRI) Quality Enhancement Research Initiative (QUERI) to describe the prevalence, comorbidities, and health service utilization among Veterans with Traumatic Brain Injury (TBI). This report will describe the prevalence, comorbidities, and health service utilization among Veterans with TBI during fiscal year (FY) 2011. Prior PT/BRI QUERI utilization reports have covered FY 2009 and FY 2010.^{1,2}

TBI is considered the “signature injury” in the Iraq and Afghanistan Wars.³ Information on the actual health service utilization of Veterans with a TBI diagnosis and high frequency comorbidities in returning Veterans is needed for resource allocation within the VA. This information may also lead to identification of patient subgroups that can be further studied and possibly targeted for interventions or system-wide improvements to more efficiently target resources to meet the needs of Veterans returning from war.

Objectives

1. Describe the annual prevalence of TBI diagnosis in Iraq and Afghanistan War Veterans.
2. Describe the demographic characteristics, comorbidities and health service utilization among Veterans with TBI, with particular focus on psychiatric disturbances and pain related comorbidities.
3. Describe the annual prevalence of TBI diagnosis by region of care and facility type.

METHODS

Overview and Study Population

The focus of this report is to provide a one year summary for FY 2011 (October 1, 2010 to September 30, 2011). The study population consisted of all patients who used VHA inpatient or outpatient care in FY 2011. The institutional review board of the Minneapolis VA Health Care System approved the study, including a Health Insurance Portability and Accountability Act waiver of authorization.

Data Sources

Our cohort includes Veterans identified through the Decision Support Services (DSS) outpatient files as Iraq and Afghanistan War Veterans. We included only those who also had records in the Planning Services and Support Group FY 2011 enrollment file. This enrollment file along with the patient geocode files were then used to obtain FY 2011 demographic and eligibility, both maintained by the VHA Assistant Under Secretary for Health. Data from FY 2011 National Patient Care Database patient treatment files and outpatient care files were used to identify diagnoses, categorize the inpatient and outpatient health services utilization based on the category of care (e.g., general medicine, mental health, rehabilitation, etc.), and identify the facilities at which the patient was seen. Finally, estimates of FY 2011 patient costs were obtained from the VA's Health Economic Resource Center (HERC) data files. These estimates of per patient average fiscal year costs are based on hypothetical Medicare reimbursement levels.^{4,5}

Diagnosis Codes

We used International Classification of Diseases – 9th Revision – Clinical Modification (ICD-9) codes to classify the conditions the Veterans were diagnosed with during FY 2011. The specific codes for each diagnosis are included in Appendix A – Diagnosis Codes.

We focused on diagnoses of TBI, pain of the head, neck or back and mental health conditions. We excluded diagnosis codes only present on lab, radiology or telephone visits, because we believed these codes were less likely to be assigned by someone trained to appropriately diagnose these conditions. For the diagnosis of TBI we used codes currently used by VA for TBI surveillance.^{6,7} For pain diagnoses, we used standard ICD-9 codes for identifying patients treated for head,^{8,9} neck⁹ and back pain^{8,9} supplemented with recently developed headache codes (ICD-9 339 series). We also extracted ICD-9 codes for the following mental health conditions: PTSD, depression, anxiety disorders other than PTSD, bipolar disorder, psychoses, substance abuse excluding nicotine dependence, any mental health disorder (excluding “post-concussion syndrome” and “nicotine dependence”), and nicotine dependence.

Categories of Care

Inpatient stays were grouped into categories of care based on the bed section and treating specialty (see Appendix B). Likewise, outpatient care was grouped in primary care, mental health, polytrauma, rehabilitation, orthopedics, neurology, audiology, and other based on the primary clinic stop codes assigned to each episode of care (see Appendix C).

Facility Type

The VA established the TBI/Polytrauma System of Care (PSC) in 2005 to meet rehabilitation needs of Iraq and Afghanistan War Veterans with TBI and polytrauma. The PSC consists of the following four components (with numbers of facilities in FY 2011): (1) Four Polytrauma Rehabilitation Centers (PRCs; Minneapolis, MN; Palo Alto, CA; Richmond, VA; Tampa, FL) which provide comprehensive inpatient rehabilitation and manage the VA’s Emerging Consciousness Program for minimally-responsive patients. Co-located with each PRC is a

Polytrauma Transitional Rehabilitation Program (PTRP) which provides comprehensive, post-acute cognitive retraining and community re-entry rehabilitation through outpatient and residential programming. (2) Twenty-two specialized outpatient and subacute rehabilitation programs referred to as Polytrauma Network Sites (PNSs) geographically distributed within each of the VA's 21 integrated service networks (VISNs). The PNSs are charged with providing inpatient rehabilitation and outpatient care to former PRC patients and Iraq and Afghanistan War Veterans who present with mild TBI. (3) Polytrauma Support Clinic Teams (PSCT) that provide outpatient services for stable TBI sequelae at facilities closer to the Veteran's home. (4) Polytrauma Point of Contact (PPOC), located at every facility.

The facility types for this report include the following categories: facilities with Polytrauma Rehabilitation Centers (PRC); facilities with Polytrauma Network Sites (PNS); facilities with Polytrauma Support Clinic Teams (PSCT); Community-Based Outpatient Clinics (CBOC); VA Medical Centers that do not have a PNS, PSCT or CBOC; and other non-Medical Center VA facilities (Other VA Facility). Appendix D - Location of Care Variables provides additional detail about how these facilities were coded. It should be noted that facilities, particularly smaller facilities, may be reclassified from year to year. The data used in this report were taken from the Department of Veterans Affairs Planning Systems and Support Group (PSSG) website (http://vaww.pssg.med.va.gov/PSSG/pssg_vast_data.htm) on August 31, 2011. Additional information about the Polytrauma System of Care is also available online (<http://www.polytrauma.va.gov/system-of-care/index.asp>).

Statistical Methods

Descriptive statistics were calculated to compare demographic characteristics and co-occurring mental health and head, neck or back pain diagnoses by TBI diagnosis status (yes, no). The proportion of Veterans with inpatient stays, the length of inpatient stays and the number of outpatient appointments were reported by TBI status and by categories of specialty care. Average costs in terms of both mean and median costs were reported for outpatient, inpatient and pharmacy costs. The proportion of Veterans who were seen at each facility type is reported by TBI status. Finally the portion of Veterans with a TBI diagnosis is reported based on the primary VISN for each Veteran. Analyses are generally limited to the population of Veterans who received health care from the VHA during FY 2011, with the exception that we also examined changes in the prevalence of diagnoses and compared the change in total costs from FY 2009 to FY 2011. All analyses were performed using SAS version 9.2.

RESULTS

Population Characteristics

In FY 2011, 471,383 Iraq and Afghanistan War Veterans received care from VHA medical facilities. Among these Veterans, 6.5% (n=30,521) had a TBI diagnosis. Veterans with a TBI diagnosis were on average younger (31.6 versus 34.3 years old) and more likely to be male (95% versus 87%) compared with patients without a TBI diagnosis (Table 1). There were also small differences in terms of race with more Veterans with a TBI diagnosis being white; however, 18% of Veterans did not have known race/ethnicity data in the VA datasets at the time of the data extraction.

Prevalence of Mental Health and Pain Diagnoses

Diagnoses of mental health conditions, nicotine dependence and pain in head, neck or back were frequent among all Iraq and Afghanistan War Veteran VHA users (Table 2). However, all of these conditions were much more prevalent among Veterans with a diagnosis of TBI compared to Veterans without a TBI diagnosis. PTSD was particularly prevalent in Veterans with a TBI diagnosis (72%) compared to those without (25%). Similarly, we found that 54% of Veterans with TBI had received both PTSD and pain diagnoses, compared with only 12% in Veterans without a TBI diagnosis.

Prevalence of TBI, PTSD and Pain Diagnoses across Three Years

While the prevalence of a TBI diagnosis in any one year's data was slightly less than 7%, when data from three years was pooled together (FY 2009 to FY 2011), we found 9.6% of the Veterans had a TBI diagnosis in at least one of those years (Table 3). Similarly the prevalence of Veterans with all three diagnoses (TBI, pain, and PTSD) represented 3.5% of all Iraq and Afghanistan War Veterans seen during 2011, but this prevalence rose to 6.0% when data were pooled across three years.

Outpatient, Inpatient and Pharmacy Cost for Veterans with TBI Diagnosis

For Veterans with a diagnosis of TBI, the cost of care was consistently higher across all cost categories (Table 4 - Median Costs and Table 5 - Mean Costs). The median costs more closely approximate the typical patient costs than do the mean costs since there is a large skew in the distribution of costs driven by a relatively small number of very high cost patients. For example, while the median total cost (outpatient, inpatient and pharmacy) for a patient with TBI was \$5,749, the mean total cost (outpatient, inpatient and pharmacy) was \$11,967. The median

annual cost per patient was 3.4 times higher for TBI-diagnosed Iraq and Afghanistan War Veterans than those without a TBI diagnosis (\$5,749 versus \$1,688).

Overall the average cost per Iraq and Afghanistan War Veteran increased nearly 5% from 2010 to 2011 (Table 6). However, for Veterans with a TBI diagnosis the median cost decreased slightly (-2.9%), while the mean cost increased 6%. Median and mean costs increased by 5.3% and 5.4%, respectively, in Veterans without a TBI diagnosis.

Patterns of Outpatient and Inpatient Health Service Utilization

Veterans with a TBI diagnosis had much more frequent appointments than Veterans without a TBI diagnosis (Table 7). The typical (median) Veteran with a TBI diagnosis had 19 outpatient appointments compared with a median of 6 for Veterans without a TBI diagnosis. Many of these additional appointments were in Mental Health, Rehabilitation and Polytrauma clinics.

As shown in Table 8, inpatient stays were more common among those diagnosed with TBI compared to those not diagnosed with TBI (12.9% vs. 4.0%). Among Veterans with a TBI diagnosis, inpatient psychiatry stays were the most common followed by General Medicine and Surgery.

Table 9 shows the mean (with standard deviation) and median (with 25th and 75th percentiles) length of stay for each of the category of inpatient stay among only the patients who experienced that type of stay during the year. The average length of stay varies by the type of stay. The average length of stay for a person with a TBI diagnosis is consistently higher than that of a person who did not have a TBI diagnosis and for the rehabilitation stays the lengths of stays are typically much longer in Veterans with TBI diagnoses.

Geographic Variation of TBI Diagnoses

There was a significant difference across VA VISNs in terms of prevalence of Veterans having at least one TBI diagnosis during fiscal year 2011 (Table 10). The prevalence ranged from 4.5% to 8.2%.

Facility Type

Veterans with a TBI diagnosis are more likely to be seen at all of the different types of VA health care facilities than Veterans without a TBI diagnosis (Table 11). Among Veterans with a TBI diagnosis, Community-Based Outpatient Clinics (CBOCs) were used at least once by 54%, while 11% used the CBOCs exclusively for their VA health care. Patients who had PRC stays either in FY 2011 or at any time comprised only a very small fraction of Veterans diagnosed with TBI in FY 2011.

DISCUSSION

In 2011, 30,521 (6.5%) of the 471,383 Iraq and Afghanistan War Veterans who used VA health care carried a diagnosis of TBI. When data from 2009 to 2011 are pooled the number of Veterans who carried a TBI diagnosis increases to 9.6%, because some Veterans received the diagnosis in only one or two of the three years. While the approximately 6.5% prevalence level of TBI in Iraq and Afghanistan Veterans that we observed from FY 2011 is consistent with our report from FY 2009,¹ both the FY 2011 and the pooled three year prevalence of TBI diagnoses are smaller than estimates that have been reported in survey studies.^{10,11} Prior survey work was based on Veteran or service member self-report in the contexts of written or telephone surveys and were not exclusive to VA-enrolled Veterans.^{10,11} Clinical interview with a specialist is considered the gold standard for TBI diagnosis because of the difficulty obtaining accurate information on TBI

history through brief self-report measures.^{12,13} Self-report measures, therefore, may overestimate the rate of TBI compared with clinical assessment just as they have been found to overestimate the rate of PTSD relative to gold standard interviews.¹⁴ On the other hand, clinical assessment is also subject to error and medical diagnoses may be underreported in VA records.¹⁵ Additionally, some Iraq and Afghanistan War Veterans who use VA may have TBI that has not been identified. VA policy requires that all Iraq and Afghanistan Veterans be screened for deployment-related TBI; and those who report trauma exposure with altered consciousness and peritraumatic and current neurobehavioral symptoms be referred for a comprehensive TBI evaluation.¹⁶ The VA is currently reporting that about 95% of these Veterans are successfully screened and that about 75% of those who screen positive undergo comprehensive evaluation.¹⁷ TBI may have occurred in a portion of those who have not been screened, those who screen negative because their symptoms have resolved, and those who screen positive but do not follow-up with a TBI evaluation. In sum, while our findings describe the proportion of Iraq and Afghanistan War Veteran VA users with TBI diagnosis in the VA FY 2011 administrative data, they do not describe the actual prevalence of TBI in the population of all Iraq and Afghanistan War Veterans.

Among those Veterans with clinician diagnosed TBI, we find that mental health, particularly PTSD, and pain-related co-morbidity is the norm. We also found that the overall cost of medical care at VA facilities, as well as the amount of outpatient and inpatient utilization, was consistently higher across all categories of care. Consistent with the high prevalence of mental health diagnoses in the TBI diagnosed population, large increases in mental health utilization make up a substantial proportion of the increased overall utilization seen among Veterans with a TBI diagnosis.

Patients with a TBI diagnosis are seen throughout the VA health care system, in all VISNs and at all different types of VA health care facilities. The intensity of health care use is greater across nearly all facility types for patients with a TBI diagnosis than it is for patients without a TBI diagnosis. Regional differences in the proportion of Veterans with a TBI diagnosis do not appear to be explained by the geographic location of PRC facilities.

In comparing FY 2011 with the prior two years, there was a substantial increase in the number of Iraq and Afghanistan War Veterans receiving care at VA facilities (471,383 in FY 2011 and 327,388 in FY 2009). However the relative frequency of TBI diagnosis, the high rate of comorbidities among those with TBI diagnoses, and the utilization of VA health care services by TBI diagnosis status has remained much the same from 2009 to 2011 on a per Veteran basis.

The findings presented in this report should be taken in context with potential limitations. The findings are based on administrative data, which may be limited by errors in documentation of the patient characteristics, diagnoses, or procedures. Details on the severity of the TBI are difficult to reliably obtain from the administrative record, so while the majority of Veterans with a diagnosis of TBI are likely to have mild TBI, we were not able to report results separately based on the severity of the injury. Additionally, we did not have available information on diagnoses of Iraq and Afghanistan War Veterans from the US who did not use VA services. Lastly, our estimates of health care utilization are based only on estimates of VHA health care utilization such that we cannot provide estimates on the overall societal cost of TBI which would include patient, family or non-VHA service-related costs as well as non-health care-related costs such as reduced productivity.

Strengths of this report include its coverage of the entire population of Iraq and Afghanistan War Veterans seen in a VHA facility in 2011 and our ability to derive information about associated medical costs and other indicators of health care utilization such as outpatient appointments and inpatient stays that can be used for resource allocation. Additionally, as the third in a series of annual reports, this report can be compared against the reports from FY 2009 and FY 2010 to look at trends across three years.

Conclusions

Consistent with fiscal years 2009 and 2010, approximately 7% of Iraq and Afghanistan War Veterans who used VA health care services in 2011 carried a TBI diagnosis. Among this group of patients with a TBI diagnosis, the vast majority also had a clinician-diagnosed mental health disorder and approximately half of those with clinician diagnosed TBI had both PTSD and pain. VA health care utilization was consistently higher in Veterans with a diagnosis of TBI and a substantial portion of this increase was due to increased mental health care utilization. Overall, while the absolute number of Iraq and Afghanistan War Veterans increased by over 40% from FY 2009 to FY 2011, the relative proportion of Veterans diagnosed with TBI and the high rate of comorbid PTSD and pain in this population has remained relatively stable. The average cost of treating these patients also remained relatively stable over this time period.

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Tables

Table 1: Demographic Characteristics of Iraq and Afghanistan War Veterans with and without TBI Diagnosis

Demographics	TBI Diagnosis		Total
	Yes	No	
	N=30,521	N=440,862	N=471,383
Age Mean (SD)	31.6 (8.3)	34.3 (9.8)	34.1 (9.7)
Gender			
Female	5%	13%	13%
Male	95%	87%	87%
Race			
White	70%	60%	60%
Non-White	19%	22%	22%
Unknown	11%	19%	18%
Ethnicity			
Hispanic	13%	10%	10%
Non-Hispanic	77%	72%	72%
Unknown	10%	18%	18%
Urban/Rural			
Urban	59%	58%	58%
Rural	39%	38%	38%
Highly Rural	1%	1%	1%
Unknown	1%	4%	3%
Service Connection			
None	30%	43%	42%
0%	2%	3%	3%
10-40%	18%	27%	26%
50-90%	40%	24%	25%
100%	10%	3%	3%
VA User			
New	25%	25%	25%
Past	75%	74%	74%
Unknown	0%	1%	1%

Table 2: Prevalence of Mental Health and Pain Diagnoses in Iraq and Afghanistan War Veterans with and without TBI Diagnoses

Diagnoses	TBI Diagnosis		Total
	Yes	No	
	N=30,521	N=440,862	N=471,383
Any Mental Health	88%	41%	44%
PTSD	72%	25%	28%
Depression	47%	21%	23%
Anxiety	24%	11%	12%
Bipolar	3%	1%	1%
Psychosis	2%	1%	1%
Substance Disorder	22%	9%	10%
Nicotine Dependence	23%	13%	14%
Headache	49%	9%	12%
Back Pain	46%	24%	25%
Neck Pain	15%	5%	6%
Any Head/Back/Neck Pain	72%	31%	34%
TBI-Memory Problems	7%	<1%	1%
Mental Health and Any Pain	65%	18%	21%
PTSD and Any Pain	54%	12%	15%

Table 3. Proportion of Iraq and Afghanistan War Veterans with Diagnoses of TBI, Pain of the Head, Neck or Back, and/or PTSD

Diagnoses* % (n)	Percentage of Iraq and Afghanistan War Veterans seen in VA in FY2009	Percentage of Iraq and Afghanistan War Veterans seen in VA in FY2010	Percentage of Iraq and Afghanistan War Veterans seen in VA in FY2011	Percentage of Unique Iraq and Afghanistan War Veterans seen in VA from FY2009 to FY2011
	N=327,388	N=398,453	n=471,383	n=613,391
<i>Mutually Exclusive</i>				
No TBI, Pain, or PTSD	52.4%	52.0%	52.0%	48.2%
Pain Only	18.1%	18.3%	18.0%	20.1%
PTSD Only	12.1%	12.1%	12.4%	9.5%
Pain and PTSD	10.7%	10.9%	11.1%	12.6%
TBI Only	0.7%	0.7%	0.7%	0.8%
TBI and Pain	1.1%	1.1%	1.1%	1.6%
TBI and PTSD	1.2%	1.2%	1.1%	1.3%
TBI, Pain, and PTSD	3.7%	3.8%	3.5%	6.0%
<i>Any Diagnosis</i>				
TBI	6.7%	6.8%	6.5%	9.6%
Pain	33.6%	34.1%	33.7%	40.2%
PTSD	27.6%	27.9%	28.2%	29.3%

* *Mutually exclusive* diagnoses include non-overlapping categories of diagnoses. For example, “TBI Only” refers to a diagnosis of TBI in that particular time period mentioned in the column, but no diagnoses of PTSD or Pain during that time period. In the *Any Diagnosis* categories each row stands on its own. Throughout this table the pain categories refer to only diagnoses of head, neck, or back pain

Table 4. Median Cost of Care at VHA Facilities by TBI Diagnosis Category for Iraq and Afghanistan War Veterans who received VA care in 2011

	TBI Diagnosis		Total
	Yes	No	
Category of Cost*	Median (25th-75th Percentiles)	Median (25th-75th Percentiles)	Median (25th-75th Percentiles)
<i>Outpatient</i>			
Medical/Surgical	\$1,418 (\$670-\$2,810)	\$667 (\$279-\$1,435)	\$679 (\$294-\$1,525)
Behavioral	\$1,186 (\$304-\$3,102)	\$0 (\$0-\$667)	\$0 (\$0-\$783)
Diagnostic	\$690 (\$269-\$1,429)	\$226 (\$61-\$594)	\$243 (\$63-\$641)
Other	\$631 (\$146-\$1,643)	\$0 (\$0-\$127)	\$0 (\$0-\$223)
Total Outpatient	\$5,014 (\$2,532-\$9,400)	\$1,501 (\$644-\$3,319)	\$1,625 (\$667-\$3,652)
Total Inpatient	\$0 (\$0-\$0)	\$0 (\$0-\$0)	\$0 (\$0-\$0)
Total Outpatient and Inpatient	\$5,227 (\$2,587-\$10,526)	\$1,513 (\$646-\$3,404)	\$1,640 (\$667-\$3,762)
Total Pharmacy	\$270 (\$72-\$805)	\$64 (\$0-\$274)	\$71 (\$0-\$302)
Total Outpatient, Inpatient, and Pharmacy	\$5,749 (\$2,851-\$11,614)	\$1,688 (\$695-\$3,798)	\$1,829 (\$736-\$4,199)

*Costs were based on estimates of patient costs obtained from the VA's Health Economic Resource Center (HERC) (see Appendix E). These costs are for all Veterans regardless of whether or not they received these categories of care such that the costs are \$0 for the Median and 25th and 75 percentiles of Total Inpatient Costs, since far less than 25% of Veterans received any inpatient services during the fiscal year.

Table 5. Mean Cost of Care at VHA Facilities by TBI Diagnosis Category for Iraq and Afghanistan War Veterans who received VA care in 2011

	TBI Diagnosis		Total
	Yes	No	
Category of Cost	Mean (SD)	Mean (SD)	Mean (SD)
<i>Outpatient</i>			
Medical/Surgical	\$2,306 (\$3,118)	\$1,277 (\$2,713)	\$1,344 (\$2,753)
Behavioral	\$2,660 (\$6,360)	\$798 (\$2,716)	\$919 (\$3,122)
Diagnostic	\$1,140 (\$1,805)	\$485 (\$844)	\$527 (\$951)
Other	\$1,338 (\$2,258)	\$261 (\$950)	\$331 (\$1,117)
Total Outpatient	\$7,444 (\$9,177)	\$2,820 (\$4,787)	\$3,121 (\$5,312)
<i>Inpatient</i>			
Medical/Surgical	\$670 (\$7,038)	\$243 (\$3,127)	\$271 (\$3,518)
Behavioral	\$1,843 (\$10,890)	\$326 (\$4,276)	\$425 (\$4,996)
Long-term Care	\$96 (\$4,032)	\$12 (\$1,390)	\$18 (\$1,693)
Residential/Domiciliary	\$490 (\$4,312)	\$94 (\$1,927)	\$120 (\$2,167)
Other	\$656 (\$12,070)	\$29 (\$2,686)	\$69 (\$4,033)
Total Inpatient	\$3,755 (\$19,855)	\$704 (\$6,788)	\$903 (\$8,328)
Total Outpatient and Inpatient	\$11,199 (\$23,770)	\$3,524 (\$9,356)	\$4,025 (\$11,057)
Total Pharmacy	\$768 (\$2,017)	\$350 (\$1,461)	\$377 (\$1,507)
Total Outpatient, Inpatient, and Pharmacy	\$11,967 (\$24,206)	\$3,874 (\$9,758)	\$4,402 (\$11,455)

*Costs were based on estimates of patient costs obtained from the VA's Health Economic Resource Center (HERC) (see Appendix E). The costs are averages across all Veterans regardless of whether they used the services such that for many of the categories the typical Veteran experienced little to no cost while a small number of Veterans experienced relatively high costs leading to large standard deviations in the cost estimates.

Table 6. Change in Average Costs for Iraq and Afghanistan War Veterans from FY 2010 to FY 2011

	TBI Diagnosis		Total
	Yes	No	
Median Total Outpatient, Inpatient, and Pharmacy			
FY 2010*	\$5,922	\$1,603	\$1,748
FY 2011	\$5,749	\$1,688	\$1,829
1 Year Increase in Total Median Costs	-2.9%	5.3%	4.6%
Mean Total Outpatient, Inpatient, and Pharmacy	Yes	No	Total
FY 2010*	\$11,289	\$3,677	\$4,195
FY 2011	\$11,967	\$3,874	\$4,402
1 Year Increase in Total Mean Costs	6.0%	5.4%	4.9%

* The FY 2010 costs come from the Fiscal Year 2010 VA Utilization Report for Iraq and Afghanistan War Veterans Diagnosed with TBI.²

Table 7. Outpatient Appointments in 2011 by Category of Care in Iraq and Afghanistan War Veterans with and without TBI Diagnoses

Category of Care	TBI Diagnosis				Total	
	Yes		No		Mean (SD)	Median (25th-75 th Percentile)
	Mean (SD)	Median (25th-75 th Percentile)	Mean (SD)	Median (25th-75 th Percentile)		
Total Appointments	32.6 (46.2)	19 (10-36)	10.7 (19.8)	5 (2-12)	12.1 (23.1)	6 (2-13)
Primary Care	3.8 (4.3)	3 (1-5)	2.2 (2.6)	1 (1-3)	2.3 (2.8)	2 (1-3)
Mental Health	12.2 (27.6)	4 (1-11)	3.6 (13.3)	0 (0-2)	4.2 (14.8)	0 (0-3)
Polytrauma	3.9 (13.6)	1 (0-4)	0.1 (1.0)	0 (0-0)	0.4 (3.7)	0 (0-0)
Other Rehabilitation	3.2 (12.1)	0 (0-2)	0.7 (4.1)	0 (0-0)	0.9 (5.1)	0 (0-0)
Audiology	0.3 (0.7)	0 (0-0)	0.1 (0.4)	0 (0-0)	0.2 (0.5)	0 (0-0)
Neurology	0.3 (1.1)	0 (0-0)	0.1 (0.4)	0 (0-0)	0.1 (0.5)	0 (0-0)
Orthopedics	0.3 (0.9)	0 (0-0)	0.2 (0.7)	0 (0-0)	0.2 (0.7)	0 (0-0)
Other	8.5 (11.8)	5 (2-11)	3.9 (6.7)	2 (0-5)	4.1 (7.2)	2 (0-5)

Table 8. Inpatient Stays in 2011 by Category of Care in Veterans with and without TBI Diagnoses

	TBI Diagnosis		Total
	Yes	No	
Category of Care	N=30,521	N=440,862	N=471,383
Any Inpatient Stay	12.9%	4.0%	4.6%
General Medicine	3.6%	1.3%	1.5%
Surgery	1.4%	0.8%	0.8%
Psychiatry	6.7%	1.7%	2.0%
Substance Abuse	0.1%	0.03%	0.04%
Spinal Cord	0.1%	0.02%	0.03%
Any Rehabilitation	0.5%	0.02%	0.05%
Polytrauma Rehab	0.4%	<0.01%	0.03%
Neurology	0.3%	0.04%	0.1%
Any Domiciliary	4.0%	0.7%	1.0%
Mental Health Domiciliary	3.0%	0.5%	0.7%
Nursing Home/Long Term Care	0.2%	0.03%	0.05%

Table 9. Inpatient Length of Stay in 2011 by Category of Care in Iraq and Afghanistan War Veterans with and without TBI Diagnoses

Category of Care	TBI Diagnosis					
	Yes			No		
	N	Mean (SD)	Median (25th-75th Percentile)	N	Mean (SD)	Median (25th-75th Percentile)
Any Inpatient Stay	3924	31.7 (63.5)	9 (3-39)	17525	18.9 (54.7)	4 (2-15)
General Medicine	1086	6.8 (31.1)	3 (1-5)	5831	5.7 (52.9)	2 (1-5)
Surgery	422	5.0 (13.3)	2 (1-5)	3369	4.0 (18.2)	2 (1-4)
Psychiatry	2037	13.3 (28.2)	6 (3-14)	7397	10.3 (18.8)	5 (3-10)
Substance Abuse	43	10.8 (10.2)	6 (4-15)	147	8.7 (9.1)	5 (3-9)
Spinal Cord	41	61.3 (69.9)	27 (6-105)	101	60.9 (163.8)	17 (4-57)
Any Rehabilitation	166	47.3 (48.1)	24.5 (14-66)	92	24.6 (34.4)	15 (7.5-24.5)
Polytrauma Rehab	121	54.3 (51.6)	30 (17-86)	22	15.6 (5.3)	15.5 (14-18)
Neurology	87	3.9 (4.5)	3 (1-5)	196	3.6 (3.0)	3 (2-4)
Any Domiciliary	1213	57.2 (51.0)	43 (27-73)	3274	56.3 (52.2)	39 (23-75)
Mental Health Domiciliary	930	44.2 (33.6)	37 (24-54)	2417	41.8 (34.1)	32 (21-52)
Nursing Home/Long Term Care	67	107.4 (285.9)	23 (10-73)	150	94.5 (258.0)	24.5 (8-74)

Table 10. Prevalence of TBI Diagnoses among Iraq and Afghanistan War Veterans by VISN in 2011

VISN	Total N	TBI Diagnosis
1	17792	8%
2	10747	6%
3	13233	5%
4	20438	6%
5	10274	4%
6*	28813	5%
7	34327	6%
8*	34010	7%
9	22809	8%
10	13636	8%
11	18740	5%
12	19019	6%
15	16646	7%
16	38790	6%
17	30513	6%
18	21513	7%
19	18616	8%
20	23250	7%
21*	19247	7%
22	32685	8%
23*	26147	5%

*VISNs 6, 8, 21 and 23 each have one VA Polytrauma Rehabilitation Center (PRC) Facility, they are: Richmond, VA, Tampa, FL, Palo Alto, CA and Minneapolis, MN, respectively.

Table 11. Type of VA Facility where Veterans with and without TBI Diagnoses Received Care

	TBI		Total
	Yes	No	
Locations of Care†	N=30,521	N=440,862	N=471,383
Facilities Used during FY 2011*			
Polytrauma Network Site (PNS)	30%	20%	21%
Polytrauma Rehabilitation Center (PRC) Facility	6%	4%	4%
Polytrauma Support Clinic Teams (PSCT) Facility	60%	49%	50%
Community-Based Outpatient Clinics (CBOC)	54%	44%	45%
VA Medical Center without PRC, PNS or PSCT	30%	22%	22%
Other VA Facility	9%	7%	7%
Patients only seen at CBOC Facilities in FY 2011	11%	19%	18%
Inpatient Rehabilitation Stay at a PRC Facility			
PRC Inpatient Rehabilitation or Polytrauma Stay in FY2011	0.4%	0.02%	0.04%
PRC Inpatient Rehabilitation or Polytrauma Stay Ever (FY2011 or prior)	2%	0.1%	0.2%
Polytrauma Transitional Rehabilitation Program (PTRP) Stay in FY2011	0.1%	No Data	<0.01%

* Patients can be seen at multiple different locations during the fiscal year, so the Locations of Care columns sum to more than 100%.

†See Appendix D for additional detail on Location of Care variables.

Appendices

Appendix A: Diagnosis Codes

Diagnosis	International Classification of Diseases – 9th Revision – Clinical Modification (ICD-9) codes
TBI	310.2, 800-801.9, 803.0-804.9, 850.0-854.1, 905.0, 907.0, 950.1-950.3, 959.01, 959.9*, V15.52
Pain	
Headache	346.x, 307.81, 784.0, 339.xx
Neck Pain	721.0x, 721.1x, 722.0x, 722.31, 722.71, 722.81, 722.91, 723.xx, 839.0, 839.1, 847.0
Back Pain	721.3x - 721.9x, 722.2x, 722.30, 722.70, 722.80, 722.90, 722.32, 722.72, 722.82, 722.92, 722.33, 722.73, 722.83, 722.93, 724.xx, 737.1, 737.3, 738.4, 738.5, 739.2, 739.3, 739.4, 756.10, 756.11, 756.12, 756.13, 756.19, 805.4, 805.8, 839.2, 839.42, 846, 846.0, 847.1, 847.3, 847.2, 847.9
Any Mental Health Diagnosis	290.0 – 319.0 except 310.2 “Post-Concussion Syndrome” and 305.1 “Nicotine Dependence”
PTSD	309.81
Depression	296.2–296.35, 296.5–296.55, 296.9, 300.4, 311
Anxiety Disorder not PTSD	300.0x, 300.2x, 300.3x
Bipolar Disorder	296.00-296.16, 296.4x, 296.56, 296.6x, 296.8x
Psychosis	295.x, 297.x, 298.x
Substance Abuse excluding Nicotine Dependence	303.xx, 304.xx, 305.0, 305.2, 305.3, 305.4x, 305.5, 305.6, 305.7, 305.8, 305.9
Nicotine Dependence	305.1

*From Fiscal Year 2012 onward the 959.9 code has been removed from the TBI code definition used in the annual reports. The 959.9 code was rarely used and is non-specific about the location of injury. The removal of this code does not have a significant impact on the results of this report. Our recommendation is to use the following TBI codes: 310.2, 800-801.9, 803.0-804.9, 850.0-854.1, 905.0, 907.0, 950.1-950.3, 959.01, V15.52.

Appendix B: Inpatient Category of Care Coding

Category of Care	Bedsection / Treating Specialty
General Medicine	1-9, 12-17, 24, 30, 31, 83, 1E, 1F, 1H, 1J, 104, 105, 107, 108
Neurology	10, 11, 18, 19, 34
Rehabilitation	20, 21, 35, 36, 41, 1D, 1N, 82, 103, 112
Polytrauma Rehab	20, 82, or 112 at a PRC facility
Spinal Cord	22, 23
Surgery	48-63, 65, 78, 97, 1G, 106
Psychiatry	25, 26, 28, 29, 33, 38, 39, 70, 71, 75-77, 79, 89, 91-94
Substance Abuse	27, 72-74, 84, 90
Intermediate	32,40
Any Domiciliary	37, 85, 86, 87, 88, 1K, 1L, 1M, 109-111
Mental Health Domiciliary	86, 88, 1K, 1L, 1M, 109-111
Nursing Home/Long Term Care	42-47, 64, 66-69, 80, 81, 95, 96, 1A, 1B, 1C, 100-102
Other	98, 99

This table is a modification of Table 4 from: Wagner TH, Chow A, Barnett PG. HERC's Average Cost Datasets for VA Inpatient Care FY1998 - FY2010. Guidebook. Menlo Park CA. VA Palo Alto, Health Economics Resource Center; 2011. Modifications include removing the PRRTTP category (this was a facility specific category that broke out less intensive psychiatry and substance abuse programs at some facilities) and moving all of those codes into the existing psychiatry and substance abuse categories. New codes were placed into the existing categories of care using the bill code categories assigned to each bed section code. We merged the existing Blind Rehabilitation into Rehabilitation. We created two new subcategories. Mental Health Domiciliary is a subgroup of Domiciliary that includes 86, 88, 1K, 1L, 1M, 109-111. Polytrauma Rehabilitation is a subgroup of Rehabilitation that includes 112 or code 20 at one of the four PRC facilities. We did not show the Intermediate category in results due to the small number of Veterans with this type of care.

Appendix C: Outpatient Category of Care Coding

Outpatient Category of Care	Primary Clinic Appointment
Audiology	203
Mental Health	500-599
Neurology	293, 315
Orthopedics	409
Primary Care	301, 322, 323, 324, 348
Polytrauma	195, 196, 197, 198, 199, 219
Other Rehabilitation	200, 201, 202, 204-218, 220, 221, 417, 418, 423
Other	All other clinic appointments

Appendix D: Location of Care Variables

Facility Type	Description of the Coding for Each Facility Type
Polytrauma Network Site (PNS)	Records (clinic stops) at the following stations: 509, 523, 526, 528A7, 541, 549, 554, 578, 580, 583, 596, 618, 640, 642, 652, 657, 663, 672, 673, 678, 688, 691. <i>PNS includes the four PRC sites.</i>
Polytrauma Rehabilitation Center Facility (PRC facility)	Records (clinic stops) at the following stations: 618, 640, 652, 673. <i>This is a subset of PNS.</i>
Polytrauma Support Clinic Teams (PSCT) Facility	Records (clinic stops) at the following stations: 402, 405, 438, 460, 501, 502, 503, 506, 508, 512, 516, 520, 521, 528, 528A5, 528A6, 528A8, 529, 531, 534, 537, 539, 542, 544, 546, 548, 550, 552, 553, 556, 558, 561, 561A4, 562, 564, 568, 573, 575, 581, 586, 589, 589A7, 590, 595, 598, 600, 603, 605, 607, 612A4, 613, 614, 620, 620A4, 621, 623, 626, 626A4, 630, 630A4, 630A5, 631, 632, 635, 636A6, 636A8, 644, 646, 648, 656, 659, 660, 662, 664, 667, 671, 674, 676, 679, 689, 693, 695. <i>No overlap with any of the other facility types: PNS, PRC facility, CBOC, Other VA Medical Center, or Other VA Facility.</i>
Community-Based Outpatient Clinics (CBOC)	<i>Any CBOC defined as a PNS or PSCT would be included under PNS or PSCT, not here. No overlap with any of the other facility types: PNS, PRC facility, PSCT, Other VA Medical Center, or VA Other Facility.</i>
Other VA Medical Center	Records (clinic stops) at any medical center not included in PNS, PSCT, or PRC facility. <i>No overlap with PNS, PSCT, PRC facility, or CBOC.</i>
Other VA Facility	Records (clinic stops) at any other facility type not covered above. <i>No overlap with PNS, PSCT, PRC facility, CBOC, or Other VA Medical Center.</i>
Additional Location of Care Variables	Description
PRC Inpatient Rehabilitation or Polytrauma Stay in FY2011	Patient had at least one stay in a PRC rehabilitation or polytrauma bedsection in the current fiscal year
PRC Inpatient Rehabilitation or Polytrauma Stay Ever	Patient had at least one stay in a PRC rehabilitation or polytrauma bedsection ever
Polytrauma Transitional Rehabilitation Program (PTRP) Stay in FY2011	Patient had at least one stay in a Polytrauma Transitional Rehabilitation Program (PTRP) in FY2011
CBOC Only	Patient had a CBOC appointment and no records at any non-CBOC facility type

Appendix E: Category of Cost Definitions

Category of Cost Variables	Definitions*
<i>Outpatient</i>	
Medical/Surgical	The total national cost of all outpatient care in the medical and surgical categories (category 21 (medical) and category 28 (surgery)) during the fiscal year
Behavioral	The total national cost of all outpatient care in the behavioral categories (category 29 (psychiatry) and category 30 (substance abuse treatment)) during the fiscal year
Diagnostic	The total national cost of all outpatient care in the diagnostic categories (category 23 (ancillary services) and category 25 (diagnostic services)) during the fiscal year
Other	The total national cost of all outpatient care in all other categories (category 22 (dialysis), category 24 (rehabilitation), category 27 (prosthetics), category 31 (dental), category 32 (adult day care), category 33 (home care), and category 99 (unidentified stops)) during the fiscal year
Total Outpatient	Total National Outpatient Cost: the total national cost of all outpatient care during the fiscal year
<i>Inpatient</i>	
Medical/Surgical	Total national cost of all inpatient care in the medical and surgical categories (category 0 (medical) and category 4 (surgical)) during the fiscal year
Behavioral	The total national cost of all inpatient care in the behavioral categories (category 5 (psychiatry) and category 6 (substance abuse)) during the fiscal year
Long-term Care	The total national cost of all inpatient care in the long term care category (category 9) during the fiscal year
Residential/Domiciliary	The total national cost of all inpatient care in the residential and domiciliary categories (category 8 (domiciliary) and category 10 (PRRTP)) during the fiscal year
Other	The total national cost of all inpatient care in all other categories (category 1 (rehabilitation), category 2 (blind rehabilitation), category 3 (spinal cord injury), and category 7 (intermediate)) during the fiscal year
Total Inpatient	The total national cost of all inpatient care during the fiscal year
Total Outpatient and Inpatient	The total national cost of all inpatient and outpatient costs during the fiscal year (Does not include pharmacy costs or fee basis costs)
Total Pharmacy	The total DSS pharmacy cost accrued during the fiscal year
Total Outpatient, Inpatient, and Pharmacy	The total national cost of inpatient, outpatient, and pharmacy costs during the fiscal year (Does not include fee basis costs)

*More detailed information on VA Health Economic Resource Center (HERC) average cost categories is available in the following publication: Wagner TH, Chow A, Barnett PG. HERC's Average Cost Datasets for VA Inpatient Care FY1998 - FY2010. Guidebook. Menlo Park CA. VA Palo Alto, Health Economics Resource Center; 2011.