Electroconvulsive therapy at a Veterans Health Administration Medical Center

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Abstract

Objectives—Little epidemiologic research has examined the practice of electroconvulsive therapy (ECT). We investigated socio-demographic and clinical characteristics, service use, and psychotropic medication prescription patterns associated with ECT use at a Veterans Health Administration Medical Center.

Methods—Among veterans receiving specialty mental health services, we compared those who received ECT with those who did not using bivariate chi-square and t-tests and multivariate logistic regression.

Results—In fiscal year 2012, 11,117 **v**eterans received specialty mental health services, of whom 50 received ECT (0.45%) in FY2012 or FY2013. Those who received ECT were more likely to be diagnosed with Major Depressive or Bipolar Disorders and had substantially higher levels of mental health service utilization (Cohen's d>0.75) and psychotropic prescription fills, including antidepressants (Cohen's d=2.66), antipsychotics (Cohen's d=2.15), lithium (Cohen's d=1.34), mood stabilizers (Cohen's d=1.30), and anxiolytic/sedative/hypnotics (Cohen's d=1.34).

Conclusions—Our findings suggest that ECT is used as a treatment of last resort, although available evidence and guidelines recommend wider use.

Introduction

Electroconvulsive therapy (ECT) is among the most effective treatments for Major Depressive Disorder (MDD), with response rates of 80–90% when used as first-line treatment and response rates of 50–60% in Treatment-Resistant Depression (TRD) [1]. Despite its efficacy, ECT is thought to be under-utilized because of stigma, restricted access due to limited availability, high procedure costs, the risk of cognitive side effects, and legal restrictions in some locales. In countries where its use has been assessed longitudinally, ECT

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use has declined [2, 3]. One potential additional reason for this decline may be related to the reduction in the number of centers that offer ECT on an inpatient basis [3]. However, since recent technical advances (e.g., ultra-brief pulse width, right unilateral placement) have substantially reduced cognitive risks associated with ECT (most notably, autobiographical memory [4]) and it can increasingly be offered on an outpatient basis, the limited and declining use of ECT may be denying optimal treatment to many patients.

While Major Depressive Disorder is the most common indication and the indication for which the most evidence exists [5], ECT has also been shown to be effective for other disorders including bipolar depression [6], catatonia [5], mania [7], and positive symptoms of schizophrenia [8]. More limited evidence has shown benefit in treatment-resistant cases of OCD [9].

In view of evidence of its effectiveness and suggestions that ECT is underused [10], there is a need for clinical epidemiological service utilization studies of the community practice of ECT in the United States. Recent reports in international settings [11–15] show a wide variation in the prevalence of ECT use, with recent treated prevalence estimates ranging from 41 ECT patients/100,000 population in Sweden [11] to 1.1 ECT patients/100,000 population in Poland [2]. A recent systematic review and meta-analysis on the use of ECT internationally only included US studies dating from 1999 or earlier as no more recent studies were available [2]. The most recent picture of the US practice of ECT comes from Case *et al.*, whose analysis from the National Inpatient Survey showed a decline in inpatient use of ECT from 1993 to 2009, which the authors attribute to a reduction in the number of hospitals that offer this service [3]. However, their analysis was limited by the fact that it only examined ECT delivery on an inpatient basis and did not compare ECT recipients and other mental health patients. With significant changes in criteria for and lengths of stay of psychiatric hospitalization over the time period analyzed, many centers increasingly provide ECT on an outpatient basis for a large portion of ECT patients. Pfeiffer *et al.*, characterized demographic characteristics within the Veterans Health Administration between those diagnosed with depression who received ECT treatment and those who did not [10]. However, they did not examine patterns of service use or psychotropic medication fills.

To better characterize community practice of ECT, we used cross-sectional data on ECT use among veterans receiving specialty psychiatric care at a large Veterans Affairs Medical Center in New England to identify overall rates of use and to compare veterans who received ECT and those who did not on sociodemographic characteristics; psychiatric and medical co-morbid diagnoses; use of medical and mental health services and psychotropic medication fills.

Methods

Sample

Data were drawn from administrative records of all veterans who received specialty mental health care in Fiscal year (FY) 2012 (October 1, 2011 to September 30, 2012) at the VA Connecticut Healthcare System (VACT). Records identified all veterans who received ECT services from VACT in either the index year (FY 2012) or FY 2013. The study was approved

the VA Connecticut institutional review board and was granted a waiver of informed consent.

Measures

Database measures included sociodemographic characteristics, service utilization data, medical and psychiatric diagnoses, and psychotropic medication prescription history during FY2012. Sociodemographic characteristics included age, gender, race, service connected disability status, pension status, and whether the patient had been homeless during the year. Homelessness was also assessed using codes representing use of specialized services for homeless veterans or having a V60 (homelessness) ICD-9 Code. Medical and psychiatric diagnoses were based on ICD-9 codes in VA administrative files. Overall medical comorbidity was measured by the Charlson Comorbidity Index [16].

Service utilization was measured by the total number of medical/surgical visits per patient, the total number of emergency room visits, and total number of psychiatric or substance use treatment visits during the index year. Because ECT is often performed on an inpatient basis, hospitalization could not be used as a distinguishing criterion.

Psychotropic medication prescription fills during the year were categorized into six groups: antipsychotics, antidepressants, anxiolytics/sedative/hypnotics, stimulants, mood stabilizers, and lithium. Measures includes the total number of prescriptions filled in the current year in each category and in all combined categories during the current year.

Analysis

Analysis proceeded in two steps. First bivariate analyses using chi square and t-tests compared the significance of differences between veterans who received ECT and those who did not on socio-demographic characteristics, medical and psychiatric diagnoses, service utilization, and psychotropic medication fills. In comparing continuous variables, we utilized Welch's t-test (also known as Satterthwaite test) when F-tests indicated unequal variances. Further details of Welch's t-test can be found elsewhere [17]. We also present effect sizes reflecting the magnitude of differences using Cohen's d (difference in mean divided by pooled standard deviation) for continuous variables and risk ratios for categorical variables. Continuous variables with a Cohen's $d > 0.5$ and categorical variables with risk ratios >2.0 or <0.5 were considered to reflect a substantial difference between veterans who received ECT and those who did not.

Next, logistic regression was used to identify characteristics that independently differentiated veterans who received ECT and those who did not. Measures that substantially differentiated groups on bivariate analysis were entered into a step-wise logistic regression model. A measure of the date of first contact with VHA during the year was used for differences in days of exposure to VHA treatments.

Results

Sociodemographic Characteristics

In FY2012, 11,117 veterans received specialty mental health services at VACT and 50 (0.45%) subsequently received ECT in FY2012 or FY2013. The sample was overwhelmingly male (93%) and Caucasian (83%), with a mean (SD) age of 56.5 (16.4) (Table 1). Almost half (46%) had a service-connected disability and 14% had been homeless during the year. African Americans were less likely to receive ECT than others and recipients of VA pensions were significantly more likely to receive ECT.

Clinical Diagnoses

Both groups had substantial medical comorbidities but there were no significant or substantial differences in the prevalence of any particular medical illnesses or on the overall Charlson Comorbidity Index (Cohen's d=0.15). Compared to those who did not receive ECT, the ECT group had significantly and substantially higher rates of most psychiatric diagnoses, including schizophrenia (Risk Ratio [RR] =2.5), bipolar disorder (RR=3.5), major depressive disorder (RR=2.9), other depressive disorders (e.g., dysthymia, RR=1.6), personality disorder (RR=4.9), and alcohol or drug dependence considered together (RR=2.0).

Service Utilization

Veterans who received ECT had significantly and substantially higher levels of service use compared to those who did not receive ECT on measures of average emergency room visits per patient, and psychiatric or substance abuse outpatient visits, all with large effect sizes (all Cohen's d>0.75). There was no significant difference in outpatient medical/surgical visits between groups (Table 1).

Psychotropic Prescription Patterns

Total psychotropic medication prescription fills per patient during FY 2012 were significantly and much higher among the ECT group compared to the no-ECT group (mean 74.2 v. 14.4, t=−5.25, p<0.0001), with a very large effect size (Cohen's d=2.87). More specifically, the ECT group had substantially higher numbers of prescriptions for all individual classes of psychotropic medications examined except for stimulants, with very large effect sizes for antidepressants and antipsychotics (Cohen's d > 2.0), as well as for anxiolytic/sedative/hyponotics, lithium, and anticonvulsant/mood stabilizers (Cohen's d > 1.3).

Logistic Regression Model

Stepwise logistic regression showed only three variables were independently associated with treatment with ECT: major depressive disorder (Odds ratio=8.47, 95% confidence interval (CI) 4.1–17.5), bipolar disorder (Odds ratio=3.00, 95% CI= 1.6–5.8), and the number of psychotropic prescription fills (Odds ratio per 10 prescriptions/year=1.25, 95% CI= 1.19–1.30). With a c-statistic of 0.87, this model had a very good fit with only these three variables.

The stepwise logistic regression analysis was repeated on the subgroup of patients diagnosed with MDD and the only two variables that were significant were a diagnosis of bipolar disorder (p<.002) and the number of filled prescriptions (p<0.0001), again with a high c statistic of 0.83.

Discussion

In this study of veterans receiving specialty mental health care at a large VA medical center, less than 1% of patients receiving specialty mental health care received ECT and there were substantial differences in psychiatric diagnoses, mental health service utilization, and psychotropic prescription fill patterns between those who received ECT and those who did not. In a stepwise logistic regression model, the differences between veterans who underwent ECT and those who did not were explained entirely by a diagnosis of major depressive disorder or bipolar disorder and the total number of psychotropic prescriptions per year.

Unsurprisingly, veterans who received ECT were significantly more likely to carry diagnoses of major depressive disorder and bipolar disorder. However, it was somewhat unexpected that those receiving ECT were also more likely to be diagnosed with personality disorder, alcohol or drug dependence on the bivariate analysis. High rates of alcohol and drug dependence have generally not been reported in previous literature characterizing ECT patients among veterans [10] indicating that in this context current substance use disorders were not an exclusion criterion for ECT.

Our data suggest that approximately 1 patient in 221who receive specialty mental health care receive ECT. It is difficult to contextualize this within prior research that bases prevalence estimates on the general population. However, our finding that ECT patients receive much higher numbers of mental health outpatient visits and, especially, more psychotropic prescriptions, especially antidepressants, than other veterans suggests that this treatment is used as an option of last resort for patients receiving exceptionally intensive treatment, a practice which the APA Task Force recommend against [5]. Further, as suggested by the high comorbidities of personality disorder and substance use disorder in this dataset, in some cases ECT may have been used as a treatment of last resort in patients who are otherwise very difficult to treat, perhaps when the treating clinician did not know what else might possibly be useful.

Several limitations require comment. Most notably, our analysis is limited to a single medical center and thus reflect the practice patterns of a small number of ECT practitioners. Further, our sample comprises a relatively older, predominantly white group of veterans who reside in the New England area; hence, the generalizability of our findings to non-veterans populations or other regions is unknown. Finally, our data is drawn from administrative databases, which can have significant limitations (such as diagnosis being made from ongoing clinical interview and not structured research interviews) and do not include important clinical measures such as number of failed antidepressant trials, length of current depressed episode, psychotic versus non-psychotic depression, or clinical response to ECT.

Despite these limitations, use of ECT is exceptionally rare and stark differences were found between patients receiving ECT and those who did not. Our findings suggest that, contrary to professional guidelines, ECT is used as a treatment of last resort and may therefore be under-utilized. Larger, more representative samples of longitudinal epidemiological studies should be conducted to better characterize ECT patterns in the United States.

Acknowledgments

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Table 1

Demographic, medical comorbidities, psychiatric indications, service utilization, and psychotropic prescription rates

	No ECT group N=11067		ECT group N=50		Effect size	Test statistic	df	p value
	Mean/N	SD/%	Mean/N	SD/%	Risk Ratio / Cohen's d	Chi square / t statistic		
Demographic Variables								
Male	10255	0.9	45	0.9	0.97	0.04	1	0.84
Age (years)†	56.5	16.4	59.6	10.5	0.19	−2.12	50	0.04
Race *								
White	8488	0.8	44	0.9	1.08	1.32	1	0.25
African American	1440	0.1	2	0.0	0.29	3.70	1	0.05
Other race	57	0.0	2	0.0	7.32	11.69	1	<0.01
Disability Measures								
Service Connected 50% or more	3231	0.3	17	0.3	1.17	0.42	1	0.52
Service Connected less than 50%	1886	0.2	6	0.1	0.70	0.77	1	0.38
Receives VA Pension	383	0.0	5	0.1	2.89	6.33	1	0.01
Homeless during the year	1558	0.1	7	0.1	0.99	0.06	1	0.80
Medical Comorbidities								
Congestive Heart Failure	5403	0.5	27	0.5	1.11	0.70	1	0.40
Cerebrovascular Accident	527	0.0	3	0.1	1.26	0.19	1	0.66
Chronic Obstructive Airway Disease	1739	0.2	8	0.2	1.02	0.01	1	0.92
Diabetes Mellitus	2366	0.2	12	0.2	1.12	0.27	1	0.60
Cancer	1047	0.1	4	0.1	0.85	0.09	1	0.76

	No ECT group N=11067		ECT group N=50		Effect size		Test statistic		df	p value
	Mean/N	SD/%	Mean/N	SD/%	Risk Ratio /	Cohen's d	Chi square /	t statistic		
Any Pain Diagnosis	5596	0.5	28	0.6	1.11		0.32		1	0.57
Charlson Medical Severity Diagnosis Index	1.6	2.0	1.9	2.2		0.16		−1.11	11,115	0.27
Psychiatric Diagnosis										
Schizophrenia	982	0.1	11	0.2	2.48		9.72		1	<0.01
Bipolar disorder	1076	0.1	17	0.3	3.50		31.18		1	<0.01
Major depression	3024	0.3	40	0.8	2.93		60.66		1	<0.01
Other depression (e.g. dysthymia)	3893	0.4	29	0.6	1.65		8.28		1	<0.01
Post-traumatic stress disorder	4289	0.4	16	0.3	0.83		1.41		1	0.24
Anxiety disorder	2664	0.2	16	0.3	1.33		1.33		1	0.25
Adjustment disorder	1224	0.1	3	0.1	0.54		1.47		1	0.23
Personality disorder	356	0.0	8	0.2	4.97		24.36		1	<.01
Any drug	1894	0.2	17	0.3	1.99		7.10		1	0.01
Any substance abuse diagnosis	3071	0.3	28	0.6	2.02		16.06		1	<.01
Alcohol dependence	2379	0.2	21	0.4	1.95		11.55		1	<0.01
Drug dependence	1894	0.2	17	0.3	1.99		7.10		1	0.01
Service Use										
Any Mental Health Inpatient Treatment	648	0.1	27	0.5	9.22		178.47		1	<0.01
Emergency Room Visits†	0.8	2.3	2.8	3.3		0.87		−4.23	49	<0.01
Medical Surgical Visits	12.4	15.8	15.7	13.8		0.21		−1.48	11,115	0.14

	No ECT group N=11067		ECT group N=50		Effect size	Test statistic		df	p value
	Mean/N	SD/%	Mean/N	SD/%	Risk Ratio / Cohen's d	Chi square /	t statistic		
Psychiatric or Substance Abuse Outpatient Visits†	15.9	32.7	42.0	58.4	0.80		-3.17	49	<0.01
Psychotropic Medication Prescriptions									
Antidepressant Prescriptions†	5.9	9.3	31.3	31.4	2.66		-5.71	49	<0.01
Antipsychotic Prescriptions†	2.6	7.9	20.2	33.0	2.15		-3.78	49	<0.01
Anxiolytic/Sedative/Hypnotic Prescriptions†	2.8	5.9	10.8	15.0	1.34		-3.79	49	<0.01
Stimulant Prescriptions†	0.2	1.5	0	0.0	-0.12	12.57		11,066	<0.01
Lithium†	0.2	1.8	2.8	7.8	1.34		-2.31	49	0.02
Anticonvulsant/mood stabilizer†	1.7	5.6	9.1	15.7	1.30		-3.33	49	<0.01
All Psychotropics*†	14.4	20.1	74.2	80.1	2.87		-5.28	49	<0.01

df - degrees of freedom;

*
Missing data (7.6%) from these variables;

†
Welch's t test assuming unequal variance