Fiscal Year 2014 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) 2014. The study population consisted of all Iraq and Afghanistan War Veterans who used inpatient or outpatient care in VHA in FY 2014. In 2014, 7% of the Iraq and Afghanistan War Veterans who used VA health care 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 and rehabilitation 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 since 2009, when we first started generating these reports.

BACKGROUND

This report was conducted 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) 2014. Prior PT/BRI QUERI utilization reports have covered FY 2009 through FY 2013.[1-5]

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, health service utilization and VHA costs 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

This is PTBRI QUERI's 5th TBI Utilization Report. The focus of this report is to provide a one year summary for FY 2014 (October 1, 2013 to September 30, 2014). The study population consisted of all Iraq and Afghanistan War Veterans who used VHA inpatient or outpatient care in FY 2014. 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 VA's Managerial Cost Accounting National Cost Extracts (MCA) outpatient files as Iraq and Afghanistan War Veterans. We included only those who also had records in the Planning Services and Support Group FY 2014 enrollment files. These enrollment files along with the patient geocode files, VETSNET data, and data from the Corporate Data Warehouse (CDW) patient data domain tables were then used to obtain FY 2014 demographics and VHA eligibility information. Data from CDW inpatient and outpatient data domains were used to obtain diagnoses, categorize the inpatient and outpatient health services utilization based on the category of care (e.g., primary care, mental health, rehabilitation, etc.), and identify the facilities at which the patient was seen. Additionally, MedSAS Fee Basis data were used for diagnoses and to categorize people who obtained care outside of VHA facilities.

The FY 2014 report is just the second year that we have been reporting costs based on activity based methods. The data sources and methodology for estimating costs were changed

substantially for the FY 2013 report. In earlier reports (FY 2009-FY 2012) VHA costs per patient were obtained from the VA's Health Economic Resource Center (HERC) data files. HERC estimates of per patient average fiscal year costs were based on hypothetical Medicare reimbursement levels.[6,7] For the FY 2013 report we switched to estimating costs using VA's Managerial Cost Accounting National Cost Extracts (MCA) and added additional information on Fee Basis costs invoiced during the year. MCA cost data provide finer grain detail allowing the categories of care for costs to be more closely aligned with the outpatient and inpatient utilization categories. MCA follows practices known as activity-based cost accounting and these methods are designed to provide precise cost estimates for care that occurred within VHA facilities. VA payments to non-VA health care providers are captured under the Fee Basis program. Additional details on the MCA and Fee Basis data files have previously been published.[8,9] For costs paid in FY 2014 we are using Fee Basis invoices paid in FY 2014. Invoices for most non-VA encounters are paid within six months, but the VA has the authority to pay invoices that are submitted much later. Therefore, Fee Basis costs available for FY 2014 will include some costs from prior years and not fully capture all Fee Basis costs attributable to utilization for FY 2014. Because of the change in cost methods the FY 2014 costs can be directly compared to the FY 2013 costs, but direct comparisons with earlier reports (FY 2009 to FY 2012) are not possible.

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 2014. 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.[10,11] We extracted ICD-9 codes for the following mental health conditions: PTSD, depression, anxiety disorders other than PTSD, bipolar disorder, psychosis, substance abuse excluding nicotine dependence, any mental health disorder (excluding "post-concussion syndrome" and "nicotine dependence") and nicotine dependence. Additionally, we have included diagnoses for penetrating eye injury, genitourinary outcomes determined by a recent Institute of Medicine committee that could be higher in patients who have suffered blast-related injuries,[12] and amputation. Amputation is separated into major, minor and unspecified categories and for the amputation diagnosis categories we also considered CPT procedure codes (see Appendix A).

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, other rehabilitation, specialty, neurology, orthopedics, ancillary, audiology, diagnostic, emergency/urgent care, home care 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 2014, 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 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 May 2015, 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 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 overall outpatient, inpatient, pharmacy, and VA Fees Basis costs as well as the subcategories of outpatient and inpatient care as defined in Appendices B and C. 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. All analyses were performed using SAS version 9.2 (SAS Institute Inc., Cary, NC, USA.).

RESULTS

Population Characteristics

In FY 2014, 684,133 Iraq and Afghanistan War Veterans received care from VHA medical facilities. Among these Veterans, 7.0% (n=45,845) had a TBI diagnosis associated with care received in FY 2014. Veterans with a TBI diagnosis were on average younger (33 versus 36 years old) and more likely to be male (94% 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, up to 10% of Veterans did not have known race/ethnicity data in the VA datasets at the time of the data extraction.

About 70% of all Iraq and Afghanistan War Veterans who received VA care in FY 2014 were classified as having some level of service connected disability (Table 1). Twenty-eight percent of Veterans with a TBI diagnosis in FY 2014 had a service connection rating for TBI.

Prevalence of TBI, 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 (73%) compared to those without (28%). Similarly, we found that 56% of Veterans with TBI had received both PTSD and pain diagnoses, compared with only 14% in Veterans without a TBI diagnosis. Among the overall population, the majority carried at least one diagnosis of TBI, Pain or PTSD during FY 2014 while 3.9% carried all three diagnoses of TBI, Pain and PTSD, and only 0.7% had TBI without either of the other conditions (Table 3).

Prevalence of Amputation, Genitourinary and Penetrating Eye Injury Diagnoses

Diagnoses or procedures related to amputation, while generally quite rare in Iraq and Afghanistan War Veterans, were 5 times higher in Veterans with a TBI compared to other Veterans (1.02% vs. 0.21%, respectively) (Table 4). The bulk of these amputations were considered to be major amputations (see Appendix A for additional details on coding of amputation). Genitourinary diagnoses were significantly higher in prevalence (5.1% overall), but there was not a large difference in the rate of these diagnoses by TBI status 5.66% vs. 5.06%). Finally, although penetrating eye injuries were very rare, diagnosed in 1 in 2000 Iraq and Afghanistan war Veterans, the rate of diagnoses was five times higher in those with TBI

(approximately 1 in 500) compared to those who did not carry a TBI diagnosis (approximately 1 in 2500).

Outpatient, Inpatient and Fee Basis Costs for Veterans with TBI Diagnosis

For Veterans with a diagnosis of TBI, the cost of care was consistently higher across all cost categories (Table 5 - Median Costs and Tables 6a-c - Mean Costs). The median costs more closely approximate the typical patient costs than do the mean costs since there is a very 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 fee basis cost) for a patient with TBI was $7,470, the mean total cost (outpatient, inpatient and fee basis cost) was $15,161. The median annual cost per patient was over 3 times higher for TBI-diagnosed Iraq and Afghanistan War Veterans than those without a TBI diagnosis ($7,470 versus $2,182).

Overall the average cost per Iraq and Afghanistan War Veteran increased from 2013 to 2014 (Table 7) with increases of 9.1% and 7.5%, respectively, for median and mean costs. Veterans with a TBI diagnosis had a somewhat lessor relative increase in costs from 2013 to 2014 (median costs increased 5.2% while the mean costs increased 4.2%).

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 8). The typical (median) Veteran with a TBI diagnosis had 17 outpatient appointments compared with a median of 5 for Veterans without a TBI diagnosis. Veterans with TBI had increased numbers of appointments in every outpatient category of care; however the bulk of the increased utilization was seen in the mental health and rehabilitation service lines.

As shown in Table 9, inpatient utilization was much higher among those diagnosed with TBI compared to those not diagnosed with TBI (12.2% vs. 3.4%). Similar to the increase in outpatient utilization, Veterans with a TBI diagnosis had higher percentages of inpatient stays across all categories of care, but inpatient mental health related stays (e.g. psychiatry and mental health domiciliary) were by far the biggest drivers of the higher utilization.

Table 10 shows the mean (with standard deviation) and median (with 25^{th} and 75^{th} 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. 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. A larger proportion of Veterans with TBI had inpatient stays in psychiatry, mental health domiciliary and rehabilitation which tend to have longer lengths of stay than other inpatient categories such as 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 2014 (Table 11). 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, 17% were seen exclusively outside the PSC during FY 2014 (Table 12). Among Veterans with a TBI diagnosis, Community-Based Outpatient Clinics (CBOCs) were used at least once by

58%, while 11% used the CBOCs exclusively for their VA health care. Patients who had PRC inpatient stays comprised only a very small fraction of Veterans diagnosed with TBI in FY 2014.

DISCUSSION

In 2014, 47,845 (7%) of the 684,133 Iraq and Afghanistan War Veterans who used VA health care carried a diagnosis of TBI. The approximately 7% prevalence level of TBI in Iraq and Afghanistan War Veterans that we observed in FY 2014 has remained consistent in our reports going back to FY 2009.[1] Among those Veterans with clinician diagnosed TBI, we found that mental health, particularly PTSD, and pain-related co-morbidity is the norm. We also found that the overall cost of medical care covered by VHA, 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, a much higher level of mental health utilization drives a substantial proportion of the increased overall health care 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. While most Veterans with a TBI diagnosis are seen at least once during the year at a VHA facility in the Polytrauma System of Care, there are significant numbers of Veterans who received all of their VA care during the year at facilities outside the PSC.

In comparing FY 2014 with our earliest report from FY 2009, there has been a 109% increase in the annual number of Iraq and Afghanistan War Veterans receiving care at VA facilities

(684,133 in FY 2014 versus 327,388 in FY 2009).[1,13] 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 2014 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. Our findings describe the proportion of Iraq and Afghanistan War Veteran VA users with TBI diagnosis in the VA FY 2014 administrative data, which is not the same as the prevalence of TBI in the broader population of all Iraq and Afghanistan War Veterans. 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. The substantial changes in the methodology for estimating costs that occurred between the FY 2012 and FY 2013 reports (switching from HERC "pseudo bills" to MCA "activity billing") makes direct comparisons of changes in costs over the period from FY 2009 to FY 2014 to difficult,[14] but this change has improved the ability of these reports to more closely align cost categories of care to the categories of care for outpatient and inpatient utilization. Furthermore, with the FY 2014 report we were able to show the increase in costs from FY 2013 to FY 2014. Lastly, our estimates of health care utilization are based only on estimates of VHA health care utilization and VA covered care. Therefore, we cannot provide estimates on the overall societal cost of TBI which would include patient, family or non-VHA 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 VHA in 2014 and our ability to derive information about associated medical costs and other indicators of health care utilization such as outpatient appointments, inpatient stays and Fee Basis costs that can be used for resource allocation. Additionally, as the sixth in a series of annual reports, these reports provide both a glimpse of changes over time and yet have continued to evolve to include more information.

Conclusions

Consistent with fiscal years 2009 through 2013, approximately 7% of Iraq and Afghanistan War Veterans who used VA health care services in 2014 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 and costs were 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 a more than doubling of the number of these Veterans seeking care from FY 2009 to FY 2014 and to a lesser extent due to an increase in the average cost per Veteran. 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.

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Tables

Table 1: Characteristics of Iraq and Afghanistan War Veterans with and without TBI Diagnosis in FY 2014

Characteristics	TBI Diagnosis		
	Yes	No	Total
	N=47,845	N=636,288	N=684,133
Age Mean (SD)	33 (8)	36 (10)	36 (10)
Gender			
Female	6%	14%	13%
Male	94%	86%	87%
Race			
White Only	75%	67%	67%
Black Only	13%	18%	17%
Native American/Alaska Native Only	1%	1%	1%
Asian Only	2%	2%	2%
Native Hawaiian/Pacific Islander Only	1%	1%	1%
Multiracial	3%	2%	2%
Unknown	6%	10%	10%
Ethnicity			
Non-Hispanic	85%	82%	83%
Hispanic	13%	11%	11%
Unknown	3%	6%	6%
Urban/Rural			
Urban	70%	71%	71%
Rural	29%	27%	27%
Highly Rural	1%	1%	1%
Unknown	1%	1%	1%
Service Connection (Total)			
None	17%	30%	29%
0%	1%	2%	2%
10-40%	12%	24%	23%
50-90%	51%	38%	39%
100%	20%	6%	7%
Service Connection for TBI			
None	72%	96%	94%
0%	5%	1%	1%
10-40%	19%	3%	4%
50-90%	3%	0.29%	1%
100%	1%	0.04%	0.09%
VA User			
New	18%	19%	19%
Past	82%	81%	81%

Table 2: Prevalence of Mental Health and Pain Diagnoses in Iraq and Afghanistan War Veterans with and without TBI Diagnoses in FY 2014

Diagnoses	TBI Diagnosis		
	Yes	No	Total
	N=47,845	N=636,288	N=684,133
Any Mental Health	91%	52%	55%
PTSD	73%	28%	31%
Depression	48%	24%	26%
Anxiety	31%	16%	17%
Bipolar	4%	2%	2%
Psychosis	3%	1%	1%
Substance Disorder	38%	21%	22%
Nicotine Dependence	25%	14%	15%
Headache	49%	10%	13%
Back Pain	50%	28%	29%
Neck Pain	16%	7%	7%
Any Head/Back/Neck Pain	73%	35%	38%
Mental Health and Any Pain	68%	24%	27%
PTSD and Any Pain	56%	14%	17%

Table 3: Proportion of Iraq and Afghanistan War Veterans with Diagnoses of TBI, Pain of the Head, Neck or Back, and/or PSTD in FY 2014

ICD 9 Diagnoses	% of OEF/OIF/OND seen in VA during FY2014
	N=684,133
Mutually Exclusive	
No TBI, Pain, or PTSD	47.2%
Pain Only	19.6%
PTSD Only	13.2%
Pain and PTSD	13.0%
TBI Only	0.7%
TBI and Pain	1.2%
TBI and PTSD	1.2%
TBI, Pain, and PTSD	3.9%
Any Diagnosis	
TBI	7.0%
Pain	37.7%
PTSD	31.3%

* 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. Prevalence of Amputation, Genitourinary and Penetrating Eye Injury Diagnoses in Iraq and Afghanistan War Veterans with and without TBI Diagnoses in FY 2014

Diagnoses	TBI Diagnosis		
	Yes	**No**	**Total**
	N=47,845	N=636,288	N=684,133
Any Amputation Diagnosis or Procedure	1.02%	0.21%	0.27%
Major	0.82%	0.15%	0.20%
Minor	0.23%	0.06%	0.08%
Unspecified	0.20%	0.02%	0.04%
Genitourinary Conditions	5.66%	5.06%	5.10%
Penetrating Eye Injury	0.20%	0.04%	0.05%

Table 5. Median Cost of Care by TBI Diagnosis Category for Iraq and Afghanistan War Veterans Who Received VA Care in 2014

	TBI Diagnosis		
	Yes	**No**	**Total**
Category of Cost*	**Median (25th-75th Percentiles)**	**Median (25th-75th Percentiles)**	**Median (25th-75th Percentiles)**
Outpatient			
Primary Care	$842 ($432-$1,564)	$497 ($219-$964)	$518 ($232-$1,003)
Mental Health	$1,214 ($250-$3,099)	$0 ($0-$826)	$0 ($0-$961)
Polytrauma Rehabilitation	$275 ($0-$1,050)	$0 ($0-$0)	$0 ($0-$0)
Other Rehabilitation	$0 ($0-$313)	$0 ($0-$0)	$0 ($0-$0)
Specialty Care	$172 ($0-$1,046)	$0 ($0-$393)	$0 ($0-$430)
Ancillary	$11 ($0-$440)	$0 ($0-$0)	$0 ($0-$47)
Diagnostic	$429 ($135-$1,013)	$170 ($30-$523)	$183 ($40-$555)
Emergency/Urgent Care	$0 ($0-$498)	$0 ($0-$0)	$0 ($0-$0)
Prosthetics	$0 ($0-$166)	$0 ($0-$18)	$0 ($0-$29)
Pharmacy	$289 ($81-$857)	$80 ($0-$313)	$89 ($0-$343)
Other	$0 ($0-$203)	$0 ($0-$0)	$0 ($0-$0)
Total Outpatient	$6,623 ($3,388-$12,383)	$2,035 ($844-$4,633)	$2,215 ($899-$5,132)
Total Inpatient	$0 ($0-$0)	$0 ($0-$0)	$0 ($0-$0)
Total Outpatient and Inpatient	$7,040 ($3,492-$14,374)	$2,050 ($845-$4,772)	$2,235 ($902-$5,318)
Total Outpatient, Inpatient, and Fee Basis Cost**	$7,470 ($3,704-$15,280)	$2,182 ($892-$5,105)	$2,383 ($952-$5,688)

*Costs were based on estimates of VHA costs per patient obtained from the VA's MCA and MedSAS Fee Basis data files (see Appendices B and C for definitions of Care Categories). 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. Outpatient and Fee Basis subcategories with zero dollars for all groups are not shown in the table.

**Fee Basis costs available for FY 2014 will include some costs from prior years and do not fully capture all non-VA utilization for FY 2014.

Table 6a. Mean Outpatient Cost of Care at VHA Facilities by TBI Diagnosis Category for Iraq and Afghanistan War Veterans Who Received VA Care in 2014

	TBI Diagnosis		
Outpatient	**Yes**	**No**	**Total**
Category of Cost	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Primary Care	$1,219 ($1,381)	$744 ($992)	$777 ($1,031)
Mental Health	$2,578 ($4,333)	$915 ($2,584)	$1,031 ($2,775)
Polytrauma Rehabilitation	$892 ($2,188)	$23 ($254)	$84 ($666)
Other Rehabilitation	$385 ($1,300)	$94 ($485)	$115 ($585)
Specialty Care	$1,192 ($3,133)	$674 ($2,667)	$710 ($2,705)
Neurology	$130 ($407)	$26 ($186)	$34 ($211)
Orthopedic	$74 ($362)	$45 ($265)	$47 ($273)
Ancillary	$430 ($1,084)	$125 ($598)	$146 ($649)
Audiology	$54 ($172)	$25 ($109)	$27 ($115)
Diagnostic	$760 ($1,006)	$421 ($707)	$444 ($737)
Emergency/Urgent Care	$405 ($1,012)	$204 ($592)	$218 ($633)
Home Care	$100 ($769)	$12 ($267)	$18 ($329)
Prosthetics	$498 ($4,906)	$152 ($2,921)	$176 ($3,102)
Pharmacy	$836 ($2,546)	$431 ($4,750)	$459 ($4,631)
Other	$279 ($947)	$99 ($657)	$111 ($683)
Total Outpatient	$9,834 ($11,378)	$3,990 ($8,058)	$4,399 ($8,466)

*Costs were based on estimates of VHA costs per patient obtained from the VA's MCA data files (see Appendix C for definitions of Care Categories). 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 6b. Mean Inpatient Cost of Care at VHA Facilities by TBI Diagnosis Category for Iraq and Afghanistan War Veterans Who Received VA Care in 2014

	TBI Diagnosis		
Inpatient	**Yes**	**No**	**Total**
Category of Cost	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
General Medicine	$440 ($6,130)	$144 ($3,222)	$165 ($3,505)
Surgery	$199 ($2,692)	$99 ($2,149)	$106 ($2,192)
Psychiatry	$1,236 ($8,376)	$217 ($3,050)	$288 ($3,691)
Substance Abuse	$9 ($422)	$2 ($162)	$2 ($192)
Spinal Cord	$98 ($5,960)	$13 ($1,682)	$19 ($2,262)
Any Rehabilitation	$398 ($10,349)	$4 ($477)	$32 ($2,777)
Polytrauma Rehab.	$181 ($7,616)	$0 ($121)	$13 ($2,018)
Polytrauma Transitional	$128 ($5,230)	$0 ($225)	$9 ($1,400)
Rehabilitation Medicine	$70 ($3,248)	$3 ($335)	$8 ($918)
Neurology	$34 ($788)	$4 ($322)	$6 ($374)
Intermediate Medicine	$15 ($3,127)	$0 ($157)	$1 ($841)
Any Domiciliary	$1,398 ($8,652)	$236 ($3,515)	$317 ($4,100)
Mental Health Domiciliary	$1,017 ($6,963)	$151 ($2,559)	$212 ($3,087)
Nursing Home and Long Term Care	$166 ($5,415)	$17 ($1,605)	$28 ($2,109)
Other	$0 ($0)	$0 ($0)	$0 ($0)
Total Inpatient	$4,372 ($28,125)	$741 ($7,275)	$995 ($10,266)

*Costs were based on estimates of VHA costs per patient obtained from the VA's MCA data files (see Appendix B for definitions of Care Categories). 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 6c. Mean VHA Cost of Care for Combinations of Outpatient, Inpatient and Fee Basis Care by TBI Diagnosis Category for Iraq and Afghanistan War Veterans Who Received VA Care in 2014

	TBI Diagnosis		
	Yes	**No**	**Total**
Category of Cost	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Total VHA Outpatient	$9,834 ($11,378)	$3,990 ($8,058)	$4,399 ($8,466)
Total VHA Inpatient	$4,372 ($28,125)	$741 ($7,275)	$995 ($10,266)
Total VHA Outpatient and Inpatient	$14,205 ($31,601)	$4,731 ($11,682)	$5,394 ($14,234)
Fee Basis Outpatient Cost**	$531 ($5,327)	$205 ($1,708)	$228 ($2,169)
Fee Basis Inpatient Cost**	$375 ($3,901)	$104 ($1,792)	$123 ($2,014)
Fee Basis Ancillary Cost**	$49 ($623)	$17 ($295)	$20 ($329)
Combined VHA Outpatient, VHA Inpatient, and Fee Basis**	$15,161 ($33,460)	$5,058 ($12,368)	$5,765 ($15,073)

*Costs were based on estimates of VHA costs per patient obtained from the VA's MCA and MedSAS Fee Basis data files. The costs are averages across all Veterans who used VHA in FY 2013. Cost data are highly skewed with rare extreme outliers such that the median and interquartile range better describe the costs of the typical Veteran than do the mean and standard deviation.

**Fee Basis costs available for FY 2014 will include some costs from prior years and do not fully capture all non-VA utilization for FY 2014.

Table 7. Change in Average Costs for Iraq and Afghanistan War Veterans from FY 2013 to FY 2014

	TBI Diagnosis		
Median Total Outpatient, Inpatient, and Fee Basis	**Yes**	**No**	**Total**
FY 2013	$7,096	$1,996	$2,185
FY 2014	$7,470	$2,182	$2,383
1 Year Change in Total Median Costs	5.2%	9.3%	9.1%
Mean Total Outpatient, Inpatient, and Fee Basis	**Yes**	**No**	**Total**
FY 2013	$14,552	$4,658	$5,364
FY 2014	$15,161	$5,058	$5,765
1 Year Change in Total Mean Costs	4.2%	8.6%	7.5%

Table 8. Outpatient Appointments in 2014 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	29.4 (38.0)	17 (9-35)	10.7 (18.2)	5 (2-12)	12.0 (20.8)	6 (2-13)
Primary Care	3.8 (3.9)	3 (1-5)	2.3 (2.8)	1 (1-3)	2.4 (2.9)	2 (1-3)
Mental Health	12.2 (24.7)	4 (1-12)	3.9 (12.3)	0 (0-3)	4.4 (13.7)	0 (0-3)
Polytrauma	2.3 (7.1)	1 (0-2)	0.1 (0.7)	0 (0-0)	0.2 (2.1)	0 (0-0)
Other Rehabilitation	2.7 (9.3)	0 (0-2)	0.7 (3.3)	0 (0-0)	0.8 (4.0)	0 (0-0)
Specialty Care	2.4 (4.7)	1 (0-3)	1.3 (3.1)	0 (0-1)	1.4 (3.3)	0 (0-1)
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 (0.6)	0 (0-0)	0.1 (0.6)	0 (0-0)
Ancillary	2.0 (4.1)	1 (0-2)	0.6 (2.0)	0 (0-0)	0.7 (2.2)	0 (0-1)
Audiology	0.2 (0.6)	0 (0-0)	0.1 (0.4)	0 (0-0)	0.1 (0.4)	0 (0-0)
Diagnostic	0.9 (2.0)	0 (0-1)	0.7 (1.6)	0 (0-1)	0.7 (1.7)	0 (0-1)
Emergency or Urgent Care	0.7 (1.8)	0 (0-1)	0.4 (1.0)	0 (0-0)	0.4 (1.1)	0 (0-0)
Home Care	0.2 (1.6)	0 (0-0)	0.03 (0.6)	0 (0-0)	0.04 (0.7)	0 (0-0)
Other	1.5 (3.5)	0 (0-1)	0.6 (2.2)	0 (0-0)	0.7 (2.3)	0 (0-0)

Table 9. Inpatient Stays in 2014 by Category of Care in Veterans with and without TBI Diagnoses

	TBI Diagnosis		
	Yes	**No**	**Total**
Category of Care	N=47,845	N=636,288	N=684,133
Any Inpatient Stay	12.21%	3.43%	4.04%
General Medicine	3.29%	1.17%	1.32%
Surgery	1.37%	0.65%	0.70%
Psychiatry	6.42%	1.42%	1.77%
Substance Abuse	0.07%	0.02%	0.02%
Spinal Cord	0.10%	0.02%	0.03%
Any Rehabilitation	0.36%	0.01%	0.04%
Polytrauma Rehab	0.16%	--	0.01%
PM&R Transitional Rehab	0.09%	--	0.01%
Rehabilitation Medicine	0.17%	0.01%	0.02%
Neurology	0.29%	0.04%	0.06%
Intermediate	--	0.003%	0.004%
Any Domiciliary	3.93%	0.71%	0.94%
Mental Health Domiciliary	3.16%	0.54%	0.72%
Nursing Home/Long Term Care	0.21%	0.03%	0.04%

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

Table 10. Inpatient Length of Stay in 2014 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	5844	32.5 (52.5)	9 (3-43)	21822	20.4 (42.4)	4 (2-17)
General Medicine	1573	4.2 (7.6)	2 (1-4)	7469	3.7 (6.8)	2 (1-4)
Surgery	655	2.9 (4.0)	2 (1-4)	4147	2.9 (6.8)	2 (1-3)
Psychiatry	3074	13.8 (25.4)	6 (3-14)	9044	11.1 (23.0)	5 (3-10)
Substance Abuse	34	8.2 (5.8)	6.5 (3-10)	110	6.0 (4.6)	5 (3-8)
Spinal Cord	49	48.5 (85.4)	13 (4-49)	131	25.4 (44.6)	7 (3-26)
Any Rehabilitation	170	49.1 (58.7)	25 (16-69)	88	17.0 (19.0)	12 (6.5-19)
Polytrauma Rehab	75	36.4 (54.0)	19 (4-47)	--	--	--
PM&R Transitional Rehab	44	63.6 (51.7)	59.5 (20.5-89)	--	--	--
Rehabilitation Medicine	83	26.4 (33.5)	19 (11-23)	76	14.0 (16.1)	10.5 (6-19)
Neurology	140	3.1 (2.7)	3 (1-4)	264	3.0 (3.7)	2 (1-4)
Intermediate	--	--	--	18	2.7 (3.4)	1 (1-4)
Any Domiciliary	1878	64.4 (55.2)	48 (29-87)	4540	63.8 (59.3)	44 (27-87)
Mental Health Domiciliary	1514	50.4 (39.0)	42 (26-63)	3429	46.1 (38.6)	35 (22-57)
Nursing Home/Long Term Care	102	63.5 (91.0)	31 (14-66)	203	40.6 (60.8)	20 (9-43)

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

Table 11. Prevalence of TBI Diagnoses among Iraq and Afghanistan War Veterans by VISN in 2014

VISN	Total N	TBI Diagnosis
1	26310	8%
2	14096	6%
3	17797	5%
4	27907	8%
5	17322	5%
6*	44945	7%
7	51399	6%
8*	51791	7%
9	31739	8%
10	19768	8%
11	26906	5%
12	25197	6%
15	24192	7%
16	57189	7%
17*	47369	6%
18	31294	8%
19	26271	9%
20	33979	7%
21*	28000	8%
22	47852	8%
23*	32773	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 12. Type of VA Facility where Veterans with and without TBI Diagnoses Received Care

	TBI		
	Yes	**No**	**Total**
Locations of Care†	N=47,845	N=636,288	N=684,133
Facilities Used during FY 2014*			
Polytrauma Network Site (PNS)	31%	22%	22%
Polytrauma Rehabilitation Center (PRC) Facility	9%	6%	6%
Polytrauma Support Clinic Teams (PSCT) Facility	59%	49%	49%
Community-Based Outpatient Clinics (CBOC)	58%	46%	47%
VA Medical Center without PRC, PNS or PSCT	29%	20%	21%
Other VA Facility	9%	4%	4%
Patients not seen at a PRC, PNS, or PSCT Facility in FY 2014	17%	32%	31%
Patients only seen at CBOC Facilities in FY 2014	11%	17%	17%
Inpatient Rehabilitation Stay at a PRC Facility			
PRC Inpatient Polytrauma Stay in FY2014	0.16%	--	0.01%
Polytrauma Transitional Rehabilitation Program (PTRP) Stay in FY2014	0.10%	--	0.01%
PRC Inpatient Rehabilitation Medicine Stay in FY2014	0.11%	0.004%	0.01%
PRC Inpatient Polytrauma or Rehab. Medicine Stay Ever (FY2014 or Earlier)	2.00%	0.12%	0.25%
PRC Inpatient Polytrauma Stay Ever (FY2014 or Earlier)	1.03%	0.03%	0.10%
PRC Inpatient Rehabilitation Medicine Stay Ever (FY2014 or Earlier)	1.48%	0.10%	0.20%

* Since patients can been seen at multiple locations during the fiscal year, 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	Codes*
TBI	310.2, 800-801.99, 803-804.99, 850-854.99, 905.0, 907.0, 950.1-950.3, 959.01, V15.52
Pain	
Headache	307.81, 339, 346, 784.0
Back or Neck Pain	720-724.9, 737-737.9, 738.2, 738.4-738.5, 739.1-739.4, 756.1-756.2, 805-806.9, 839-839.59, 846-847.9
Any Mental Health Diagnosis	290.0 – 319.0 (excluding 305.1), 648.3-648.4
PTSD	309.81
Depression	296.2–296.36, 296.5, 296.9, 300.4, 311
Anxiety Disorder not PTSD	300.0x, 300.2, 300.3
Bipolar Disorder	296.00-296.16, 296.4, 296.6, 296.8
Psychosis	295, 297, 298
Substance Abuse excluding Nicotine Dependence	291, 292, 303-305.9 (excluding 305.1), 648.3-648.34
Nicotine Dependence	305.1
Amputation	
Major	887.0, 887.1, 887.2, 887.3, 897.0, 897.1, 897.2, 897.3, V49.64, V49.65, V49.66, V49.67, V49.74, V49.75, V49.76, V49.77, CPT and ICD-9 Procedure codes: 23900, 23930, 24900, 24920, 24925, 24930, 24931, 25900, 25905, 25907, 25909, 25915, 25920, 25924, 27290, 27295, 27590, 27591, 27592, 27594, 27596, 27598, 27880, 27881, 27882, 27884, 27886, 27888, 27889, 84.04, 84.05, 84.06, 84.07, 84.08, 84.13, 84.14, 84.15, 84.16, 84.17, 84.18, 84.19
Minor	885.0, 885.1, 886.0, 886.1, 887.7, 895.0, 895.1, 896.0-896.3, V49.61-V49.63, V49.71- V49.73 CPT and ICD-9 Procedure codes: 25927, 25929, 25931, 26910, 26951, 26952, 28800, 28805, 28810, 28820, 28825, 84.01, 84.02, 84.03, 84.11, 84.12
Unspecified	887.4-887.6, 897.4-897.7, V49.60, V49.70 CPT and ICD-9 Procedure codes: 24935, 24940, 84.0, 84.1, 84.10
Penetrating Eye Injury	360.34, 360.43, 360.50-360.69, 871
Genitourinary Potentially Trauma related	593.3, 593.4, 593.82, 596.1, 596.2, 596.4, 596.51, 596.53, 596.54, 596.7, 596.89, 598, 599.1, 599.4, 599.6, 599.7, 606, 607.84, 607.89, 680.8, 614, 616, 618, 619, 622.4, 623.2, 625, 626, 628

*Diagnoses are based on International Classification of Diseases – 9th Revision – Clinical Modification (ICD-9) diagnosis except where indicated. Amputation is defined based on both ICD-9 and CPT Procedure codes.

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, 86-88, 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. The "Other" category includes non-VA beds in a VA facility (98 for non-DoD and 99 for DoD).

Appendix C: Outpatient Category of Care Coding

Outpatient Category of Care	Primary Clinic Appointment
Primary Care	301, 322-324, 338, 342, 348, 350
Mental Health	156, 157, 501-599, 731
Polytrauma	195-199, 219
Other Rehabilitation	201, 202, 204-211, 213-218, 220-225, 228-231, 240, 250, 417, 418, 423, 425, 437, 438
Specialty	116, 180, 181, 302-314, 316-321, 327-330, 333, 335, 337, 339-341, 345, 349, 353, 394, 401-408, 410-416, 419-422, 426, 427, 429-433, 435, 436, 439, 457, 602-604, 606-608, 611
Neurology	315
Orthopedics	409
Ancillary	111, 117, 120, 122-125, 147, 160, 161, 163-169, 708, 711, 714, 999
Audiology	203
Diagnostic	104-109, 115, 126-128, 145, 146, 148, 150-152, 154, 212, 334, 701-705, 717, 718
Emergency or Urgent Care	101, 102, 130, 131
Home Care	118, 119, 121, 170-179, 215, 670, 680-682, 725-730
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, 671, 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.