Electroconvulsive Therapy in Veterans Health Administration Hospitals

Prevalence, Patterns of Use, and Patient Characteristics

Talya Peltzman, MPH, Daniel J. Gottlieb, MS,* Brian Shiner, MD, MPH,* Natalie Riblet, MD, MPH,* and Bradley V. Watts, MD, MPH*†*

Objectives: The body of large-scale, epidemiological research on electroconvulsive therapy (ECT) in the United States is limited. To address this gap, we assessed demographic, clinical, pharmacological, and mental health treatment history as well as 2-year mortality outcomes associated with ECT use in the largest U.S. health care system.

Methods: Among all patients who sought mental health care at Veterans Health Administration (VHA) hospitals in 2012, we used bivariate analyses to compare patients who did and not receive ECT during 2 years of follow-up. Among the population who received ECT, descriptive statistics were calculated to characterize prior mental health treatment patterns and ECT receipt.

Results: 0.11% (N = 1616) of all VHA mental health patients in 2012 (N = 1,457,053) received ECT in 2 years of follow-up. There was significant regional variation in provision of ECT. Those who received ECT were more likely to have diagnoses of major depressive, bipolar, and personality disorders and were significantly more likely to have had a recent mental health inpatient stay (risk ratio, 6.94). Receipt of ECT was not associated with a difference in all-cause mortality (risk ratio, 0.88). Thirty-two percent of those who received ECT had no substantial antidepressant or therapy trial in the year before index mental health encounter.

Conclusions: Use of ECT in the VHA is rare. Patients who receive ECT have a complex and high-risk profile, not necessarily consistent with the most common indications for ECT.

Key Words: electroconvulsive therapy, Veterans Health Administration, United States, epidemiology

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Research has clearly and consistently demonstrated the efficacy and safety of electroconvulsive therapy (ECT) in treating a variety of psychiatric conditions,[1,2] most prominently treatment-resistant depression.[3] Despite this evidence and the long-standing recommendations to consider ECT in specific clinical situations,[4] research suggests that use of ECT in the United States is decreasing.[5,6] However, the most recent studies on national trends of ECT have been limited in scope.[7] Moreover, there is a paucity of up to date, large-scale epidemiological research describing the characteristics of patients who receive ECT in the United States, including studies of patient mortality.

Although recent national reports on the prevalence and characteristics of ECT have been published in a variety of international settings,[8–13] national studies of ECT in the United States are limited. The most recent national study of ECT was conducted by Wilkinson et al in 2018,[14] using the 2014 MarketScan data, which provides private health insurance claims data for more than 4.7 million US employees and their dependents. This study assessed the prevalence of ETC claims among more than 970,000 individuals with a major depressive disorder (MDD) or bipolar disorder, of whom 0.25% had at least 1 ECT treatment. The authors also reported on the characteristics of patients who received ETC, noting high levels of psychiatric comorbidities and hospitalization. Additionally, the authors reported significant regional variation among ECT treatment, with the fewest treatments per population provided in the western US states. Although this study adds a valuable national perspective of ECT treatment and patient characteristics, it is limited by its focus on a population which is employed (predominately within large corporations) and which has access to private health insurance. Use of this nonrandom convenience sample,[15] limits interpretability for the general US population.

A 2012 study by Case et al, using the data from the 1993 to 2009 National Inpatient Sample, reported on national ECT prevalence, irrespective of employment or insurance status.[6] However, this study was limited to inpatient stays at general hospitals and thus did not capture patients being treated in standalone psychiatric facilities or on an outpatient basis. Although these limitations likely resulted in incomplete capture of ECT practice, the authors reported on 424,235 inpatient stays during the study period, representing an annual prevalence of ECT among inpatients which declined from 0.0159% in 1995 to 0.0072% in 2009. Although this decline was associated with fewer US hospitals providing ECT, the work did not examine patient characteristics and treatment patterns among those receiving ECT.

Pfeiffer et al[16] studied patients with MDD being treated in Veterans Health Administration (VHA) hospitals and found that ECT was used in 0.16% of cases. The authors reported several independent predictors of ECT receipt including residential proximity to a facility which offers ECT, white race, having fewer medical comorbidities, and age greater than 65 years. A limitation of the Pfeiffer study is its focus on patients with MDD. Although a diagnosis of MDD is the most common indication for ECT in the United States,[3,7] ECT is also effective in the treatment of other psychiatric disorders, including schizophrenia and bipolar disorder.[1,2]

To date, few studies have sought to describe the characteristics of patients who receive ECT in the United States and those which have, as described above, are limited in their scope. Without this information, it is difficult to establish whether ECT is being provided in a manner that is likely to impact population health. Further, it is unclear whether ECT is associated with specific mortality outcomes.

From the *Veterans Affairs (VA) Medical Center, White River Junction, VT; and †National Center for Patient Safety, Ann Arbor, MI.

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Reprints: Talya Peltzman, MPH, VA Medical Center (116D), 215 North Main St, White River Junction, VT 05009 (e-mail: Talya.Peltzman@va.gov).

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The present study seeks to address this gap by presenting descriptive, cross-sectional analysis of 2-year ECT use among all VHA patients who accessed mental health services in 2012. Like Wilkinson (2018), we compare detailed demographic, clinical, and prescribing data among patients who did and did not receive ECT. We expand on these earlier analyses by providing a comparison of all-cause and suicide mortality between the ECT and non-ECT receiving group. We further expand on the clinical profile of patients who received at least 1 session of ECT by assessing the prevalence and characteristics of mental health treatment in the 2 years before their index mental health encounter. Finally, to better understand current practice, we characterize treatment patterns of the procedure, including descriptive analysis of setting, frequency, and course of ECT treatment. Combined, these analyses add new and much needed detail to the field's current understanding of ECT patients and clinical practice.

METHODS

Study Population

VA electronic medical records, accessed through the VA's Corporate Data Warehouse database, were used to identify all individuals with at least 1 mental health encounter at a VA facility during calendar year 2012. The specific inpatient and outpatient clinical codes used to identify mental health encounters are provided in the appendix (Supplementary Digital Content 1, http://links.lww.com/JECT/A94). If an individual had more than 1 mental health encounter in 2012, their first encounter was used as the index date for analysis. Because our analysis included assessment of suicide mortality, individuals were excluded from analysis if they were not discharged from a VA facility during the follow-up period or if they were discharged to a full-time residential facility (N = 11,957). A small number of individuals were excluded from analysis due to indication of death before their index mental health encounter (N = 498) as such instances are likely a result of administrative error. This study was approved by the Veterans Institutional Review Board of Northern New England, which granted a waiver of informed consent for population-based research.

Measures

Receipt of ECT in the 2 years following the index mental health encounter was identified using current procedural terminology (CPT) codes 90870, 90871, 4066F, or International Classification of Diseases-9 procedure codes 94.26, 94.27. Two years was selected as a follow-up period for receipt of ECT to ensure adequate power of descriptive measures. In addition to including all ECT procedures which occurred in VA facilities, ECT funded by VA and received in non-VA facilities was identified using VA's Fee Basis Medical claims database. For purposes of analysis, and to avoid overcounting of administrative data, only 1 ECT procedure per calendar day was counted even if multiple were documented. We were unable to access data regarding the use of unilateral or bilateral ECT.

All demographic, diagnostic, and prescription data were identified using VA medical records. Medical and mental health diagnoses were identified using a conservative approach, wherein a diagnosis was required in an inpatient setting, or in 2 distinct outpatient encounters, separated by at least 7 days. This approach has been used elsewhere to improve the specificity of diagnosis indicators extracted from administrative data.[17] To summarize the burden of patient comorbidities, we calculated a Charlson Index following the guidelines suggested by Quan et al.[18] Cohort demographics, comorbidities, and VA utilization were assessed for the year before the index mental health encounter to establish patient characteristics at baseline. Similarly, all inpatient and outpatient medications which were filled or had active days-supply during the 365 days before index mental health care were included in assessment of prescription receipt.

Mortality data were obtained from the VA's Suicide Data Repository (SDR),[19] a comprehensive database of VHA user deaths, including date and cause of death, as determined by the CDC's National Death Index. The cohort was searched for indication of all-cause and suicide mortality in the 2 calendar years following their index mental health encounter. A 2-year follow-up period was used for this measure to ensure adequate capture of mortality in the group who received ECT.

To better understand the characteristics of patients who received ECT, we assessed the prevalence of both medication and therapy treatment trials in the 2 years before index mental health treatment in 2012. Given initial analysis which suggested that depression was the most common mental health diagnosis among patients who received ECT, we assessed the prevalence of drug therapy trials involving 23 compounds commonly used for treating depression (see Appendix 2.1, Supplementary Digital Content 1, http://links.lww.com/JECT/A94). A drug treatment trial was defined as the receipt of 2 or more prescriptions of the same compound within 120 days. It was possible for trials of different compounds to overlap. For this analysis, multiple trials of a single compound were not included as multiple counts (that is, each compound was only counted once). Psychotherapy was identified using CPT codes (see Appendix 2.2, Supplementary Digital Content 1, http://links.lww.com/JECT/A94). A therapy trial was defined as 8 or more visits within 120 days. To avoid overcounting among individuals who had continuous therapy, our analysis allowed a maximum of 1 therapy trial per 120-day period. As a result, an individual could have no more than 3 therapy trials per year. For this analysis, we used a 2-year lookback period to ensure adequate capture of mental health treatment and to better understand the temporal relationship of previous therapy trials and subsequent receipt of ECT. Although data were available for inpatient prescriptions and psychotherapy visits, neither were included because of the concern that such treatment could be transient and associated with an acute event.

We characterized whether ECT was provided as part of an index, maintenance, or continuation course. The ECT course assignment was performed hierarchically in the aforementioned order so that a single session of ECT could not be counted in more than 1 course. An index course was defined as the receipt of 5 or more sessions of ECT in 30 days or less. Thirteen days without ECT were required between each index episode. Maintenance courses were defined as 3 or more sessions of ECT, with each session received 13 to 30 days apart. Because maintenance could continue indefinitely, it is possible that 1 course could span the entire evaluation period. Continuation courses were defined as any ECT which occurred 7 to 30 days after the last day of an identified index treatment. Subsequent ECTs received within 13 days of an identified continuation treatment were classified as part of that continuation treatment. These definitions were derived from guidelines described in the American Psychiatric Association's "The Practice of Electroconvulsive Therapy" (2002) and were modified to allow for operational, mutually exclusive groupings.[4]

Statistical Analysis

All statistical analyses conducted for this study were descriptive in nature. Bivariate analysis was conducted to test for differences between individuals who did and did not receive ECT. A χ^2 test was used to test for differences in proportions, and risk ratio (RR) was calculated to demonstrate magnitude of the effect size. The distribution and variance of all continuous variables were checked and Welch's t test, assuming unequal variances,

was selected to test for differences in means for all continuous measures. Cohen's *D* was used to demonstrate effect size in continuous measures. SAS Enterprise Guide version 7.1 (SAS Institute, Cary, NC) was used for all data management and data analysis.

RESULTS

Our cohort included 1,457,053 patients who received mental health care in a VHA facility during 2012. Of these, 1616 (0.11%) individuals received ECT at least once in the 2 years following their index mental health encounter (Table 1). The mean (SD) age of the VHA mental health patients in this study was 54.3 (15.4). Like VA patients, more broadly, most were male (90.1%) and were likely to identify as white (70.2%). The population who received ECT was more likely to be female (RR, 1.73), and significantly less likely to identify as African American (RR, 0.37) compared with patients who did not receive ECT.

Mortality

During the 2 years following index mental health encounter, there were 75,728 deaths, including 1,904 suicide deaths. Although prevalence of all-cause mortality was similar between those who did and not receive ECT, suicide mortality was significantly higher among patients who received ECT (RR, 5.71).

Regional Variation

There was notable regional variation in receipt of ECT. Patients who resided outside of the 50 US states (RR, 2.89) and in New England (RR, 2.19) were more likely to receive ECT. Follow-up analysis on the mental health patient population outside of the United States found that most (96%) were treated at VA medical facilities in Puerto Rico.

Comorbidities

Patients who received ECT were slightly more likely to have a Charlson Index of 1 or more, driven in part by higher relative prevalence of chronic pulmonary disease (RR, 1.57) and liver disease (RR, 1.44). The ECT group was more likely to have all pain-related diagnoses, particularly chronic pain disorders (RR, 2.41).

Seventy-one percent of patients had at least 1 mental health diagnosis. Every mental health diagnosis considered was more prevalent among the group who received ECT relative to those who did not receive ECT; in particular, diagnoses of MDD (RR, 3.33), bipolar disorder (RR, 4.52), and personality disorder (5.87) were more common in the ECT group.

Prescriptions

Among patients who received ECT, 93.2% received a psychotropic medication in the year before index mental health encounter, compared with 75.8% of mental health patients who did not receive ECT (RR, 1.23). Across all categories of medications assessed, receipt of a prescription was more common among patients who received ECT. Receipt of an antipsychotic (RR, 3.04) and of a stimulant (RR, 3.81) were most different when comparing those who did and did not receive ECT.

Service Use

Patients who received ECT were significantly more likely to have engaged with VA services, particularly in inpatient settings, in the year before index mental health encounter. Both medical (RR, 2.20) and psychiatric (RR, 6.94) inpatient use was more common in the ECT group as compared with the non-ECT group. In both inpatient settings, ECT patients were more likely to have had multiple inpatient stays. This difference was particularly large in the context of mental health inpatients stays where those who received ECT were significantly more likely to have experienced 2 or more mental health inpatient stays in the year before their index mental health encounter (RR, 10.61). The index encounter itself was much more likely to be in an inpatient setting among those who received ECT (RR, 9.26). Outpatient mental health service use was slightly more common among the ECT group (RR, 1.41), as was emergency department use (RR, 1.81).

Mental Health Treatment History

Among the 1616 patients who received ECT, 39.4% had not had an antidepressant trial in the year before index ECT treatment (Table 2). This proportion remained similar (32%) when looking back 2 years for evidence of an antidepressant trial. Forty-six percent of the individuals who received ECT had 1 antidepressant trial in the year before index treatment, whereas only 2.4% had 3 or more trials in the same period.

Therapy trials were less common than medication trials: most individuals (56.3%) who received ECT had not had a therapy trial in the 2 years before ECT. In the same period, 16.3% had 1 therapy trial and 17.9% had 2 or more.

32% of individuals who subsequently received ECT had neither a therapy nor a medication trial in the year before index mental health encounter.

Patterns of ECT Use

Among those who received ECT, most (70.4%) had at least 1 session of treatment during an inpatient stay, whereas 35% of patients received ECT in both inpatient and outpatient settings (Table 3). At least 1 index course of ECT was identifiable in 60.9% of individuals treated. Fewer patients received continuous (21.8%) or maintenance (18.6%) ECT. The mean (SD) number of ECT procedures per individual over the 2 years of follow-up was 10.3 (10.2).

DISCUSSION

We examined the 2-year use of ECT among VHA patients who accessed mental health services during 2012. We determined that, in 2 years of follow-up, ECT was provided to 1 in 900 patients who sought VA mental health care in 2012. Among patients with a diagnosis of MDD, 0.37% or 1 in 270, received ECT. Demographically, patients receiving ECT looked similar to the general population seeking mental health treatment, except for several notable differences: women were more likely to receive ECT and African American patients were less likely to receive ECT. There were significant differences in the prevalence of use of ECT across the VA, with ECT being provided more than twice as often per population in New England and outside of the 50 states. Not surprisingly, ECT patients were more likely to have had any mental health diagnosis and particularly more likely to have diagnoses of major depressive, personality, and bipolar disorder. Patients receiving ECT were also more likely to have had a major medical diagnosis, as well as a diagnosis of chronic pain. Of all descriptive categories considered, history of inpatient mental health treatment was most associated with subsequent receipt of ECT.

In 2 years of follow-up, patients who received ECT had similar risk of all-cause mortality, but greater than 5 times the risk of dying from suicide. Nearly one third of patients who subsequently received ECT had no history of psychotherapy or antidepressant medication trials within VA in the year before index mental health encounter.

This work was not without limitations. Using VA data allowed this study to assess ECT use and patient characteristics in a large, national population of mental health patients. However,

TABLE 1. Mortality, Demographic, Clinical, Prescription, and Service Use Characteristics Among Individuals Who Accessed VHA Mental Health Services in 2012, by 2-Year Receipt of ECT

	Non-ECT Group		ECT Group							
	n = 1,455,437		n = 1616		Effect Size		Test Statistic			
	n/Mean	%/STD	n/Mean	%/STD	RR	Cohen *d*	χ^2	*t* Statistic	*df*	*P*
Any cause death	75,654	5.2%	74	4.6%	0.88		1.25		1	0.263
Suicide death	1892	0.1%	12	0.7%	5.71		46.42		1	<0.001
Sex										
Male	1,311,993	90.1%	1340	82.9%	0.92		94.74		1	<0.001
Female	143,440	9.9%	276	17.1%	1.73		94.74		1	<0.001
Age	54.4	15.4	55.6	13.2		−1.19		−0.59	1619	0.55
Setting of index mental health encounter										
Inpatient	78,386	5.4%	806	49.9%	9.26		6216.7		1	<0.001
Outpatient	1,377,051	94.6%	810	50.1%	0.53		6216.7		1	<0.001
Region*										
East North Central	191,435	13.2%	271	16.8%	1.27		18.5		1	<0.001
East South Central	116,606	8.0%	96	5.9%	0.74		9.3		1	0.002
Middle Atlantic	127,142	8.7%	70	4.3%	0.50		39.3		1	<0.001
Mountain	125,421	8.6%	170	10.5%	1.22		7.4		1	0.006
New England	58,340	4.0%	142	8.8%	2.19		95.6		1	<0.001
Outside 50 states	18,404	1.3%	59	3.7%	2.89		73.4		1	<0.001
Pacific	187,916	12.9%	164	10.1%	0.79		11.0		1	<0.001
South Atlantic	338,241	23.2%	339	21.0%	0.90		4.6		1	0.03
West North Central	101,834	7.0%	149	9.2%	1.32		12.3		1	<0.001
West South Central	190,098	13.1%	156	9.7%	0.74		16.5		1	<0.001
Race										
African American	302,849	20.8%	123	7.6%	0.37		170.7		1	<0.001
Native American	27,282	1.9%	31	1.9%	1.02		0.02		1	0.89
Other/Unknown	103,133	7.09%	86	5.32%	0.75		7.63		1	0.006
White	1,022,173	70.2%	1376	85.1%	1.21		171.9		1	<0.001
Service connection										
<70	431,707	29.7%	347	21.5%	0.72		51.9		1	<0.001
> =70	393,516	27.0%	599	37.1%	1.37		82.3		1	<0.001
None	630,214	43.3%	670	41.5%	0.96		2.2		1	0.13
At risk of homelessness	144,547	9.9%	218	13.5%	1.36		22.8		1	<0.001
Charlson Index										
0	1,079,765	74.2%	1076	66.6%	0.89		48.7		1	<0.001
1	149,813	10.3%	244	15.1%	1.47		40.4		1	<0.001
2+	225,859	15.5%	296	18.3%	1.18		9.6		1	0.002
Medical diagnoses										
Cancer	82,143	5.6%	96	5.9%	1.05		0.3		1	0.605
Chronic pulmonary disease	169,659	11.7%	296	18.3%	1.57		69.5		1	<0.001
Connective tissue disease	12,613	0.9%	17	1.1%	1.21		0.7		1	0.422
Diabetes mellitus	289,522	19.9%	367	22.7%	1.14		8.0		1	0.005
Liver disease	56,836	3.9%	91	5.6%	1.44		12.8		1	<0.001
Dementia	16,311	1.1%	20	1.2%	1.10		0.2		1	0.655
Congestive heart failure	51,079	3.5%	56	3.5%	0.99		0.01		1	0.923
Pain diagnoses										
Any pain diagnosis	402,627	27.7%	704	43.6%	1.57		203.9		1	<0.001
Chronic pain	71,864	4.9%	192	11.9%	2.41		165.6		1	<0.001
Headaches	99,875	6.9%	244	15.1%	2.20		171.1		1	<0.001
Neuropathic	63,963	4.4%	115	7.1%	1.62		28.4		1	<0.001
Psychogenic	11,349	0.8%	22	1.4%	1.75		7.1		1	0.015

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TABLE 1. *(Continued)*

	Non-ECT Group n = 1,455,437		ECT Group n = 1616		Effect Size		Test Statistic			
	n/Mean	%/STD	n/Mean	%/STD	RR	Cohen *d*	χ^2	*t* Statistic	*df*	*P*
Mental health diagnoses										
Any mental health diagnosis	1,033,597	71.0%	1518	93.9%	1.32		412.2		1	<0.001
Anxiety	300,280	20.6%	608	37.6%	1.82		284.4		1	<0.001
Bipolar disorder	108,527	7.5%	545	33.7%	4.52		1608.4		1	<0.001
Depression	679,420	46.7%	1280	79.2%	1.70		686.1		1	<0.001
Dysthymia	82,339	5.7%	193	11.9%	2.11		119.4		1	<0.001
MDD	258,108	17.7%	954	59.0%	3.33		1883.5		1	<0.001
PTSD	471,793	32.4%	607	37.6%	1.16		19.5		1	<0.001
Schizophrenia	77,932	5.4%	257	15.9%	2.97		353.7		1	<0.001
Any substance use disorder	310,299	21.3%	640	39.7%	1.86		325.8		1	<0.001
Personality disorder	47,212	3.2%	308	19.1%	5.87		127.7		1	<0.001
Prescription receipt										
Any psychotropic	1,103,731	75.8%	1506	93.2%	1.23		265.5		1	<0.001
Antidepressant	852,104	58.5%	1325	82.0%	1.40		365.7		1	<0.001
Antipsychotic	298,045	20.5%	1006	62.3%	3.04		1226.9		1	<0.001
Sedative Anxiolytic	497,953	34.2%	1102	68.2%	1.99		827.6		1	<0.001
stimulant	30,276	2.1%	128	7.9%	3.81		269.5		1	<0.001
Anticonvulsant mood stabilizer	416,049	28.6%	959	59.3%	2.08		747.5		1	<0.001
Service Use										
Emergency department use (y/n)	461,127	31.7%	946	58.5%	1.85		537.6		1	<0.001
Outpatient medical use (y/n)	1,345,893	92.5%	1559	96.5%	1.04		37.1		1	<0.001
Outpatient mental health use (y/n)‡	895,681	61.5%	1401	86.7%	1.41		431.7		1	<0.001
Medical inpatient Stay (y/n)	137,122	9.4%	335	20.7%	2.20		241.6		1	<0.001
Mean number of days of medical inpatient stay†	13.5	30.5	16.7	26.8		2.19		−2.35	336	0.02
No. inpatient medical Stays										
0	1,318,315	90.6%	1281	79.3%	0.88		241.6		1	<0.001
1	87,735	6.0%	202	12.5%	2.07		119.2		1	<0.001
2+	49,387	3.4%	133	8.2%	2.43		115.0		1	<0.001
Mental health inpatient stay (y/n)‡	52,913	3.6%	408	25.2%	6.94		2138.5		1	<0.001
Mean number of days MH inpatient stay†	41.5	61.7	40.7	51.3		−1.01		0.32	416	0.75
Number of inpatient mental health stays										
0	1,402,524	96.4%	1208	74.8%	0.78		2138.6		1	<0.001
2	37,071	2.5%	220	13.6%	5.34		792.7		1	<0.001
2+	15,842	1.1%	188	11.6%	10.69		1649.7		1	<0.001

*US Census Bureau regions: https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf.

†Only calculated among those who had at least 1 inpatient stay.

‡Does not include index mental health encounter.

df, degrees freedom.

patients at the VA are not necessarily representative of the general population and may differ in their indications for receipt of ECT. Further, although our study did include VA-funded ECT procedures provided at non-VA facilities, we did not include information on patients who used private or Medicaid/Medicare funding to receive ECT outside of the VA. Thus, there may be additional patients in the population of this study who received ECT but were assessed as part of the non-ECT group. We relied on administrative data for this study and did not include narratives of clinical notes or details of ECT provision, such as bilateral versus unilateral electrode placement. In this regard, we have limited understanding of why ECT was used or the specific treatment parameters of ECT. Finally, the nature of this study is cross-sectional and, at the time of writing, is nearly 6 years outdated. This calls to question whether the findings observed in this 2012 cohort have persisted. Information on recent trends of ECT use would be useful to contextualize the findings of this study.

Despite these considerations, our work provides the most current estimate of ECT use in the largest health care system in the United States. Although the prevalence of ECT identified here is greater than that established in a previous national study of general hospitals by Case et al, this study confirms Case's primary finding that ECT use in the United States is rare.

This work also confirms a disparity in ECT use among African American patients.[16,20] Previous research has noted that African American patients were less likely to seek care at hospitals that provide ECT.[21,9] Although our study did not assess hospital level characteristics, we did observe striking regional variation

TABLE 2. Characteristics of Mental Health Treatment in the 1 and 2 Years before Index Mental Health Encounter in 2012, Among Patients Who Received ECT in 2 Years of Follow-Up (N = 1616)

		Treatment Period			
		1 Year		2 Years	
Treatment Type	No. Trials	N	%	N	%
Antidepressant medication*	0	636	39.4	517	32.0
	1	742	45.9	698	43.2
	2	200	12.4	292	18.1
	3+	38	2.4	109	6.7
Therapy†‡	0	1088	67.3	910	56.3
	1	235	14.5	264	16.3
	2	159	9.8	153	9.5
	3+	134	8.3	289	17.9
Therapy + antidepressant medication	0	517	32.0	393	24.3
	1	514	31.8	425	26.3
	2	251	15.5	271	16.8
	3+	334	20.7	527	32.6

*Antidepressants included 23 compounds of commonly prescribed antidepressants (see appendix). A trial was defined as two or more fills of a give prescription in a 120-day period. Multiple trials of a single compound were not counted.

†Therapy was identified using CPT codes (see appendix). A therapy trial was defined as 8 or more days with psychotherapy in a 120-day period.

‡Three trials in a given year was the maximum number possible. Accordingly, it was possible to have more than 3 in 2 years.

in ECT use. Further research is needed to understand whether such regional variation is driving racial disparities in receipt of ETC and how both health system characteristics and patient preferences may also impact the observed disparity.

Our findings support recent work, suggesting receipt of ECT does not increase all-cause mortality but is associated with higher rates of suicide.[22,23] This finding is not surprising in that ECT is often given to patients at high risk for suicide. This phenomenon is apparent in our data, where patients who received ECT were significantly more likely to have a recent history of inpatient mental health admission. Studies which have limited comparisons to patients with similarly complex diagnostic profiles found that suicide was lower among patients who received ECT as compared with those who did not.[24,25] As other studies have noted,[22,26] the similar rates of all-cause mortality between the ECT and non-ECT patients provide evidence in support of the medical safety of modern ECT practice.

The findings regarding mental health treatment history among patients who subsequently received ECT are somewhat difficult to interpret. Though this study cannot account for prescriptions or psychotherapy received outside of VA, the proportion of patients who had no 2-year history of either treatment

TABLE 3. Characteristics of ECT Use Among Patients With a Mental Health Encounter in 2012, Who Received ECT in 2 Years of Follow-Up (N = 1616)*†

	n	%/ Std
At least 1 ECT session was received in inpatient setting	1137	70.4%
At least 1 ECT session was received in outpatient setting	887	54.9%
At least 1 ECT session was received in both inpatient and outpatient settings	570	35.3%
Mean number of ECT sessions received	10.3	10.2
Had at least 1 index‡ course of ECT (y/n)	984	60.9%
Mean number of ECT sessions received	6.0	2.5
Had at least 1 maintenance§ course (y/n)	304	18.6%
Mean number of ECT sessions received	10.2	9.3
Had at least 1 continuation¶ course (y/n)	353	21.8%
Mean number of ECT sessions received	3.6	3.8

*There were 16,591 unique procedure days represented in this population.

†Some individuals in this study who did not received ECT in a manner that was characterized by index, continuation, or maintenance course.

‡Index courses were defined as the receipt of 5 or more sessions of ECT in 30 days or less. 13 days without ECT were required between each index episode.

§Continuation courses were defined as any ECT which occurred 7 to 30 days after the last day of an identified index treatment. Subsequent ECTs received within 13 days of an identified continuation treatment were classified as part of that continuation treatment.

¶Maintenance courses were defined as 3 or more session of ECT, with each session received 13 to 30 days apart. Because maintenance could continue indefinitely it is possible that 1 course could span the entire evaluation period.

type was higher than the expected given current ECT guidelines, which suggest that the procedure is most often helpful as a secondary treatment for patients who have not been helped by other treatment options.[4] Given the high proportion of depression diagnoses in the study population, our analysis of medication treatment history focused on antidepressants. However, the lower than expected prevalence of antidepressant trials may indicate instances when ECT was used to treat other or comorbid mental health diagnoses, such as bipolar disorder and schizophrenia, for which antidepressants may not have been prescribed. More work is needed to understand mental health treatment history among patients with bipolar and schizophrenia who receive ECT. Our findings may also reflect overall suboptimal medication trial practices among VA patients. The proportion of ECT patients who had any antidepressant fill in the year prior (82%) was much higher than the proportion who had at least one 120-day trial (45.9%) during the same period.

CONCLUSIONS

This large, descriptive study found that, among individuals who used VHA mental health services in 2012, ECT use was relatively uncommon during 2 years of follow-up. Among those who did receive the procedure, a complex patient profile was evident, with greater frequency of medical and mental health diagnoses, chronic pain, and inpatient hospitalization as compared with mental health patients who did not receive ECT. That the patient profile and mental health treatment history of those who received ECT was not necessarily consistent with a profile of treatment-resistant depression is notable and suggests that future research on ECT prevalence and practice should include patients with diagnoses beyond MDD. The association between ECT and suicide observed in this study suggests that analyses which include more years of data and consider multiple risk factors are needed to better understand the relationship between receipt of ECT and suicide mortality outcomes. Though such analyses were outside the scope of this initial descriptive study, understanding more about the role of ECT in suicide prevention may be an important element in increasing the prevalence and application of ECT both in the VA and elsewhere.

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