Fiscal Year 2012 VA Utilization Report for Iraq and Afghanistan War Veterans Diagnosed with TBI

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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) 2012. The study population consisted of all Iraq and Afghanistan War Veterans who used inpatient or outpatient care in VHA in FY 2012. In 2012, 6.8% of the Iraq and Afghanistan War Veterans who used VA health care carried a diagnosis of TBI. However, 9.8% of Iraq and Afghanistan War Veterans who were seen over a three year period from FY 2010 to FY 2012 carried a diagnosis of TBI. The vast majority of patients with a TBI diagnosis also had a clinician-diagnosed mental health disorder and 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 continues to increase each year, the patterns and prevalence of diagnoses as well as the utilization of services have remained similar over time.

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) 2012. Prior PT/BRI QUERI utilization reports have covered FY 2009 through FY 2011.[1-3]

TBI is considered the "signature injury" in the Iraq and Afghanistan Wars.[4] 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 2012 (October 1, 2011 to September 30, 2012). The study population consisted of all Iraq and Afghanistan War Veterans who used VHA inpatient or outpatient care in FY 2012. 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 2012 enrollment files. These enrollment files along with the patient geocode files were then used to obtain FY 2012 demographics and VHA eligibility information. Data from FY 2012 National Patient Care Database patient treatment files and outpatient care files were used to identify additional demographic variables and 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 2012 VHA costs per patient 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.[5,6]

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 2012. The specific codes used to identify 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 similar to those used by the VA for TBI surveillance,[7,8] with one slight modification. For the FY 2012 annual report, we dropped the code 959.9 as it is non-specific about the location of injury. The 959.9 code was rarely used and the removal of this code does not have a significant impact on the results of this report. For pain diagnoses, we used standard ICD-9 codes for identifying patients treated for head,[9,10] neck[10] and back pain[9,10] 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. In FY 2012, the PSC consisted of the following four components: (1) Five Polytrauma Rehabilitation Centers (PRCs;

Minneapolis, MN; Palo Alto, CA; Richmond, VA; Tampa, FL, San Antonio, TX) 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-three 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 provide inpatient and outpatient rehabilitation services to Veterans with TBI and polytrauma, including those discharged from a PRC and those with mild to moderate the 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 added or reclassified from year to year. Data, current as of the end of 2013, from the Corporate Data Warehouse (CDW) Location and Division tables from the Dimensional data domains were used to determine if a given facility was a VA Medical Center, CBOC, or

other non-Medical Center VA Facility. 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 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 2012, with the exception that we also examined changes in the prevalence of diagnoses and compared the change in total costs from FY 2010 to FY 2012. All analyses were performed using SAS version 9.2.

RESULTS

Population Characteristics

In FY 2012, 525,307 Iraq and Afghanistan War Veterans received care from VHA medical facilities. Among these Veterans, 6.8% (n=35,826) had a TBI diagnosis associated with care received in FY 2012. Veterans with a TBI diagnosis were on average younger (32.1 versus 34.8 years old) and more likely to be male (94% 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, up to 16% of Veterans did not have known race/ethnicity data in the VA datasets at the time of the data extraction.

About two thirds of all Iraq and Afghanistan War Veterans who received VA care in FY 2012 were classified as having some level of service connected disability (Table 1). Thirty percent of Veterans with a TBI diagnosis in FY 2012 had a service connection rating for TBI.

Prevalence of Mental Health and Pain Diagnoses

Diagnoses of mental health conditions, nicotine dependence and pain in the 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 (26%). 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 were pooled together (FY 2010 to FY 2012), we found 9.8% 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 3.7% of all Iraq and Afghanistan War Veterans seen during 2012, but this prevalence rose to 6.1% 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 patients with high costs of care. For example, while the median total cost (outpatient, inpatient and pharmacy) for a patient with TBI was $5,555, the mean total cost (outpatient, inpatient and pharmacy) was $11,481. The median annual cost per patient was 3.3 times higher for TBI-diagnosed Iraq and Afghanistan War Veterans than those without a TBI diagnosis ($5,555 versus $1,691).

Overall the average cost per Iraq and Afghanistan War Veteran remained relatively flat from 2011 to 2012 (Table 6) with a decrease of 0.7% in median costs and an increase of 0.7% in mean costs. Among Veterans with a TBI diagnosis there was a greater decrease in costs from 2011 to 2012 (median costs decreased 3.3% while the mean costs decreased 4.1%).

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 20 outpatient appointments compared with a median of 7 for Veterans without a TBI diagnosis. Many of these additional appointments were in Mental Health, Rehabilitation and Polytrauma clinics, but there were also significantly more primary care and other appointments.

As shown in Table 8, inpatient stays were more common among those diagnosed with TBI compared to those not diagnosed with TBI (13.1% vs. 4.2%). Among Veterans with a TBI

diagnosis, inpatient mental health related 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 stays among only the patients who experienced that type of stay during the year. The average length of stay varies by the type of stay. Overall the average length of stay is higher for Veterans with a TBI diagnosis. Within some categories of care (e.g., rehabilitation), Veterans with TBI had significantly longer stays than Veterans without TBI. The other factor driving the greater overall length of stay is that Veterans with TBI were proportionately more likely to have longer stay categories of care like psychiatry, mental health domiciliary and rehabilitation instead of shorter stay categories like surgery and general medicine.

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 2012 (Table 10). The prevalence ranged from 5% to 9%.

Polytrauma System of Care

Although the majority of Veterans with TBI were seen in a facility that had a PRC, PNS or PSCT, almost 30% were seen outside the PSC (Table 11). Among Veterans with a TBI diagnosis, Community-Based Outpatient Clinics (CBOCs) were used at least once by 54%, while 8% used the CBOCs exclusively for their VA health care. Patients who had PRC stays either in FY 2012 or at any time comprised only a very small fraction of Veterans diagnosed with TBI in FY 2012.

DISCUSSION

In 2012, 35,826 (6.8%) of the 525,307 Iraq and Afghanistan War Veterans who used VA health care carried a diagnosis of TBI. When data from 2010 to 2012 are pooled the number of Veterans who carried a TBI diagnosis increases to 9.8%, because some Veterans received the diagnosis in only one or two of the three years. While the approximately 6.8% prevalence level of TBI in Iraq and Afghanistan War Veterans that we observed from FY 2012 has remained consistent in our reports going back to FY 2009,[1] both this annual level and the pooled three year prevalence of TBI diagnoses (approximately 10%) are smaller than estimates that have been reported in survey studies.[11,12] 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.[11,12] 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.[13,14] 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.[15] On the other hand, clinical assessment is also subject to error and medical diagnoses may be underreported in VA records.[16] Additionally, some Iraq and Afghanistan War Veterans who used VA may have TBI that had not been identified. VA policy requires that all Iraq and Afghanistan War 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.[17] 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.[18] 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 2012 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 among Veterans with diagnosed TBI 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, including CBOCs and facilities outside the PSC.

In comparing FY 2012 with our earliest report from FY 2009, there has been a 60% increase in the annual number of Iraq and Afghanistan War Veterans receiving care at VA facilities (525,307 in FY 2012 versus 327,388 in FY 2009).[1,19] 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 2012 on a per Veteran basis. Even without considering inflation, the median estimated cost of care per Veteran with TBI has decreased slightly over time from $5,831 in FY 2009 to $5,555 in FY 2012.

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 2012 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 fourth in a series of annual reports, this report can be compared against the earlier reports to look at longer-term trends.

Conclusions

Consistent with fiscal years 2009 through 2011, approximately 7% of Iraq and Afghanistan War Veterans who used VA health care services in 2012 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, particularly mental health care utilization. Overall, there has been a substantial increase in resources needed to care for Veterans of the Iraq and Afghanistan Wars due to the 60% increase in the absolute number of these Veterans seeking care at VHA facilities from FY 2009 to FY 2012. Nevertheless, the relative proportion of Veterans diagnosed with TBI and the high rate of comorbid PTSD and pain in the TBI population has remained relatively stable while the cost of providing care to each individual with TBI has decreased slightly.

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Tables

Table 1: Characteristics of Iraq and Afghanistan War Veterans with and without TBI Diagnosis in FY 2012

Characteristics	TBI Diagnosis		
	Yes	No	Total
	N=35,826	N=489,481	N=525,307
Age Mean (SD)	32.1 (8.3)	34.8 (9.8)	34.6 (9.8)
Gender			
Female	6%	13%	13%
Male	94%	87%	87%
Race			
White Only	73%	63%	64%
Black Only	11%	16%	15%
Native American/Alaska Native Only	1%	1%	1%
Asian Only	1%	2%	2%
Native Hawaiian/Pacific Islander Only	1%	1%	1%
Multiracial	2%	1%	1%
Unknown	10%	16%	16%
Ethnicity			
Non-Hispanic	84%	80%	80%
Hispanic	13%	11%	11%
Unknown	3%	10%	9%
Urban/Rural			
Urban	67%	68%	68%
Rural	31%	29%	29%
Highly Rural	1%	1%	1%
Unknown	1%	2%	2%
Service Connection (Total)			
None	26%	38%	37%
0%	1%	3%	3%
10-40%	16%	26%	26%
50-90%	44%	29%	30%
100%	13%	4%	4%
Service Connection for TBI			
None	70%	97%	95%
0%	4%	1%	1%
10-40%	21%	3%	4%
50-90%	4%	0.24%	0.48%
100%	1%	0.03%	0.08%
VA User			
New	23%	22%	22%
Past	77%	78%	78%

Table 2: Prevalence of Mental Health and Pain Diagnoses in Iraq and Afghanistan War Veterans with and without TBI Diagnoses in FY 2012

Diagnoses	TBI Diagnosis		
	Yes	No	Total
	N=35,826	N=489,481	N=525,307
Any Mental Health	88%	44%	47%
PTSD	72%	26%	29%
Depression	47%	22%	24%
Anxiety	26%	13%	14%
Bipolar	3%	1%	2%
Psychosis	3%	1%	1%
Substance Disorder	22%	10%	10%
Nicotine Dependence	23%	14%	14%
Headache	48%	9%	12%
Back Pain	47%	25%	27%
Neck Pain	16%	6%	7%
Any Head/Back/Neck Pain	71%	33%	35%
Mental Health and Any Pain	65%	19%	22%
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, by Year

Diagnoses* % (n)	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 Iraq and Afghanistan War Veterans seen in VA in FY2012	Percentage of Unique Iraq and Afghanistan War Veterans seen in VA from FY2010 to FY2012
	N=398,453	N=465,205	N=525,307	N=689,949
Mutually Exclusive				
No TBI, Pain, or PTSD	51.9%	51.3%	50.0%	46.5%
Pain Only	18.3%	18.3%	18.7%	20.6%
PTSD Only	12.1%	12.6%	12.9%	9.8%
Pain and PTSD	11.0%	11.3%	11.6%	13.4%
TBI Only	0.7%	0.7%	0.7%	0.8%
TBI and Pain	1.1%	1.1%	1.2%	1.7%
TBI and PTSD	1.2%	1.2%	1.2%	1.3%
TBI, Pain, and PTSD	3.8%	3.6%	3.7%	6.1%
Any Diagnosis				
TBI	6.8%	6.6%	6.8%	9.8%
Pain	34.2%	34.3%	35.2%	41.7%
PTSD	28.0%	28.6%	29.5%	30.5%

* *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 2012

	TBI Diagnosis		
	Yes	**No**	**Total**
Category of Cost*	**Median (25th-75th Percentiles)**	**Median (25th-75th Percentiles)**	**Median (25th-75th Percentiles)**
Outpatient			
Medical/Surgical	$1,393 ($657-$2,775)	$672 ($276-$1,449)	$685 ($295-$1,540)
Behavioral	$1,103 ($262-$2,889)	$0 ($0-$672)	$0 ($0-$801)
Diagnostic	$658 ($250-$1,435)	$225 ($61-$589)	$242 ($63-$637)
Other	$539 ($101-$1,475)	$0 ($0-$88)	$0 ($0-$180)
Total Outpatient	$4,775 ($2,396-$9,026)	$1,494 ($655-$3,318)	$1,618 ($672-$3,653)
Total Inpatient	$0 ($0-$0)	$0 ($0-$0)	$0 ($0-$0)
Total Outpatient and Inpatient	$4,981 ($2,446-$10,139)	$1,504 ($657-$3,403)	$1,632 ($672-$3,769)
Total Pharmacy	$268 ($73-$812)	$69 ($0-$288)	$77 ($0-$317)
Total Outpatient, Inpatient, and Pharmacy	$5,555 ($2,719-$11,247)	$1,691 ($708-$3,829)	$1,836 ($749-$4,238)

*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 2012

	TBI Diagnosis		
	Yes	**No**	**Total**
Category of Cost	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Outpatient			
Medical/Surgical	$2,306 ($3,229)	$1,302 ($2,709)	$1,371 ($2,759)
Behavioral	$2,474 ($4,315)	$799 ($2,424)	$914 ($2,631)
Diagnostic	$1,147 ($1,636)	$490 ($895)	$535 ($978)
Other	$1,194 ($2,138)	$239 ($1,205)	$304 ($1,313)
Total Outpatient	$7,121 ($7,667)	$2,831 ($4,697)	$3,124 ($5,073)
Inpatient			
Medical/Surgical	$569 ($4,989)	$248 ($3,465)	$270 ($3,591)
Behavioral	$1,818 ($10,620)	$342 ($4,483)	$443 ($5,153)
Long-term Care	$119 ($4,465)	$13 ($1,362)	$20 ($1,758)
Residential/Domiciliary	$471 ($4,264)	$108 ($2,103)	$132 ($2,317)
Other	$594 ($12,327)	$29 ($2,728)	$68 ($4,162)
Total Inpatient	$3,571 ($19,046)	$740 ($7,220)	$933 ($8,592)
Total Outpatient and Inpatient	$10,692 ($22,376)	$3,571 ($9,668)	$4,057 ($11,157)
Total Pharmacy	$789 ($2,299)	$374 ($1,702)	$402 ($1,752)
Total Outpatient, Inpatient, and Pharmacy	$11,481 ($22,855)	$3,945 ($10,113)	$4,459 ($11,599)

*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 2011 to FY 2012

	TBI Diagnosis		
Median Total Outpatient, Inpatient, and Pharmacy	**Yes**	**No**	**Total**
FY 2011	$5,743	$1,706	$1,849
FY 2012	$5,555	$1,691	$1,836
1 Year Change in Total Median Costs	-3.3%	-0.9%	-0.7%
Mean Total Outpatient, Inpatient, and Pharmacy	**Yes**	**No**	**Total**
FY 2011	$11,976	$3,898	$4,430
FY 2012	$11,481	$3,945	$4,459
1 Year Change in Total Mean Costs	-4.1%	1.2%	0.7%

Table 7. Outpatient Appointments in 2012 by Category of Care in Iraq and Afghanistan War Veterans with and without TBI Diagnoses

	TBI Diagnosis					
	Yes		No		Total	
Category of Care	Mean (SD)	Median (25th-75th Percentile)	Mean (SD)	Median (25th-75th Percentile)	Mean (SD)	Median (25th-75th Percentile)
Total Appointments	32.2 (38.0)	20 (11-39)	12.3 (19.1)	7 (3-14)	13.7 (21.5)	7 (3-16)
Primary Care	3.2 (3.2)	2 (1-4)	1.9 (2.1)	1 (1-2)	2.0 (2.2)	1 (1-3)
Mental Health	10.6 (20.4)	4 (1-11)	3.5 (11.1)	0 (0-3)	3.9 (12.1)	0 (0-3)
Polytrauma	2.9 (7.8)	1 (0-3)	0.1 (0.8)	0 (0-0)	0.3 (2.3)	0 (0-0)
Other Rehabilitation	2.7 (9.5)	0 (0-2)	0.7 (3.6)	0 (0-0)	0.8 (4.3)	0 (0-0)
Audiology	0.3 (0.7)	0 (0-0)	0.1 (0.4)	0 (0-0)	0.1 (0.5)	0 (0-0)
Neurology	0.3 (0.8)	0 (0-0)	0.1 (0.4)	0 (0-0)	0.1 (0.4)	0 (0-0)
Orthopedics	0.2 (0.8)	0 (0-0)	0.1 (0.7)	0 (0-0)	0.2 (0.7)	0 (0-0)
Other	12.1 (13.8)	8 (4-15)	5.9 (8.4)	3 (1-7)	6.3 (9.0)	4 (1-8)

Table 8. Inpatient Stays in 2012 by Category of Care in Veterans with and without TBI Diagnoses

	TBI Diagnosis		
	Yes	**No**	**Total**
Category of Care	N=35,826	N=489,481	N=525,307
Any Inpatient Stay	13.1%	4.2%	4.8%
General Medicine	3.9%	1.4%	1.6%
Surgery	1.3%	0.8%	0.8%
Psychiatry	6.8%	1.7%	2.1%
Substance Abuse	0.1%	0.04%	0.04%
Spinal Cord	0.1%	0.03%	0.03%
Any Rehabilitation	0.5%	0.02%	0.05%
Polytrauma Rehab	0.2%	--	0.02%
PM&R Transitional Rehab	0.1%	--	0.01%
Rehabilitation Medicine	0.1%	0.01%	0.01%
Neurology	0.3%	0.04%	0.1%
Any Domiciliary	3.9%	0.8%	1.0%
Mental Health Domiciliary	3.1%	0.6%	0.7%
Nursing Home/Long Term Care	0.3%	0.04%	0.1%

* Cells with (--) have frequencies too low to report

Table 9. Inpatient Length of Stay in 2012 by Category of Care in Iraq and Afghanistan War Veterans with and without TBI Diagnoses

	TBI Diagnosis					
	Yes			No		
Category of Care	N	Mean (SD)	Median (25th-75th Percentile)	N	Mean (SD)	Median (25th-75th Percentile)
Any Inpatient Stay	4695	30.4 (65.0)	9 (3-37)	20401	19.9 (47.8)	4 (2-16)
General Medicine	1382	6.5 (26.3)	3 (1-5)	7072	5.6 (19.1)	2 (1-5)
Surgery	475	4.4 (6.2)	2 (1-5)	3839	4.4 (21.0)	2 (1-4)
Psychiatry	2445	12.6 (21.0)	6 (3-14)	8400	11.1 (24.1)	5 (3-10)
Substance Abuse	32	12.5 (12.6)	7 (3-22.5)	173	10.6 (10.6)	6 (3-16)
Spinal Cord	48	50 (84.9)	16.5 (4.5-61)	125	68.9 (196.8)	13 (3-55)
Any Rehabilitation	167	57.5 (80.2)	30 (15-74)	89	25.3 (39.1)	16 (8-24)
Polytrauma Rehab	85	56.5 (97.8)	21 (14-52)	--	--	--
PM&R Transitional Rehab	37	66.9 (47.3)	66 (30-83)	--	--	--
Rehabilitation Medicine	23	32.6 (38.2)	18 (6-51)	26	17.0 (8.4)	17 (15-18)
Neurology	107	3.6 (3.1)	3 (2-4)	187	3.7 (4.1)	2 (1-4)
Any Domiciliary	1386	56.2 (51.3)	41 (24-74)	3886	58.2 (54.9)	40 (24-77)
Mental Health Domiciliary	1102	44.0 (33.3)	37 (22-55)	2779	42.3 (34.6)	34 (21-52)
Nursing Home/Long Term Care	100	100.6 (286.4)	25 (11-69)	203	85.9 (186.5)	26 (9-69)

* Cells with (--) have frequencies too low to report

Table 10. Prevalence of TBI Diagnoses among Iraq and Afghanistan War Veterans by VISN in 2012

VISN	Total N	TBI Diagnosis
1	21393	8%
2	11455	6%
3	14432	6%
4	22852	8%
5	12925	5%
6*	32338	6%
7	37873	6%
8*	38258	7%
9	24264	8%
10	15273	8%
11	21186	5%
12	20493	8%
15	18721	7%
16	44023	7%
17*	34311	6%
18	23431	8%
19	19731	9%
20	26863	7%
21*	21183	7%
22	35485	8%
23*	28693	5%

*VISNs 6, 8, 17, 21 and 23 each have one VA Polytrauma Rehabilitation Center (PRC) Facility, they are: Richmond, VA, Tampa, FL, San Antonio, TX, Palo Alto, CA and Minneapolis, MN, respectively.

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

	TBI		
	Yes	**No**	**Total**
Locations of Care†	N=35,826	N=489,481	N=525,307
Facilities Used during FY 2012*			
Polytrauma Network Site (PNS)	32%	25%	25%
Polytrauma Rehabilitation Center (PRC) Facility	8%	6%	6%
Polytrauma Support Clinic Teams (PSCT) Facility	64%	57%	57%
Community-Based Outpatient Clinics (CBOC)	54%	44%	45%
VA Medical Center without PRC, PNS or PSCT	29%	23%	23%
Other VA Facility	10%	5%	5%
Patients only seen at CBOC Facilities in FY 2012	8%	11%	11%
Inpatient Rehabilitation Stay at a PRC Facility			
PRC Inpatient Polytrauma Stay in FY2012	0.24%	--	0.02%
Polytrauma Transitional Rehabilitation Program (PTRP) Stay in FY2012	0.10%	--	0.01%
PRC Inpatient Rehabilitation Medicine Stay in FY2012	0.06%	0.01%	0.01%
PRC Inpatient Polytrauma or Rehab. Medicine Stay Ever (FY2012 or Earlier)	2.10%	0.10%	0.24%
PRC Inpatient Polytrauma Stay Ever (FY2012 or Earlier)	0.46%	0.01%	0.04%
PRC Inpatient Rehabilitation Medicine Stay Ever (FY2012 or Earlier)	1.72%	0.09%	0.20%

* Patients can been seen at multiple locations during the fiscal year, so the Locations of Care columns sum to more than 100%.
** Cells with (--) have frequencies too low to report
†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, 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

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	1N or 112
Polytrauma Transitional	82
Rehabilitation Medicine	20
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, Polytrauma Transitional and Rehabilitation Medicine are all subgroups of Rehabilitation. 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. *PNS includes the five PRC sites.*
Polytrauma Rehabilitation Center Facility (PRC facility)	Records (clinic stops) at the following stations: 618, 640, 652,671, 673. *This is a subset of PNS.*
Polytrauma Support Clinic Teams (PSCT) Facility	Records (clinic stops) at any PSCT station. Details on the current list of PSCT facilities are available online: http://www.polytrauma.va.gov/system-of-care/care-facilities/support-clinic-teams.asp *No overlap with any of the other facility types: PNS, PRC facility, CBOC, Other VA Medical Center, or Other VA Facility.*
Community-Based Outpatient Clinics (CBOC)	*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.*
Other VA Medical Center	Records (clinic stops) at any medical center not included in PNS, PSCT, or PRC facility. *No overlap with PNS, PSCT, PRC facility, or CBOC.*
Other VA Facility	Records (clinic stops) at any other facility type not covered above. *No overlap with PNS, PSCT, PRC facility, CBOC, or Other VA Medical Center.*
Additional Location of Care Variables*	**Description**
PRC Inpatient Polytrauma Stay	Patient had at least one stay in Polytrauma Rehabilitation (bedsection 1N or 112) at one of the 5 PRC sites
PRC Inpatient Rehabilitation Medicine Stay	Patient had at least one stay in Rehabilitation Medicine (bedsection 20) at one of the 5 PRC sites
Polytrauma Transitional Rehabilitation Program (PTRP) Stay	Patient had at least one stay in Polytrauma Transitional Rehabilitation Program (PTRP) (bedsection 82) at one of the 5 PRC sites
CBOC Only	Patient had a CBOC appointment and no records at any non-CBOC facility type

*In our FY 2009 – FY 2011 reports we had not separated Inpatient Polytrauma stays from Inpatient Rehabilitation Medicine stays that occurred at PRC facilities, since in earlier years these codes might have been used somewhat interchangeably by some PRC facilities for patients needing Polytrauma care. Going forward we think that the PRC Inpatient Polytrauma stay is the more relevant code to use and have separated these codes.

Appendix E: Category of Cost Definitions

Category of Cost Variables	Definitions*
Outpatient	
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
Inpatient	
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.