Fiscal Year 2009 VA Utilization Report for OEF/OIF Veterans Diagnosed with TBI

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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 OEF/OIF Veterans with TBI during fiscal year 2009. The study population consisted of all OEF/OIF Veterans who used inpatient or outpatient care in VHA in FY 2009. We found that in 2009, 6.7% of the Afghanistan and Iraq 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 approximately half of those with clinician diagnosed TBI had both PTSD and pain. VA health care utilization and associated costs were consistently 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. This report provides information that may inform resource allocation and future studies to identify patient subgroups warranting further study.

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 TBI. Traumatic Brain Injury (TBI) is considered the "signature injury" in the Afghanistan and Iraq Wars (OEF/OIF/OND).[1] However, to date, there has been a lack of nationwide population-based studies to examine the prevalence of TBI in VA users and how the patterns of VA health care utilization differ in Veterans with a diagnosis of TBI as compared to all other OEF/OIF/OND Veterans. 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 prevalence of TBI diagnosis in OEF/OIF/OND 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 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 fiscal year (FY) 2009 (October 1, 2008 to September 30, 2009). The study population consisted of all patients who used VHA inpatient or outpatient care in FY2009. 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 patients in FY2009, housed at the VA's Austin Information Technology Center (AITC). We then extracted all FY2009 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 FY2009 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 FY2009 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.[2,3]

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 2009. 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. For the diagnosis of TBI we applied codes currently used by VA for TBI surveillance.[4,5] 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 TBI. We assessed diagnoses of pain for three common sites of pain (i.e. head, neck and back pain). The pain diagnoses were defined similarly to what has been used in prior publications of administratively defined head,[6,7] neck[7] and back pain.[6,7] 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 OEF/OIF/OND Veterans with TBI and polytrauma. The PSC consists of the following

four components: (1) in FY2009 there were 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. A fifth PRC site will be located in San Antonio, TX. 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) are 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 OEF/OIF/OND Veterans who present with mild TBI. (3) Polytrauma Support Clinic Teams (PSCT) that provide outpatient services for stable TBI sequalae at facilities closer to the Veteran's home. (4) Polytrauma Point of Contact (PPOC) at every facility.

The facility types for this report are based on the PSC and include the following categories: sites with Polytrauma Rehabilitation Centers (PRC); Polytrauma Network Sites (PNS); sites with Polytrauma Support Clinic Teams (PSCT); Community-Based Outpatient Clinics (CBOC); Other VA Medical Centers not defined as 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. 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. The proportion of Veterans with inpatient stays, the length of inpatient stays, and the number of outpatient appointments were reported by TBI status overall and by categories of specialty care. Average costs in terms of both mean and median costs were reported by outpatient, inpatient and pharmacy costs and these costs were also broken down by categories of care. The proportion of Veterans who were seen at each different 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. All analyses were performed using SAS version 9.2.

RESULTS

Population Characteristics

In fiscal year 2009, 327,388 OEF/OIF Veterans sought care from VHA medical facilities. Among these OEF/OIF Veterans, 6.7% (n=22,053) had a diagnosis of TBI associated with their care. Veterans with a TBI diagnoses were on average younger (30.7 versus 33.3 years old) and more likely to be male (95% versus 87%) compared with patients without a TBI diagnosis (Table 1). There were not large differences observed in terms of race or ethnicity; however, a large portion of Veterans did not have known race/ethnicity data in the VA datasets at the time of the data extraction. Not surprisingly Service Connection levels were higher in Veterans with a TBI diagnosis. Also patients with a TBI diagnosis were slightly less likely to be a new user of VA services in 2009 (29% versus 31%).

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 OEF/OIF 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. The biggest difference was the huge amount of comorbid combined PTSD and pain diagnoses in Veterans with TBI. We found 54% of Veterans with TBI had these combined comorbidities compared with 11% in Veterans without a TBI diagnosis.

In order to further put these numbers into the context of the entire OEF/OIF VHA patient population, this group of Veterans with all three diagnoses (TBI, pain, and PTSD) represented 3.6% of all OEF/OIF Veterans seen during 2009 (Table 3). While all three diagnoses (TBI, pain, and PTSD) were common among Veterans seeking care at VHA facilities, it is also important to note that more than half of all OEF/OIF Veteran patients (52.7%) received none of these diagnoses. While Veterans with TBI represent a minority of the VHA patient population, they do represent a population that is more complex in terms of comorbidities and which, as will be shown in more detail below, is associated with substantially increased health care utilization.

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 $5,831, the mean total cost (outpatient, inpatient and pharmacy) was $10,999 with the top one

percent of patients with TBI having costs greater than $89,900. The median annual cost per patient was four times higher for TBI-diagnosed OEF/OIF Veterans than those without a TBI diagnosis ($5,831 versus $1,548).

Patterns of Outpatient and Inpatient Health Service Utilization

As with costs, the number of appointments and the length of stay variables are not normally distributed due to a small portion of the population with very high health care utilization. Veterans with a TBI diagnosis had much more frequent appointments than Veterans without a TBI diagnosis (Table 6). 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 come from Mental Health, Rehabilitation, and Polytrauma clinic encounters, with the number of mental health appointments being particularly notable.

The frequency of any inpatient stay during 2009 was 11.8% among Veterans with a TBI diagnosis compared with 3.8% in Veterans without a TBI diagnosis (Table 7). For all the categories of care the frequency of inpatient stays was higher in Veterans with a TBI diagnosis. Among Veterans with a TBI diagnosis, mental health related stays were the most common followed by General Medicine, Surgery, and Rehabilitation. Table 8 included below 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 people who experienced that type of stay during the year.

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 2009 (Table 9). The prevalence

ranged from 5% in VISNs 5, 7, and 11 to 9% in VISN 9. We did not investigate potential causes of this regional variation. None of the highest or lowest prevalence VISNs had a Polytrauma Rehabilitation Center (PRC) Facility.

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 10), but the largest differences were at the PRC and PNS facilities. This was expected, since those sites have the greatest resources for treating deployment-related injuries. Community-Based Outpatient Clinics were used at least once by over half of all Veterans with a TBI diagnosis, however very few used the CBOCs exclusively for their VA health care (0.2%). Only a fraction of Veterans with TBI diagnosis had been patients in a Polytrauma Rehabilitation Center.

DISCUSSION

In 2009, 22,053 (6.7%) of the 327,388 Afghanistan and Iraq War Veterans who used VA health care carried a diagnosis of TBI. The 6.7% prevalence level of TBI in Afghanistan and Iraq Veterans that we observed is smaller than that reported in survey studies.[8,9] Prior work was based on Veteran or service member self-report in the contexts of written or telephone surveys.[8,9] 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.[10,11] 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.[12] On the other hand, clinical assessment is also subject to error and medical diagnoses may be underreported in VA records.[13] 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.[14] 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.[15] TBI may be present in a proportion 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 2009, 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 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, the 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.

This report with its evidence based entirely on administrative datasets does have limitations. The findings are based on administrative data, which is potentially 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 limited in our ability to report results separately based on the severity of the injury. Additionally, we did not have available information on diagnoses of the 54% of Afghanistan and Iraq War Veterans from the US who did not use VA in 2009. 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 2009 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. However, this report represents only the early steps in an effort to provide a nationwide administrative assessment of Veterans with TBI diagnoses and their use of VA health care. Nevertheless, the pattern of findings underscores the importance of targeting this subgroup of Veterans in future health services studies. As such, this report will hopefully provide a foundation from which future research will continue to look at potentially modifiable underlying determinants of health care utilization with an eye toward

ensuring that health care for this important population of Veterans is designed such that VA health care resources are well matched to the Veterans' needs.

Conclusions

Approximately 7% of Afghanistan and Iraq War Veterans who used the VA in 2009 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. Additional descriptive research that stretches over multiple years is still needed, but even more importantly, future research on interventions targeting this high use population will be essential for determining how best to care for these returning Veterans.

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Tables

Table 1: Demographic Characteristics of OEF/OIF War Veterans with and without TBI Diagnosis

Demographics	TBI Diagnosis		
	Yes	No	Total
	N=22,053	N=305,335	N=327,388
Age Mean (SD)	30.7 (8.3)	33.3 (9.7)	33.1 (9.7)
Gender			
Female	5%	13%	12%
Male	95%	87%	88%
Race			
White	43%	44%	44%
Non-White	12%	16%	16%
Unknown	45%	40%	40%
Ethnicity			
Hispanic	8%	8%	8%
Non-Hispanic	47%	53%	53%
Unknown	45%	39%	40%
Urban/Rural			
Urban	58%	59%	59%
Rural	39%	36%	37%
Highly Rural	1%	1%	1%
Unknown	1%	4%	4%
Service Connection			
None	27%	44%	42%
0%	2%	4%	4%
10-40%	24%	30%	30%
50-90%	39%	20%	22%
100%	9%	2%	3%
VA User			
New	29%	31%	31%
Past	71%	69%	69%

Table 2: Prevalence of Mental Health and Pain Diagnoses in OEF/OIF War Veterans with and without TBI Diagnoses

Diagnoses	TBI Diagnosis		
	Yes	No	Total
	N=22,053	N=305,335	N=327,388
Any Mental Health	89%	39%	42%
PTSD	73%	24%	28%
Depression	45%	20%	21%
Anxiety	22%	10%	11%
Bipolar	2%	1%	1%
Psychosis	2%	1%	1%
Substance Disorder	20%	8%	9%
Nicotine Dependence	24%	14%	15%
Headache	47%	9%	12%
Back Pain	45%	23%	25%
Neck Pain	15%	5%	6%
Any Head/Back/Neck Pain	70%	30%	33%
TBI-Memory Problems	11%	<1%	1%
Mental Health and Any Pain	64%	17%	20%
PTSD and Any Pain	54%	11%	14%

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

Diagnoses*	Percentage of OEF/OIF Veterans seen in VA in FY2009
No TBI, Pain, or PTSD	52.7%
Pain	17.9%
PTSD	12.2%
Pain and PTSD	10.5%
TBI	0.7%
TBI and Pain	1.1%
TBI and PTSD	1.3%
TBI, Pain, and PTSD	3.6%

*Pain refers to only diagnosis of head, neck, and back pain.

Table 4. Median Cost of Care at VHA Facilities by TBI Diagnosis Category

	TBI Diagnosis		
	Yes	**No**	**Total**
Category of Cost*	**Median (25th-75th Percentiles)**	**Median (25th-75th Percentiles)**	**Median (25th-75th Percentiles)**
Outpatient			
Medical/Surgical	$1,431 ($653-$2,787)	$641 ($255-$1,347)	$641 ($281-$1,443)
Behavioral	$1,262 ($332-$2,959)	$0 ($0-$568)	$0 ($0-$691)
Diagnostic	$669 ($257-$1,394)	$210 ($58-$542)	$225 ($61-$591)
Other	$835 ($287-$1,875)	$0 ($0-$210)	$0 ($0-$344)
Total Outpatient	$5,181 ($2,727-$9,253)	$1,400 ($597-$3,080)	$1,523 ($641-$3,443)
Total Inpatient	$0 ($0-$0)	$0 ($0-$0)	$0 ($0-$0)
Total Outpatient and Inpatient	$5,387 ($2,784-$10,193)	$1,411 ($599-$3,155)	$1,536 ($641-$3,546)
Total Pharmacy	$240 ($66-$703)	$50 ($0-$222)	$57 ($0-$247)
Total Outpatient, Inpatient, and Pharmacy	$5,831 ($3,013-$11,116)	$1,548 ($643-$3,475)	$1,690 ($693-$3,902)

*Costs were based on estimates of patient costs obtained from the VA's Health Economic Resource Center (HERC) (see Appendix E)

Table 5. Mean Cost of Care at VHA Facilities by TBI Diagnosis Category

	TBI Diagnosis		
	Yes	**No**	**Total**
Category of Cost*	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Outpatient			
Medical/Surgical	$2,271 ($2,923)	$1,185 ($2,095)	$1,258 ($2,178)
Behavioral	$2,405 ($3,923)	$664 ($2,235)	$781 ($2,426)
Diagnostic	$1,072 ($1,375)	$445 ($746)	$487 ($819)
Other	$1,507 ($2,294)	$284 ($807)	$367 ($1,028)
Total Outpatient	$7,254 ($7,230)	$2,578 ($3,989)	$2,893 ($4,443)
Inpatient			
Medical/Surgical	$476 ($3,792)	$216 ($3,271)	$233 ($3,309)
Behavioral	$965 ($6,506)	$234 ($3,421)	$283 ($3,715)
Long-term Care	$178 ($5,330)	$10 ($915)	$21 ($1,643)
Residential/Domiciliary	$693 ($5,006)	$130 ($2,224)	$168 ($2,515)
Other	$721 ($13,191)	$39 ($2,973)	$85 ($4,472)
Total Inpatient	$3,031 ($17,942)	$628 ($6,525)	$790 ($7,859)
Total Outpatient and Inpatient	$10,285 ($20,818)	$3,206 ($8,495)	$3,683 ($9,983)
Total Pharmacy	$714 ($7,297)	$283 ($1,500)	$312 ($2,387)
Total Outpatient, Inpatient, and Pharmacy	$10,999 ($22,314)	$3,489 ($8,868)	$3,996 ($10,509)

*Costs were based on estimates of patient costs obtained from the VA's Health Economic Resource Center (HERC) (see Appendix E)

Table 6. Outpatient Appointments in 2009 by Category of Care in Veterans with and without TBI Diagnoses

	TBI Diagnosis					
	Yes		No		Total	
Category of Care	Mean (SD)	Median (25th-75th Percentiles)	Mean (SD)	Median (25th-75th Percentiles)	Mean (SD)	Median (25th-75th Percentiles)
Total Appointments	34.5 (51.8)	21 (11-39)	10.6 (19.1)	5 (2-12)	12.3 (23.6)	6 (2-13)
Primary Care	3.9 (4.1)	3 (1-5)	2.3 (2.6)	2 (1-3)	2.4 (2.7)	2 (1-3)
Mental Health	11.8 (25.4)	5 (1-12)	3.4 (12.3)	0 (0-2)	4.0 (13.8)	0 (0-3)
Polytrauma	5.1 (21.7)	2 (0-4)	0.2 (1.4)	0 (0-0)	0.5 (5.9)	0 (0-0)
Other Rehabilitation	3.8 (12.6)	1 (0-3)	0.7 (4.4)	0 (0-0)	0.9 (5.4)	0 (0-0)
Audiology	0.4 (0.8)	0 (0-1)	0.2 (0.5)	0 (0-0)	0.2 (0.5)	0 (0-0)
Neurology	0.4 (1.0)	0 (0-1)	0.1 (0.4)	0 (0-0)	0.1 (0.5)	0 (0-0)
Orthopedics	0.3 (1.0)	0 (0-0)	0.2 (0.7)	0 (0-0)	0.2 (0.7)	0 (0-0)
Other	8.4 (12.2)	5 (2-10)	3.7 (6.3)	2 (0-5)	4.0 (7.0)	2 (1-5)

Table 7. Inpatient Stays in 2009 by Category of Care in Veterans with and without TBI Diagnoses

	TBI Diagnosis		
	Yes	**No**	**Total**
Category of Care	N=22,053	N=305,335	N=327,388
Any Inpatient Stay	11.8%	3.8%	4.4%
General Medicine	2.7%	1.2%	1.3%
Surgery	1.3%	0.7%	0.8%
Psychiatry	5.8%	1.5%	1.8%
Substance Abuse	0.8%	0.2%	0.2%
Spinal Cord	0.10%	0.03%	0.04%
Any Rehabilitation	0.60%	0.02%	0.06%
Polytrauma Rehab	0.4%	<0.01%	0.03%
Neurology	0.20%	0.04%	0.05%
Any Domiciliary	2.3%	0.5%	0.6%
Mental Health Domiciliary	1.4%	0.3%	0.3%
Nursing Home/Long Term Care	0.30%	0.03%	0.05%

Table 8. Inpatient Length of Stay in 2009 by Category of Care in Veterans with and without TBI Diagnoses

	TBI Diagnosis					
	Yes			No		
Category of Care	**N**	**Mean (SD)**	**Median (25th-75th Percentiles)**	**N**	**Mean (SD)**	**Median (25th-75th Percentiles)**
General Medicine	593	5.8 (30.8)	2 (1-5)	3679	4.8 (16.7)	2 (1-4)
Surgery	280	4.0 (6.1)	2 (1-4)	2219	3.7 (10.2)	2 (1-4)
Psychiatry	1284	17.2 (23.9)	8 (3-21)	4724	14.4 (28.4)	6 (3-15)
Substance Abuse	177	31.3 (30.7)	27 (19-33)	625	28.3 (24.0)	24 (17-32)
Spinal Cord	29	57.0 (75.4)	23 (3-62)	89	67.3 (113.4)	21 (3-91)
Any Rehabilitation	128	55.1 (76.1)	28 (14-65)	65	26.7 (33.1)	16 (10-26)
Polytrauma Rehab	91	57.1 (83.0)	26 (15-63)	21	25.4 (29.7)	17 (14-18)
Neurology	39	3.7 (3.7)	3 (1-4)	134	4.0 (7.6)	2 (1-4)
Any Domiciliary	501	58.3 (52.6)	44 (26-73)	1388	60.7 (60.6)	41 (22-82)
Mental Health Domiciliary	305	41.0 (30.8)	35 (24-50)	807	40.2 (34.5)	31 (19-51)
Nursing Home/Long Term Care	60	85.0 (149.9)	31.5 (15.5-90)	101	46.6 (84.0)	22 (10-44)

Table 9. Prevalence of TBI Diagnoses by VISN

VISN	Total N	TBI Diagnosis
1	13580	7%
2	8242	7%
3	11138	6%
4	13821	7%
5	7608	5%
6*	19022	6%
7	22278	5%
8*	22941	6%
9	15736	9%
10	9176	8%
11	14303	5%
12	12868	6%
15	11539	8%
16	28025	7%
17	19347	6%
18	15073	8%
19	12568	8%
20	15102	7%
21*	13391	6%
22	22788	8%
23*	18774	7%

*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 10. Type of VA Facility where Veterans with and without TBI Diagnoses Received Care

	TBI Diagnosis		
	Yes	**No**	**Total**
Locations of Care†	N=22,053	N=305,335	N=327,388
Facilities Used during FY 2009*			
Polytrauma Network Site (PNS)	32%	21%	22%
Polytrauma Rehabilitation Center (PRC) Facility	7%	4%	4%
Polytrauma Support Clinic Teams (PSCT) Facility	63%	51%	51%
Community-Based Outpatient Clinics (CBOC)	51%	42%	42%
Other VA Medical Center	31%	23%	23%
Other VA Facility	5%	3%	4%
Patients only seen at CBOC Facilities in FY2009	0.2%	4%	4%
Inpatient Rehabilitation Stay at a PRC Facility			
PRC Inpatient Rehabilitation or Polytrauma Stay in FY2009	0.4%	<0.01%	0.03%
PRC Inpatient Rehabilitation or Polytrauma Stay Ever (FY2009 or prior)	2%	0.09%	0.2%
Polytrauma Transitional Rehabilitation Program (PTRP) Stay in FY2009	0.1%	<0.01%	<0.01%

* Patients can been 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
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 Appointment

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 four PRC sites.*
Polytrauma Rehabilitation Center Facility (PRC facility)	Records (clinic stops) at the following stations: 618, 640, 652, 673. *This is a subset of PNS.*
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. *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 Rehabilitation or Polytrauma Stay in FY2009	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 FY2009	Patient had at least one stay in a Polytrauma Transitional Rehabilitation Program (PTRP) in FY2009
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*
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.