

Fiscal Year 2010 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*

May 2012

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Acknowledgements

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Funding for the report was provided by the U.S. Department of Veterans Affairs, Office of Research and Development, Health Services Research & Development Service, Washington, DC through local initiated project grant (#PLY 05-2010-2) from the Polytrauma and Blast-Related Injuries (PT/BRI) QUERI.

Disclaimer

The views expressed herein do not necessarily represent the views of the Department of Veterans Affairs or the United States Government.

Recommended citation: Taylor BC, Hagel EM, Cutting A, Carson KF, Cifu DX, Bidelspach DE, Sayer NA. Fiscal Year 2010 VA Utilization Report for Iraq and Afghanistan War Veterans Diagnosed with TBI. Prepared for the VA Polytrauma and Blast-Related Injuries QUERI #PLY 05-2010-2. May 2012. Available at: <http://www.queri.research.va.gov/ptbri/docs/FY10-TBI-Diagnosis-HCU-Report.pdf>.

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 TBI during fiscal year (FY) 2010. The study population consisted of all Iraq and Afghanistan War Veterans who used inpatient or outpatient care in VHA in FY 2010. In 2010, 6.8% of the Iraq and Afghanistan War Veterans who used VA health care carried a diagnosis of TBI compared with 6.7% for FY 2009. However, 8.6% of Iraq and Afghanistan War Veterans who were seen over a two year period including FY 2009 or 2010 had 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 PTSD and pain diagnoses. VA health care utilization and associated costs were higher in Veterans with a diagnosis of TBI. A substantial portion of this increased utilization was due to increased mental health, rehabilitation, and polytrauma health care utilization. While the overall number of Iraq and Afghanistan War Veterans seen in FY 2010 was over 20% higher than FY 2009, the patterns of prevalence of diagnoses, utilization and associated costs per patient were very similar.

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 TBI. This report will describe the prevalence, comorbidities, and health service utilization among Veterans with TBI during fiscal year (FY) 2010. The first PT/BRI QUERI utilization report covered FY 2009.¹

Traumatic Brain Injury (TBI) is considered the “signature injury” in the Afghanistan and Iraq Wars.² 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 2010 (October 1, 2009 to September 30, 2010). The study population consisted of all patients who used VHA inpatient or outpatient care in FY 2010. 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 all Afghanistan and Iraq War Veterans identified through the Decision Support Services (DSS) outpatient files as VA patients in FY 2010, housed at the VA's Austin Information Technology Center (AITC). We then extracted all FY 2010 demographic and eligibility data associated with the cohort from the Planning Services and Support Group annual enrollment file as well as urban/rural designation from the patient geocode file, both maintained by the VHA Assistant Under Secretary for Health, also housed at AITC. Data from FY 2010 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 2010 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.^{3,4}

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 2010. 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 applied codes currently used by VA for TBI surveillance.^{5,6} For pain diagnoses, we used standard ICD-9 codes for identifying patients treated for head,^{7,8} neck⁸ and back pain^{7,8} 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 disorder not 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 2010): (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 VISN to which each Veteran had been assigned. Analyses are generally limited to the population of Veterans who received health care from the VHA during FY 2010, 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 2010. All analyses were performed using SAS version 9.2.

RESULTS

Population Characteristics

In FY 2010, 398,453 Iraq and Afghanistan War Veterans received care from VHA medical facilities. Among these Veterans, 6.8% (n=27,126) had a TBI diagnosis. Veterans with a TBI diagnosis were on average younger (31.0 versus 33.7 years old) and more likely to be male (95% versus 86%) 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, 20%

of Veterans did not have known race/ethnicity data in the VA datasets at the time of the data extraction. Service Connection levels were higher in Veterans with a TBI diagnosis.

Prevalence of Mental Health and Pain Diagnoses

Diagnoses of mental health conditions, nicotine dependence and pain in head, neck or back were frequently found in the overall Iraq and Afghanistan War Veteran population of 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 (73%) compared to those without (25%). Similarly, we found that 56% of Veterans with TBI had received both PTSD and pain diagnoses, compared with only 12% in Veterans without a TBI diagnosis.

Veterans with all three diagnoses (TBI, pain, and PTSD) represented 3.8% of all Iraq and Afghanistan War Veterans seen during 2010 (Table 3). This proportion of Veterans with all three diagnoses was similar to what was seen in FY 2009. However, 5.1% or 24,463 Veterans seen over a two year period (FY 2009 and 2010) had received all three of these diagnoses (TBI, pain, and PTSD). Approximately half of all Iraq and Afghanistan War Veteran patients (49.7%) received none of these diagnoses in either FY 2009 or FY 2010.

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

\$5,922, the mean total cost (outpatient, inpatient and pharmacy) was \$11,289. The median annual cost per patient was 3.7 times higher for TBI-diagnosed Iraq and Afghanistan War Veterans than those without a TBI diagnosis (\$5,922 versus \$1,603).

The average cost per Veteran increased slightly from 2009 to 2010 (Table 6). For Veterans with a TBI diagnosis the median cost increased 1.6% while the mean cost increased 2.6%. Median and mean costs increased by 1.6% 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 21 outpatient appointments compared with a median of 5 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 (12.2% vs. 3.9%). 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. For many of the categories, the average length of stay for a person with a TBI diagnosis was only slightly higher than that of a person who did not have a TBI diagnosis, with the exception that

Rehabilitation and Long Term Care stays were substantially longer in Veterans with TBI diagnoses.

Geographic Variation of TBI Diagnoses

There was a nearly two-fold magnitude of difference across VA VISNs in terms of prevalence of Veterans having at least one TBI diagnosis during fiscal year 2010 (Table 10). The prevalence ranged from 5% in VISNs 3 and 23 to 9% in VISN 19.

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 53%, while 9% used the CBOCs exclusively for their VA health care. Patients who had PRC stays either in FY 2010 or at any time comprised only a fraction of Veterans diagnosed with TBI in FY 2010.

DISCUSSION

In 2010, 27,126 (6.8%) of the 398,453 Afghanistan and Iraq War Veterans who used VA health care carried a diagnosis of TBI. When data from 2010 and 2009 are pooled the number of Veterans who carried a TBI diagnosis increases somewhat to 8.6%, because some Veterans received the diagnosis in only one of the two years. While the approximately 7% prevalence level of TBI in Afghanistan and Iraq Veterans that we observed from FY 2010 is consistent with our report from FY 2009,¹ both it and the pooled two year prevalence of TBI diagnoses are smaller than estimates that have been reported in survey studies.^{9,10} 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.^{9,10} 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.^{11,12} 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.¹³ On the other hand, clinical assessment is also subject to error and medical diagnoses may be underreported in VA records.¹⁴ Additionally, some Afghanistan and Iraq War Veterans who use VA may have TBI that has not been identified. VA policy requires that all Afghanistan and Iraq 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.¹⁵ 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.¹⁶ 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 Afghanistan and Iraq War Veteran VA users with TBI diagnosis in 2010, they do not describe the actual prevalence of TBI in the population of all Afghanistan and Iraq 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 2010 with FY 2009, there was a substantial increase in the number of Iraq and Afghanistan War Veterans (398,453 compared with 327,888) and subsequently a large increase in the absolute number of Veterans with a TBI diagnosis (27,216 compared with 22,053).

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 remained much the same for 2010 as 2009 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 Afghanistan and Iraq 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 Afghanistan and Iraq War Veterans seen in a VHA facility in 2010 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 second in a series of annual reports, this report can be compared against the report from FY 2009 to look at trends across two years.

Conclusions

Consistent with fiscal year 2009, approximately 7% of Afghanistan and Iraq War Veterans who used VA health care services in 2010 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 Afghanistan and Iraq War Veterans increased by over 20% from FY 2009 to FY 2010, the relative proportion of Veterans diagnosed with TBI and the high rate of comorbid PTSD and pain in this population remained relatively stable. The average cost of treating these patients also remained stable over this time period. Subsequent reports will be available in the future to allow for an examination of trends across years. The ultimate goal is to provide a foundation of data that can be used to provide the best possible care for these returning Veterans.

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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=27,126	N=371,327	N=398,453
Age Mean (SD)	31.0 (8.3)	33.7 (9.8)	33.5 (9.7)
Gender			
Female	5%	13%	12%
Male	95%	86%	87%
Race			
White	69%	59%	59%
Non-White	18%	21%	21%
Unknown	13%	20%	20%
Ethnicity			
Hispanic	12%	10%	10%
Non-Hispanic	79%	73%	73%
Unknown	9%	18%	17%
Urban/Rural			
Urban	59%	60%	60%
Rural	39%	37%	37%
Highly Rural	1%	1%	1%
Unknown	1%	3%	2%
Service Connection			
None	26%	42%	41%
0%	2%	4%	3%
10-40%	21%	29%	29%
50-90%	41%	23%	24%
100%	10%	3%	3%
VA User			
New	27%	27%	27%
Past	72%	71%	71%
Unknown	1%	2%	2%

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=27,126	N=371,327	N=398,453
Any Mental Health	88%	40%	43%
PTSD	73%	25%	28%
Depression	47%	20%	22%
Anxiety	23%	11%	12%
Bipolar	3%	1%	1%
Psychosis	2%	1%	1%
Substance Disorder	21%	9%	9%
Nicotine Dependence	23%	14%	14%
Headache	50%	10%	12%
Back Pain	46%	24%	25%
Neck Pain	15%	5%	6%
Any Head/Back/Neck Pain	72%	31%	34%
TBI-Memory Problems	11%	<1%	1%
Mental Health and Any Pain	66%	18%	21%
PTSD and Any Pain	56%	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 Unique Iraq and Afghanistan War Veterans seen in VA in either FY2009 or FY2010
	N=327,388	N=398,453	N=475,936
<i>Mutually Exclusive</i>			
No TBI, Pain, or PTSD	52.44%	51.97%	49.73%
Pain Only	18.09%	18.25%	19.53%
PTSD Only	12.08%	12.09%	10.31%
Pain and PTSD	10.65%	10.88%	11.84%
TBI Only	0.70%	0.71%	0.76%
TBI and Pain	1.14%	1.13%	1.43%
TBI and PTSD	1.20%	1.18%	1.27%
TBI, Pain, and PTSD	3.70%	3.78%	5.14%
<i>Any Diagnosis</i>			
TBI	6.74%	6.81%	8.59%
Pain	33.57%	34.05%	37.94%
PTSD	27.63%	27.93%	28.56%

* *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 2010

	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	\$1,431 (\$655-\$2,785)	\$661 (\$257-\$1,382)	\$661 (\$284-\$1,478)
Behavioral	\$1,252 (\$335-\$3,120)	\$0 (\$0-\$601)	\$0 (\$0-\$730)
Diagnostic	\$670 (\$254-\$1,416)	\$213 (\$60-\$558)	\$229 (\$61-\$610)
Other	\$743 (\$223-\$1,785)	\$0 (\$0-\$156)	\$0 (\$0-\$266)
Total Outpatient	\$5,179 (\$2,601-\$9,405)	\$1,436 (\$606-\$3,185)	\$1,563 (\$651-\$3,544)
Total Inpatient	\$0 (\$0-\$0)	\$0 (\$0-\$0)	\$0 (\$0-\$0)
Total Outpatient and Inpatient	\$5,420 (\$2,658-\$10,492)	\$1,446 (\$607-\$3,266)	\$1,576 (\$653-\$3,656)
Total Pharmacy	\$258 (\$71-\$774)	\$57 (\$0-\$250)	\$64 (\$0-\$277)
Total Outpatient, Inpatient, and Pharmacy	\$5,922 (\$2,915-\$11,488)	\$1,603 (\$661-\$3,630)	\$1,748 (\$708-\$4,060)

*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 2010

	TBI Diagnosis		Total
	Yes	No	
Category of Cost	Mean (SD)	Mean (SD)	Mean (SD)
<i>Outpatient</i>			
Medical/Surgical	\$2,300 (\$3,038)	\$1,241 (\$2,335)	\$1,314 (\$2,404)
Behavioral	\$2,575 (\$4,214)	\$759 (\$2,845)	\$882 (\$2,993)
Diagnostic	\$1,132 (\$1,679)	\$468 (\$804)	\$514 (\$907)
Other	\$1,421 (\$2,293)	\$279 (\$813)	\$357 (\$1,028)
Total Outpatient	\$7,429 (\$7,629)	\$2,748 (\$4,594)	\$3,067 (\$5,003)
<i>Inpatient</i>			
Medical/Surgical	\$566 (\$5,803)	\$241 (\$3,371)	\$263 (\$3,590)
Behavioral	\$1,516 (\$9,199)	\$299 (\$4,020)	\$382 (\$4,574)
Long-term Care	\$132 (\$4,658)	\$11 (\$1,052)	\$19 (\$1,584)
Residential/Domiciliary	\$550 (\$4,329)	\$121 (\$2,156)	\$150 (\$2,371)
Other	\$619 (\$11,846)	\$35 (\$2,900)	\$74 (\$4,174)
Total Inpatient	\$3,382 (\$18,354)	\$706 (\$6,891)	\$889 (\$8,226)
Total Outpatient and Inpatient	\$10,811 (\$21,550)	\$3,454 (\$9,284)	\$3,955 (\$10,743)
Total Pharmacy	\$736 (\$1,620)	\$325 (\$1,345)	\$353 (\$1,369)
Total Outpatient, Inpatient, and Pharmacy	\$11,547 (\$21,918)	\$3,779 (\$9,662)	\$4,308 (\$11,116)

*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 2009 to FY 2010

	TBI Diagnosis		
Median Total Outpatient, Inpatient, and Pharmacy	Yes	No	Total
FY 2009*	\$5,831	\$1,548	\$1,690
FY 2010	\$5,922	\$1,603	\$1,748
1 Year Increase in Total Median Costs	1.6%	1.6%	1.6%
Mean Total Outpatient, Inpatient, and Pharmacy	Yes	No	Total
FY 2009*	\$10,999	\$3,489	\$3,996
FY 2010	\$11,289	\$3,677	\$4,195
1 Year Increase in Total Mean Costs	2.6%	5.4%	5.0%

* The FY 2009 costs come from the Fiscal Year 2009 VA Utilization Report for Iraq and Afghanistan War Veterans Diagnosed with TBI.¹

Table 7. Outpatient Appointments in 2010 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-75th Percentile)
	Mean (SD)	Median (25th-75th Percentile)	Mean (SD)	Median (25th-75th Percentile)		
Total Appointments	34.9 (46.7)	21 (11-41)	11.1 (20.2)	5 (2-12)	12.7 (23.7)	6 (2-14)
Primary Care	3.8 (4.2)	3 (1-5)	2.2 (2.5)	2 (1-3)	2.3 (2.6)	2 (1-3)
Mental Health	12.1 (25.5)	5 (1-12)	4.0 (13.4)	0 (0-2)	4.2 (14.7)	0 (0-3)
Polytrauma	4.2 (14.0)	1 (0-4)	0.1 (1.3)	0 (0-0)	0.4 (4.0)	0 (0-0)
Other Rehabilitation	3.4 (11.4)	1 (0-3)	0.7 (4.0)	0 (0-0)	0.9 (4.9)	0 (0-0)
Audiology	0.4 (0.8)	0 (0-1)	0.1 (0.4)	0 (0-0)	0.2 (0.5)	0 (0-0)
Neurology	0.4 (1.0)	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	10.5 (15.5)	6 (3-13)	4.1 (6.9)	2 (1-5)	4.5 (7.9)	2 (1-5)

Table 8. Inpatient Stays in 2010 by Category of Care in Veterans with and without TBI Diagnoses

	TBI Diagnosis		Total
	Yes	No	
Category of Care	N=27,126	N=371,327	N=398,453
Any Inpatient Stay	12.2%	3.9%	4.5%
General Medicine	3.2%	1.3%	1.5%
Surgery	1.3%	0.8%	0.8%
Psychiatry	6.6%	1.7%	2.0%
Substance Abuse	0.5%	0.10%	0.10%
Spinal Cord	0.10%	0.03%	0.03%
Any Rehabilitation	0.60%	0.02%	0.10%
 Polytrauma Rehab	0.40%	<0.01%	0.03%
Neurology	0.20%	0.04%	0.10%
Any Domiciliary	3.3%	0.7%	0.9%
 Mental Health Domiciliary	2.5%	0.5%	0.6%
Nursing Home/Long Term Care	0.30%	0.04%	0.10%

Table 9. Inpatient Length of Stay in 2010 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	3320	32.7 (76.6)	9 (3-40)	14601	19.8 (45.3)	4 (2-17)
General Medicine	875	5.9 (19.4)	3 (1-5)	4911	5.3 (23.7)	2 (1-4)
Surgery	362	4.4 (8.8)	2 (1-4)	2863	3.7 (10.8)	2 (1-4)
Psychiatry	1781	15.7 (24.9)	7 (3-17)	6209	13.0 (28.2)	6 (3-13)
Substance Abuse	136	24.4 (20.9)	21 (7.5-30)	415	22.7 (17.4)	21 (9-28)
Spinal Cord	30	52.4 (79.9)	16 (5-71)	106	52.4 (103.6)	9.5 (3-48)
Any Rehabilitation	151	58.2 (95.9)	24 (14-60)	72	37.4 (51.9)	18 (11-44.5)
Polytrauma Rehab	107	65.9 (108.5)	25 (15-74)	13	20.6 (13.1)	18 (14-29)
Neurology	54	3.1 (2.2)	2.5 (1-4)	161	3.3 (2.8)	3 (1-4)
Any Domiciliary	901	53.8 (57.2)	40 (23-66)	2529	56.8 (57.0)	37 (21-74)
Mental Health Domiciliary	665	39.1 (33.5)	34 (20-49)	1735	37.2 (30.4)	29 (18-48)
Nursing Home/Long Term Care	69	166.3 (363.5)	41 (13-119)	143	66.2 (144.8)	21 (8-73)

Table 10. Prevalence of TBI Diagnoses among Iraq and Afghanistan War Veterans by VISN in 2010

VISN	Total N	TBI Diagnosis
1	15115	7%
2	9499	6%
3	13200	5%
4	18994	7%
5	9145	6%
6*	24127	6%
7	27144	6%
8*	26592	7%
9	19010	8%
10	11064	7%
11	16596	6%
12	16843	6%
15	13748	8%
16	32390	6%
17	24516	7%
18	18628	7%
19	15204	9%
20	19858	8%
21*	16601	7%
22	27537	8%
23*	22567	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=27,126	N=371,327	N=398,453
Facilities Used during FY 2010*			
Polytrauma Network Site (PNS)	31%	21%	22%
Polytrauma Rehabilitation Center (PRC) Facility	7%	4%	4%
Polytrauma Support Clinic Teams (PSCT) Facility	62%	51%	51%
Community-Based Outpatient Clinics (CBOC)	53%	43%	43%
VA Medical Center without PRC, PNS or PSCT	30%	22%	22%
Other VA Facility	55%	13%	16%
Patients only seen at CBOC Facilities in FY 2010	9%	18%	17%
Inpatient Rehabilitation Stay at a PRC Facility			
PRC Inpatient Rehabilitation or Polytrauma Stay in FY2010	0.30%	<0.01%	0.03%
PRC Inpatient Rehabilitation or Polytrauma Stay Ever (FY2010 or prior)	2.0%	0.10%	0.20%
Polytrauma Transitional Rehabilitation Program (PTRP) Stay in FY2010	0.10%	<0.01%	<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 PRRTP 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 FY2010	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 FY2010	Patient had at least one stay in a Polytrauma Transitional Rehabilitation Program (PTRP) in FY2010
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.