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Research report

Electroconvulsive therapy for major depression within the Veterans Health Administration

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ABSTRACT

Objectives: Electroconvulsive therapy (ECT) is the most effective treatment for severe or treatment resistant depression; however, the lack of widely accepted methods for determining when ECT is indicated may contribute to disparities and variation in use. We examined receipt of ECT among depressed patients in the largest coordinated health system in the US, the Veterans Health Administration.
Methods: Using administrative data, we conducted a multivariable logistic regression to identify individual clinical and sociodemographic predictors of receiving ECT, including variables of geographic accessibility to ECT, among patients diagnosed with major depressive disorder between 1999 and 2004.
Results: 307 (0.16%) of 187,811 patients diagnosed with major depression received ECT during the study period. Black patients were less likely to receive ECT than whites (odds ratio 0.33; 95% confidence interval: 0.20, 0.55), and patients living in the South (OR: 0.71; 95% CI: 0.53, 0.95) or West (OR: 0.59; 95% CI: 0.42, 0.82) were less likely to receive ECT than patients living in the central US. Patients whose closest VA facility provided ECT had a higher likelihood of receiving ECT (OR: 3.02; 95% CI: 2.22, 4.10). Depressed patients with no major medical comorbidities were also more likely to receive ECT (OR: 2.42; 95% CI: 1.65, 3.55).
Limitations: Findings are not adjusted for depression severity.
Conclusions: ECT use for major depression was relatively uncommon. Race, US region, geographic accessibility, and general medical health were all associated with whether or not patients received ECT. Clinicians and health systems should work to provide equitable access and more consistent use of this safe and effective treatment.

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1. Introduction

Electroconvulsive therapy (ECT) is the most effective treatment option for severe depression (Carney et al., 2003). Response rates with ECT are also 50–70% among patients who have not responded to prior antidepressant treatment (Prudic et al., 1990). There are few contraindications to ECT, and the mortality rate from the procedure is comparable to receiving general anesthesia alone (Lisanby, 2007; Roy and Overdyk, 1997; Sartorius and Hewer, 2007).

Although the efficacy and safety of ECT have a well-established evidence base, there has been substantial variation in its availability and use. In the US, the most recent nationwide data regarding ECT use are from a 1988–1989 survey of psychiatrists that estimated the rate of ECT use at 4.9 patients

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per 10,000 people (0.05%) with 36.3% of metropolitan areas reporting no ECT use (Hermann et al., 1995). When areas that provided ECT were ranked by rate of ECT use, there was a four-fold difference in the rates between the 25th and 75th percentile areas, which is a greater variation than for most other medical procedures. The variability in ECT use was not explained by the prevalence of depression; rather, the number of psychiatrists and primary care physicians and state regulations were the strongest predictors of ECT use.

Reducing disparities in access to and quality of healthcare is a stated goal of the US Department of Health and Human Services (US Department of Health and Human Services, 2001). The VA health system, the largest national health system in the US, prioritizes the use of evidence-based treatments and has established a minimum degree of uniformity in services provided across all of its medical centers (Kizer, 1996). Examining the use of ECT within the VA health system provides an opportunity to determine the degree to which disparities exist within a large coordinated US health system and may provide guidance in achieving more equitable and effective treatment of depression, both within the VA and other health systems. Using VA administrative and clinical data, we determined the overall prevalence of ECT use among depressed veterans and the degree to which use varied by proximity to a VA medical center that provided ECT, by demographic and clinical factors, and by region within the US.

2. Methods

2.1. Study population

We used data on patient clinical and demographic characteristics from the VA National Registry for Depression (NARDEP), which was created and maintained by the VA's Serious Mental Illness Treatment Resource and Evaluation Center (SMITREC) in Ann Arbor, Michigan (Blow et al., 2003). Patients were included if they were diagnosed with major depressive disorder and had at least one other visit with any depression diagnosis or were treated with an antidepressant medication during the period between April 1, 1999 and September 30, 2004. Major depression diagnoses were identified using the International Classification of Diseases, Ninth Revision (ICD-9) diagnostic codes 296.2x and 296.3x. Patients with schizophrenia, schizoaffective disorder, and bipolar I disorder were excluded from the study.

2.2. Study measures

Patient use of ECT treatment was determined from current procedural terminology (CPT) codes in the outpatient records (90870 and 90871) and ICD-9 codes from surgery and procedure records (94.26 and 94.27). We validated this measure against computer-assisted chart reviews of 400 depressed patients with a history of a two-week psychiatric hospitalization at an ECT-providing facility and found that use of administrative codes had a sensitivity of 0.96 (95% confidence interval [CI]: 0.78–0.99) and specificity of 0.997 (95% CI: 0.985–0.999) for identifying VA ECT use within this population. We also manually reviewed each instance where only one ECT treatment was identified in the administrative records, as ECT is usually provided over several treatments, and excluded these instances if there was no clinical documentation of ECT, assuming that this meant that the ECT treatment had been recorded in error. We also included instances of ECT provided by non-VA facilities that were recorded in the Fee Basis Medical and Pharmacy System.

We obtained data from the NARDEP on patient demographic characteristics including age (18–40, 40–49, 50–64, and ≥65), sex, Hispanic ethnicity, and race (white, African–American, other, and unknown), with “other” race including patients of Asian, Native Hawaiian, Pacific Islander, or Native American race/ethnicity and patients who were multi-racial. Psychiatric comorbidity was defined as patients receiving any of the following clinical diagnoses in the twelve months prior to cohort entry: post traumatic stress disorder (PTSD), any other anxiety disorder (panic disorder with or without agoraphobia, generalized anxiety disorder, anxiety disorder not otherwise specified, and all phobias), bipolar II disorder, any substance use disorder, and any personality disorder. General medical comorbidities in the year prior to cohort entry were characterized using the Charlson Comorbidity Index (scored as 0, 1, and >1) (Charlson et al., 1987).

We derived two variables related to geographic accessibility: mean distance to a facility providing ECT treatment and whether the patient's closest VA facility performed ECT treatment. Distance was calculated as a straight-line distance to the VA facility from the most densely populated area of the patient's zip code (i.e., population centroid), as done in previous studies (Druss and Rosenheck, 1997; McCarthy et al., 2007; Piette and Moos, 1996). We also determined whether patients had a service-connected disability (indicating some VA-recognized disability stemming from injuries or conditions that occurred or were exacerbated during military service) that could potentially facilitate access to VA services. To measure regional variation in ECT use, we categorized patient treatment location into one of four US regions (Northeast, Central, West, and South). We also determined in which of the 21 VA-defined service regions (Veterans Integrated Service Networks [VISNs]), the patient received ECT. VISNs encompass geographically contiguous regions (except those containing Hawaii, Alaska, and Puerto Rico) but cross state lines. Each VISN has a mental health service leader who is responsible for implementing VA policy regarding ECT use in their network.

2.3. Statistical analysis

We conducted bivariate analyses using Wilcoxon and chi-square tests for continuous and categorical variables, respectively. We fit multivariable logistic regression models with ECT use as the dependent variable and independent variables included patient demographic and clinical characteristics, an indicator for whether the patients' closest VA facility provided ECT, and US region. Statistical significance level was set at alpha = 0.05 for all analyses. Statistical analyses were conducted using SAS software version 9.2.

3. Results

3.1. Study population

187,811 VA patients with major depression were included in the study, of which 90% were male, 72% white, 15% black,

and 6% Hispanic, and the mean age was 54 years old. 307 (0.16%) of these patients received ECT during the 5 1/2 year study period.

3.2. Availability and regional variation of ECT

Out of 128 VA Medical Centers, 60 (47%) performed ECT. Depressed patients who received ECT were more likely to have the procedure available at their nearest VA facility than depressed patients who did not receive ECT (84% vs. 64%), and ECT recipients lived an average of 17 miles closer to an ECT facility than non-recipients (Table 1). Patients who received ECT were more likely than non-recipients to live in the Central region of US (28.0% vs. 19.7%) and less likely to live in the West (20.2% vs. 24.3%). There was also a statistically significant variation in rates of ECT use across the VA VISNs ($X^2 = 105.7$; df = 20; $p < 0.0001$), ranging from 1.5 to 36.0 ECT recipients per 10,000 depressed veterans.

3.3. Clinical and demographic predictors

In bivariate comparisons, patients who received ECT were more likely to be 65 and older (33.6%) compared to depressed patients who did not receive ECT (21.3%). Depressed veterans who received ECT were more often white (88.6% vs. 72.0%) and less often black (5.2% vs. 15.5%) than patients not treated with ECT. Patients who received ECT were more likely to have a comorbid personality disorder diagnosis (6.2% vs. 3.4%) but there were no statistically significant differences in comorbidity with PTSD, other anxiety disorders, substance use disorders, or having received a diagnosis of bipolar II disorder. Patients who received ECT were less likely to have a major medical comorbidity compared to those who did not receive ECT (21.2% vs. 31.6%).

Table 1
Characteristics of VA patients diagnosed with major depressive disorder and predictors of receipt of ECT (FY 1999–2004).

Variable	No ECT (N = 187,504)	Received ECT (N = 307)	AOR (95% CI) [a] of receiving ECT	
Patient's closest facility performs ECT	63.6%	83.7%	3.02	(2.22, 4.10)
Age				
18–40 years	13.2%	8.8%	1.00	Reference
40–49 years	21.9%	14.7%	1.08	(0.66, 1.74)
50–64 years	43.6%	43.0%	1.63	(1.06, 2.52)
65+ years	21.3%	33.6%	2.64	(1.67, 4.18)
Male sex	90.3%	91.2%	0.89	(0.59, 1.35)
Race				
White	72.0%	88.6%	1.00	Reference
Black	15.5%	5.2%	0.33	(0.20, 0.55)
Other	2.6%	1.6%	0.61	(0.25, 1.48)
Unknown	9.9%	4.6%	0.42	(0.24, 0.73)
Hispanic ethnicity	5.9%	3.9%	0.61	(0.34, 1.09)
Posttraumatic stress disorder	25.4%	25.4%	1.11	(0.84, 1.46)
Other anxiety disorder	19.3%	21.8%	1.08	(0.82, 1.42)
Personality disorder	3.4%	6.2%	2.20	(1.37, 3.54)
Bipolar II disorder	0.7%	0.7%	1.02	(0.25, 4.10)
Substance use disorder	20.6%	17.3%	0.97	(0.71, 1.33)
Service-connected disability	35.7%	31.3%	0.85	(0.66, 1.10)
Charlson comorbidity				
0	68.4%	78.8%	2.42	(1.65, 3.55)
1	15.2%	11.1%	1.22	(0.75, 1.99)
>1	16.5%	10.1%	1.00	Reference
US region				
Central	19.7%	28.0%	1.00	Reference
Northeast	20.5%	18.6%	0.75	(0.54, 1.06)
South	35.5%	33.2%	0.71	(0.53, 0.95)
West	24.3%	20.2%	0.59	(0.42, 0.82)

[a] Adjusted odds ratio and 95% confidence intervals from a multivariable logistic regression predicting receipt of ECT adjusted for all other variables simultaneously.

3.4. Multivariable analyses

Using a regression model that included all predictor variables simultaneously, depressed veterans were more likely to receive ECT if they were aged 50–64 (OR: 1.63; 95% CI: 1.06–2.52) or 65+ (OR: 2.64; 95% CI: 1.67–4.18) when compared to younger patients aged 18–39 (Table 1). When compared to white patients, black patients were considerably less likely to receive ECT (OR: 0.33; 95% CI: 0.20–0.55). Comorbid personality disorders (OR: 2.20; 95% CI: 1.37–3.54) were associated with an increased likelihood of receiving ECT, whereas other comorbid psychiatric conditions were not associated with ECT. Depressed veterans without a major medical comorbidity were also more likely than those with a medical comorbidity to receive ECT (OR: 2.42; 95% CI: 1.65–3.55). Patients whose closest VA facility provided ECT were also more likely to receive ECT (OR: 3.02; 95% CI: 2.22–4.10). Patients living in the Southern (OR: 0.71; 95% CI: 0.53–0.95) and Western (OR: 0.59; 95% CI: 0.42–0.82) regions of the US were less likely to receive ECT compared with those in the Central region.

4. Discussion

Within the VA health system, approximately 1 in 613 patients with major depression received ECT. It is difficult to contextualize this finding with prior work in the VA and general US population, which has relied on survey methods and assessed populations other than those with major depression (Hermann et al., 1995; Srinivasaraghavan and Weiner, 1997). However, as treatment algorithms for chronic depression recommend ECT after 3 or 4 failed psychotropic medication trials, as many as 1 in 3 depressed patients may be candidates for ECT after receiving sequenced antidepressant treatment (Rush et al., 2006; Texas Department of State Health Services, 2008; Trivedi and Kleiber, 2001). Given the high rates of hospitalization, suicide, and comorbidity among depressed VA patients, it is unlikely that this population has less clinical need for ECT than more broadly representative depressed populations (Blow et al., 2003; Valenstein et al., 2009; Zivin et al., 2007). Our findings therefore suggest under-utilization of ECT in this population.

Several patient-level characteristics not directly related to clinical indication were associated with the receipt of ECT, including local access to ECT services and patient race, age, and general medical condition. Depressed veterans whose closest VA facility offered ECT were approximately three times more likely to receive ECT than those whose closest facility did not offer ECT. Regional variation in ECT use was evident in analyses of both larger US geographical regions and the smaller VA administrative units or VISNs. Prior reports of regional differences in ECT use, such as the historically low use of ECT in California, have been attributed to the presence

of managed care organizations and stricter state regulations (Hermann et al., 1995; Kramer, 1997). As a federally funded institution, treatment practices within the VA may be less directly influenced by private health maintenance organizations (HMOs) or state regulations; however, these factors may contribute to differences between VISNs and US regions by affecting local practice patterns, training, or the availability of psychiatrists capable of performing ECT.

African–Americans are just as likely as whites to benefit from ECT, but African–Americans were much less likely to receive ECT, consistent with a prior report from a single academic mental health center (Breakey and Dunn, 2004; Williams et al., 2008). African–Americans are also significantly less likely than whites to receive guideline-concordant outpatient depression care even though African–Americans experience similar rates of depression and are as likely as whites to initiate mental health treatment (Cooper-Patrick et al., 1999; Rosenheck and Fontana, 1993; Wang et al., 2000; Young et al., 2000). Future research should explore whether provider bias or a lack of acceptance of ECT treatment specifically among African–Americans contributes to the disparities in ECT use.

Younger depressed veterans were less likely to receive ECT than older veterans, consistent with prior reports of ECT use in the US and with studies showing that patients with treatment resistant depression are older than other depressed patients (Crown et al., 2002; Kramer, 1997; Thompson and Blaine, 1987). Depressed veterans who received ECT were also more likely to have a comorbid personality disorder, but ECT use was not related to comorbid substance use disorders, anxiety disorders (including PTSD), or bipolar II disorder. While it is not surprising that patients with more complex psychopathology are more likely to receive ECT, limited evidence suggests that depressed patients with borderline personality disorder (but not other personality disorders) may actually be less responsive to ECT (Feske et al., 2004). Patients were also more likely to receive ECT if they had no major medical comorbidities, suggesting that treatment decisions regarding ECT may be unduly influenced by the presence of medical comorbidities given that ECT can usually be provided safely in these settings.

Our findings also have several implications for the VA and other health systems. Improving access to ECT may result in increased use as evidenced by the strong relationship between the geographic proximity to an ECT-providing facility and ECT receipt. However, disparities in ECT use among patient subgroups and regional variation may not be affected by simply improving access. Variation in health care utilization occurs more frequently among discretionary services than for guideline-based care; clearer practice guidelines, perhaps including specific treatment algorithms, may therefore be an important step towards reducing disparities (Sirovich et al., 2008). Ensuring that health care providers – psychiatrists in particular – are familiar with ECT and its indications, particularly in minority patients or individuals with medical comorbidities, may also improve the effective and equitable use of ECT.

Our study is limited by the unavailability of several likely important predictors of ECT use, such as measures of illness severity, antidepressant treatment resistance, and patient or provider attitudes. A strength of our study was the inclusion of a sizeable and diverse patient population from the largest coordinated health system in the US; we note, however, that the relative importance of specific predictors may be different in non-veteran populations. VA patients may have received ECT in non-VA facilities; however, we included databases that included information on non-VA ECT use and prior surveys show low rates of referrals to outside facilities for ECT (Srinivasaraghavan and Weiner, 1997). Finally, the VA has made initiatives in recent years to enhance mental health care and changes in ECT use resulting from these initiatives may not be reflected in the current analyses.

5. Conclusions

Treatment with ECT is relatively uncommon within the VA health system but is more likely among patients with local access to the service; with fewer than half of the VA Medical Centers providing ECT, the VA should consider further increasing access to this highly effective treatment. Other health systems should consider parallel efforts to monitor and improve access to ECT. Racial disparities also exist and subsequent research should address the contribution of patient and provider attitudes towards the use of ECT. More specific practice guidelines, implementation of treatment algorithms, or other forms of provider decision support regarding use of ECT should also be explored to ensure more consistent use.

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Conflict of interest

All authors declare that they have no conflicts of interest.

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