

RTI(h)(s). Recent Trends in Hospitalizations Related to Post-Traumatic Stress Disorder in the United States

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BACKGROUND

- Post-traumatic stress disorder (PTSD) may develop after a person is exposed to one or more traumatic events, such as sexual assault, serious injury, or the threat of physical harm or death
- People considered at risk include combat military personnel, victims of natural disasters, and victims of violent crime
 - The average risk of developing PTSD after trauma is around 8% for men and just over 20% for women¹
 - The National Comorbidity Survey Replication has estimated that the lifetime prevalence of PTSD among adult Americans is 6.8%, with the rate among women (9.7%) more than twice that among men $(3.6\%)^2$
- Treatment for PTSD can be multifaceted and may include cognitive behavior therapy, psychotherapy, and pharmacological intervention
- Although it is generally agreed that PTSD exerts a substantial burden on patients, families, health care workers, hospitals, and society as a whole, there is limited information on the magnitude of the financial implications
 - Estimates of the annual total direct health care cost of PTSD in the United States (US) are rare and typically focus on the burden faced by the US military
 - Further, details on the burden of illness in specific care settings (e.g., inpatient) are limited

OBJECTIVE

 This study sought to document recent trends in adult PTSD-related hospitalizations in the US

METHODS

Study Design

Retrospective database analysis

Data Source

- Discharge data from the 2000-2010 Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS) databases
- The NIS, the largest inpatient care database in the US, is the only national inpatient database with charge information on all patients, regardless of payer
- The NIS includes many clinical and nonclinical variables for each inpatient stay, including patient demographics, diagnosis codes, length of stay (LOS), total charges, admission and discharge status, payer, and hospital-specific characteristics
- Sampling weights allow for generating nationally representative estimates

Inclusion Criteria

- Age ≥ 18 years
- A primary diagnosis of PTSD (ICD-9-CM code 309.81)

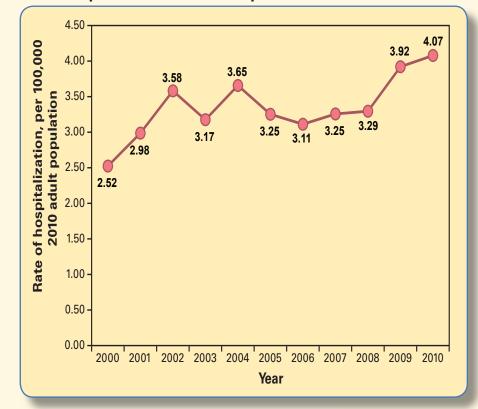
Study Measures and Analytical Methods

- For each of the 11 years assessed
- Weighted estimates of the number and rate of hospitalizations related to PTSD
- Characteristics of PTSD-related hospitalizations (i.e., sex, age, payer, admission source, discharge
- Per-discharge total costs (charge data converted to costs using facility-specific cost-to-charge ratios) and LOS for PTSD-related hospitalizations
- Descriptive analyses were carried out using the SAS® (Version 9.3) statistical software package

RESULTS

Rates of PTSD-Related Hospitalization (Figure 1)

Figure 1. Rate of PTSD-Related Hospitalization in the US, 2000-2010, per 100,000 2010 Adult Population



Patient Characteristics (Table 1)

- On average, between 2000 and 2010, there were 7,187 PTSD-related discharges annually (range: 5,139 - 9,175), the majority of which (> 56% in each of the 11 years) were female patients
- The mean age of patients with a PTSD-related hospitalization was approximately 37 years, regardless of study year
- Across all years, white patients made up more than 50% of PTSD-related hospitalizations, while there was significant variability in the proportion attributable to black patients, ranging from 5.5% in 2002 to 11.7% in 2007, before falling slightly to 10.5% in 2010
- In all years except 2010, the greatest number of PTSD-related hospitalizations were in the Northeast region of the US
- The proportion of PTSD-related hospitalizations that had private insurance as the primary payer generally decreased over time, from nearly 35% in 2000 to roughly 22% in 2010, while government payers (i.e., Medicaid and Medicare) typically comprised approximately half of all PTSD-related hospitalizations, regardless of the study year

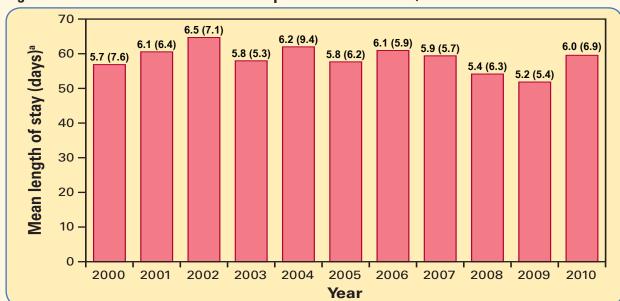
Admission Source and Discharge Disposition (Table 2)

- The proportion of admissions arriving from an emergency department has increased, from 37% in 2001 to 57.3% in 2006
- Beginning in 2007, the proportion of records in the NIS databases with missing data for admission source has increased substantially; thus, data for 2008, 2009, and 2010 should be viewed with caution
- Across all study years, nearly 9 out 10 discharges were classified as routine

LOS and Total Costs (Figures 2 and 3)

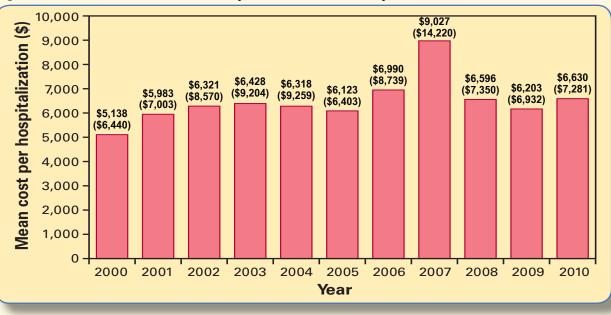
- During the study period, the mean (standard deviation [SD]) LOS increased slightly, from 5.7 (7.6) days in 2000 to 6.0 (6.9) days in 2010
- Mean (SD) costs increased by 23.2%, from \$5,138 (\$6,440) in 2000 to \$6,330 (\$7,281) in 2010

Figure 2. Mean LOS of PTSD-Related Hospitalizations in the US, 2000-2010



^a SD shown in parentheses.

Figure 3. Mean Cost (in 2013 Dollars) per PTSD-Related Hospitalization in the US, 2000-2010



^a SD shown in parentheses.

LIMITATIONS

- Patient discharges were identified based on diagnosis codes that, if recorded inaccurately, may cause misidentification of PTSD
- The HCUP databases do not include information on military status or reliable information across states regarding the Veterans Health Administration as a payer; thus, we were unable to evaluate if increasing rates of hospitalization are related to military personnel returning from combat deployment
- Unique patient identifiers are not available in the NIS; therefore, we were unable to follow patients who transferred from facility to facility. Results may be biased somewhat if the experiences of patients who transferred from facility to facility differed from those who remained in the same hospital during their entire stay

CONCLUSIONS

- PTSD-related hospitalization rates in the US increased during the first decade of the 2000s (overall, +61.6%), with the total cost burden increasing at an even greater rate during this period (+129%)
 - The estimated total inpatient burden of PTSD-related hospitalizations (i.e., aggregate costs across all PTSD-related hospitalizations) increased from \$26.3 million in 2000 to \$60.3 million in 2010
- Further research is warranted to better understand factors that may be influencing the observed growth in rates of PTSD-related hospitalization in the US (e.g., changing diagnostic criteria, increasing numbers of servicemen and women returning from military combat settings)
- Such research may help in planning optimal resource allocation both in inpatient settings and across the entire continuum of care

REFERENCES

- 1. National Collaborating Centre for Mental Health (UK). NICE Clinical Guidelines, No. 26. Leicester (UK): Gaskell (Royal College of Psychiatrists); 2005.
- 2. Olszewski TM, Varrasse JF. J Psychosoc Nurs Ment Health Serv. 2005 Jun;43(6):40-7.

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Table 1. Characteristics of Adult PTSD-Related Inpatient Admissions in the US, 2000-2010

Table 1. Characteri	ı	00	20	•	2002		2003		2004		2005		2006		2007		2008		2009		2010	
		Weighted Weighted			ļ											Weighted Weighted				<u> </u>		
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Total	5,139	100.00	6,143	100.00	7,436	100.00	6,659	100.00	7,743	100.00	6,952	100.00	6,718	100.00	7,101	100.00	7,261	100.00	8,730	100.00	9,175	100.00
Sex ^a																						
Male	1,180	22.96	1,659	27.01	2,162	29.07	1,906	28.62	2,145	27.70	2,188	31.47	2,209	32.88	2,370	33.38	2,502	34.46	3,282	37.59	3,437	37.46
Female	3,959	77.04	4,479	72.91	5,274	70.93	4,712	70.76	5,588	72.17	4,759	68.46	4,496	66.92	4,731	66.62	4,745	65.35	5,433	62.23	5,734	62.50
Age (years)																						
18-29	1,539	29.94	1,746	28.42	1,911	25.70	2,033	30.53	2,235	28.86	2,164	31.13	2,132	31.73	2,349	33.08	2,437	33.55	2,776	31.79	3,238	35.30
30-39	1,577	30.69	1,906	31.04	2,543	34.19	2,139	32.13	2,403	31.04	1,741	25.04	1,721	25.62	1,774	24.99	1,832	25.22	2,090	23.94	2,286	24.91
40-49	1,330	25.89	1,582	25.76	1,878	25.26	1,595	23.96	1,972	25.47	1,842	26.49	1,888	28.11	1,861	26.21	1,724	23.75	1,979	22.67	2,028	22.10
50-59	570	11.09	718	11.69	918	12.34	715	10.74	872	11.27	878	12.63	710	10.56	772	10.87	982	13.52	1,257	14.40	1,163	12.68
≥ 60	123	2.39	191	3.11	187	2.51	176	2.64	261	3.37	327	4.71	268	3.99	344	4.85	288	3.96	628	7.20	460	5.01
Age (years),	36.4		37.1 (11.9)		37.3		36.3		37.1		37.7		37.2		37.1		37.1		38.4		36.8	
` '	mean (SD) (11.0)		(11	.9)	(11	.5)	(11.5)		(11.9)		(12.8)		(12.1)		(12.5)		(13.0)		(13.7)		(12.7)	
Race/ethnicity	0.407	00.40	0.540	F7.04	4.007	24.00	4.075	04.40	4 700	04.00	4.004	F0.40	0.044	E0 70	0.544	40.07	4.005	F0.00	F 000	04.40	0.000	00.00
White	3,107	60.46	3,540	57.64	4,607	61.96	4,075	61.19	4,790	61.86	4,064	58.46	3,811	56.73	3,541	49.87	4,305	59.28	5,362	61.42	6,086	66.33
Black	480	9.34	609	9.91	408	5.49	562	8.44	653	8.43	480	6.91	754	11.23	828	11.65	566	7.79	669	7.67	961	10.48
Hispanic	263	5.12	272	4.42	324	4.35	307	4.62	275	3.55	324	4.66	266	3.96	223	3.13	310	4.27	391	4.48	518	5.64
Other	187	3.63	121	1.99	264	3.55	141	2.13	119	1.54	167	2.39	254	3.79	247	3.47	343	4.72	287	3.27	329	3.58
Unknown/missing	1,102	21.45	1,599	26.03	1,833	24.65	1,573	23.63	1,906	24.61	1,918	27.59	1,633	24.30	2,264	31.87	1,738	23.94	2,021	23.15	1,281	13.97
Region	1.007	01.05	0.005	04.10	0.775	F0 77	0.077	40.00	0.000	40.00	0.071	00.70	0.050	00.54	0.000	00.00	0.105	00.00	0.400	07.04	0.050	00.00
Northeast	1,637	31.85	2,095	34.10	3,775	50.77	2,677	40.20	3,099	40.02	2,071	29.79	2,656	39.54	2,392	33.69	2,105	28.99	2,439	27.94	2,956	32.22
Midwest	1,618	31.48	1,554	25.30	1,255	16.88	1,057	15.87	1,208	15.60	1,824	26.24	1,669	24.84	1,508	21.24	1,864	25.67	2,426	27.79	1,492	16.26
South	1,227	23.88	1,543	25.12	1,373	18.46	1,638	24.60	2,331	30.10	1,626	23.39	1,715	25.53	2,225	31.33	1,966	27.08	2,387	27.34	3,526	38.43
West	656	12.77	951	15.48	1,033	13.89	1,287	19.33	1,104	14.26	1,430	20.57	679	10.11	976	13.74	1,327	18.28	1,479	16.94	1,201	13.09
Primary payer	1.000	22.00	1.000	20.04	1.000	22.22	1.004	10.50	1 007	20.04	1 000	04.05	1 001	10.07	1.057	10.11	1.400	20.00	1.000	10.04	1.001	20.50
Medicare	1,226	23.86	1,268	20.64	1,660	22.32	1,234	18.53	1,807	23.34	1,693	24.35	1,281	19.07	1,357	19.11	1,498	20.63	1,688	19.34	1,881	20.50
Medicaid	1,325	25.78	1,999	32.54	2,682	36.07	2,286	34.33	2,491	32.17	1,796	25.83	1,852	27.57	1,820	25.63	2,189	30.15	2,316	26.53	2,834	30.89
Private insurance	1,777	34.58	1,794	29.20	1,909	25.67	1,766	26.52	2,170	28.03	2,013	28.96	1,871	27.85	1,698	23.91	1,900	26.17	2,253	25.81	1,983	21.61
Other/missing	811	15.78	1,081	17.60	1,185	15.94	1,372	20.60	1,276	16.48	1,449	20.84	1,714	25.51	2,226	31.35	1,676	23.08	2,473	28.33	2,478	27.01

Table 2. Admission Source and Discharge Disposition of Adult PTSD-Related Inpatient Admissions in the US, 2000-2010

A small number of records had a missing value for sex and are excluded from this measure; therefore, the sum of the frequencies may not equal the total

	2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		2010	
	Weighted	Weighted	Weighted	Weighted	Weighted	Weighted	Weighted	Weighted	Weighted	Weighted	Weighted	Weighted	Weighted	Weighted	Weighted	Weighted	Weighted	Weighted	Weighted	Weighted	Weighted	Weighted
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Total	5,139	100.00	6,143	100.00	7,436	100.00	6,659	100.00	7,743	100.00	6,952	100.00	6,718	100.00	7,101	100.00	7,261	100.00	8,730	100.00	9,175	100.00
Admission source																						
ED	2,173	42.29	2,272	36.98	4,007	53.88	3,742	56.19	3,938	50.86	3,848	55.35	3,852	57.33	3,484	49.06	1,391	19.15	914	10.47	688	7.50
Routine including births and other sources	2,186	42.54	3,061	49.84	2,950	39.67	2,273	34.14	2,602	33.60	2,471	35.54	2,174	32.36	2,019	28.43	1,257	17.31	555	6.35	859	9.36
Other admission source (i.e., another hospital, other health care facility, court/law enforcement)	325	6.33	585	9.52	438	5.89	514	7.72	1,129	14.58	614	8.83	663	9.87	811	11.42	416	5.73	390	4.47	589	6.42
Unknown/missing admission source	454	8.84	224	3.65	42	0.56	130	1.95	75	0.96	19	0.27	29	0.44	788	11.09	4,198	57.81	6,871	78.70	7,039	76.72
Discharge dispositio	Discharge disposition																					
Routine	4,663	90.74	5,458	88.85	6,642	89.32	6,164	92.57	6,971	90.03	6,228	89.59	6,030	89.76	6,392	90.02	6,535	90.00	8,054	92.26	8,226	89.66
Other discharge disposition, including unknown/missing	476	9.26	685	11.15	794	10.68	496	7.45	773	9.98	724	10.41	688	10.24	711	10.01	726	10.00	676	7.74	949	10.34

ED = emergency department Note: Beginning in 2007, a greater proportion of records in the NIS databases contained a missing value for admission source than in previous years