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BRIEF COMMUNICATION

Electro-convulsive therapy practices in the community

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ABSTRACT

Background. Controlled studies have demonstrated that variations in electro-convulsive therapy (ECT) technique impacts on efficacy and cognitive side effects. However, there is little information on the extent of variation in how ECT is practiced in community settings in the United States.

Methods. A survey of practice patterns was conducted at ECT facilities in the greater New York City metropolitan area.

Results. The 59 facilities varied considerably in many aspects of ECT practice, often clearly departing from the standards in the field. The more intensive the form of ECT used at facilities, the less likely was cognitive status assessed following the treatment course.

Conclusion. There is marked variability in the nature of ECT practices in community settings. The extent to which this variability impacts on the benefits and risks of ECT needs to be examined.

INTRODUCTION

Approximately 100000 patients receive electro-convulsive therapy (ECT) annually in the US. (Hermann *et al*. 1995), and perhaps 1000000 patients worldwide. In the US, there is marked regional variation in ECT utilization, with many metropolitan and rural areas having no access to ECT. In a recent survey, annual ECT use varied from 0·4 to 81·2 patients per 10000 population in the metropolitan areas that provided it (Hermann *et al*. 1995). Part of this variation in utilization may be associated with the stringency of state regulation regarding ECT. However, in a survey of ECT practices in the North East Thames and East Anglian regions in England, Pippard (1992) noted a 12-fold difference in ECT usage among districts.

It is also evident that ECT is utilized in the US far more in private and academic medical facilities than in public sector hospitals (Thompson *et al*. 1994; Hermann *et al*. 1995). Age, income and race are powerful predictors of ECT use in the US, which is higher among older, more affluent, and white patients (Thompson *et al*. 1994; Olfson *et al*. 1998). The greater utilization in older patients has been attributed to the high representation in this group of medication intolerance, and the safety profile of ECT in the context of co-morbid medical conditions (Sackeim, 1998). The greater utilization of ECT in non-minority populations and those of higher income is unexplained (Olfson *et al*. 1998).

While there is literature on the factors impinging on the rate of use of ECT, there is little information on how ECT is practiced in community settings, particularly in the US. Good quality of care implies provision of care that is technically competent. Treatment guidelines and recommendations are increasingly used to define technical competence, and are based on scientific evidence and expert opinion. Progress has been made towards defining practice

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standards for the administration of ECT (American Psychiatric Association, 1990, 2000; Royal College of Psychiatrists, 1995).

Due to a concern about the possibility of widespread use of sub-optimal technique, the National Institutes of Health Consensus Conference Panel on ECT called for a national survey of ECT practice in the US (National Institutes of Health, 1985). This was never performed. Such audits and surveys have been conducted in England (Pippard and Ellam, 1981; Pippard, 1992), Ireland (Latey & Fahy, 1985) and Australia (Halliday & Johnson, 1995) with disconcerting results. The first audit in England resulted in an editorial in the *Lancet* stating that ECT was a valuable treatment that could be abandoned due to misuse (Editorial, 1981). The more recent audit in England continued to document practices that are difficult to justify (Pippard, 1992). For example, Pippard (1992) reported that in virtually all of the 40 hospitals visited electrical dosage was maintained at a fixed intensity, despite the large variability in seizure threshold (Sackeim *et al*. 1991). Furthermore, there was a four-fold difference among the hospitals in the actual fixed dosage used, which could not be rationally explained. There has never been a comprehensive survey of ECT practices in the US. We conducted a survey of diverse aspects of practice at ECT facilities in the greater New York City metropolitan area.

METHOD

A questionnaire survey documented ECT practices in the tri-state New York City metropolitan region. The Director of Psychiatric Services was contacted at all facilities with in-patient mental health beds in: the five boroughs of New York City; Westchester and Nassau Counties in New York State; Bergen, Essex, Hudson, Middlesex, Passaic, Somerset and Union Counties in New Jersey; and Fairfield County in Connecticut. Eighty-six of the 156 (55%) facilities with mental health beds had an ECT service. A questionnaire was mailed to the identified Director of the ECT Service at each facility in early 1997 requesting detailed information about the practices at the facility in the prior year. With follow-up communications, completed questionnaires were received from 59 (69%) of the facilities offering ECT.

RESULTS

Table 1 summarizes findings for key variables in the survey. Unless otherwise indicated, values refer to the percentage of patients receiving ECT. Mean values are the average per facility, while the weighted means account for the number of patients treated at the individual facilities and reflect the average across the tri-state region.

Facilities differed markedly in how many patients annually received ECT (range = 1–288), with 21 facilities reporting a census of $\leqslant 15$ ECT patients per year, and nine facilities reporting treating $\geqslant 100$ patients per year. These nine facilities treated 58% of the patients receiving ECT in the region. The majority of patients were > 60 years of age, although some facilities only treated younger or older adults. No facility reported treating children under the age of 13, and adolescents from 13 to 18 were extremely rare. The great bulk of ECT was performed exclusively on an in-patient basis. The high volume ECT facilities were more likely to utilize out-patient ECT. The great majority of patients receiving ECT were treated for major depression ($> 85\%$), with mania and schizophrenia the next most common conditions. The most frequent indication for ECT was medication resistance, but some facilities stated that none of the patients receiving ECT did so due to medication resistance, while others stated that this was true of 100% of patients.

The number of physicians who performed ECT at these facilities varied from 1 to 20, with a mode of 3. The forms of ECT administered varied considerably. Approximately 11% of patients (weighted mean) received sine wave stimulation (range = 0–90%). Approximately 75% of patients were treated with bilateral ECT; 34 facilities treated $\geqslant 90\%$ of patients with bilateral ECT, whereas only 17 facilities treated at least 30% of patients with unilateral ECT. Nine facilities reported some use of multiple-monitored ECT, in which more than one seizure is evoked in a session. Dosing strategies were especially heterogeneous. The principal strategy was fixed dosage at 11 facilities, formula-based dosing at 17 facilities and 30 facilities reported that they used the empirical titration method (American Psychiatric Association, 2000). The average number of treatments

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Table 1. *ECT practices at 59 facilities in the New York City region*

Variable	Mean (S.D.)	Weighted mean
Facility characteristics (% of facilities)		
Facility type		
General medical	88·14	
Psychiatric	11·86	
Facility ownership		
Non-profit	81·36	
Public	15·25	
Proprietary	3·39	
University affiliation	44·07	
ECT patient characteristics (% of patients)		
Patients treated per year, *N*	50·91 (65·03)	
Age		
18–60 years (%)	45·07 (25·55)	42·53
Over 60 years (%)	54·56 (25·87)	54·35
In-patient/out-patient		
In-patient (%)	85·28 (21·67)	74·86
Out-patient (%)	14·44 (21·80)	22·57
Principal diagnosis		
Depression (%)	86·92 (19·21)	89·07
Indication for ECT		
Medication resistance (%)	67·80 (23·44)	58·77
Previous optimal ECT response (%)	29·18 (23·47)	27·06
Psychiatric urgency (%)	19·80 (26·01)	19·42
Patient preference (%)	9·16 (16·12)	10·71
Pre-ECT cognitive impairment (%)	17·48 (18·43)	12·65
ECT practices (% of patients)		
Number of ECT practitioners, *N*	3·67 (3·53)	5·41
Waveform		
Sine wave (%)	1·90 (12·06)	10·92
Electrode placement		
Unilateral ECT (%)	20·88 (26·28)	23·49
Bilateral ECT (%)	79·21 (26·06)	75·54
Multiple seizures in a session (%)	5·59 (21·68)	1·96
Dosing strategy		
Fixed dose (%)	17·72 (35·66)	26·55
Formula-based (%)	29·92 (43·52)	15·35
Titration (%)	54·81 (45·54)	61·41
Average no. of treatments per patient (no.)	7·98 (1·89)	7·28
Psychotropics		
All discontinued (%)	44·77 (32·90)	28·02
Patient outcomes		
Benefit clinically (%)	84·36 (11·22)	86·66
Post-ECT treatment		
Pharmacotherapy (%)	82·87 (24·55)	73·58
Continuation ECT (%)	17·96 (23·88)	15·90
Post-ECT cognitive impairment (%)	46·24 (29·81)	52·00
Relapse rate (%)	23·04 (16·35)	20·24

Means are the average across the 59 facilities. Weighted mean values account for the differences among facilities in number of patients treated and reflect the averages for all patients across the facilities.

patients received was estimated to vary between 5 and 14·5 (median = 8).

All facilities reported using EKG, pulse oximetry, and vital sign monitoring during ECT. However, EEG monitoring was not used in 14% of the facilities, and monitoring of the motor seizure with the cuff technique (to block the distribution of the muscle relaxant) was not conducted in 53% of the facilities. Indeed, five facilities neither monitored EEG nor used the cuff technique.

Methohexital was the principal anesthetic agent in 59% of the facilities, sodium pentothal in 36% and propofol in 31% (a number of facilities reported primary use of more than one agent), 17% of facilities did not routinely use an anticholinergic agent. Only 28% of patients in the region were withdrawn from psychotropics

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during ECT, with large volume ECT facilities the least likely to withdraw psychotropics. Nineteen facilities reported that the majority or all patients were routinely withdrawn from psychotropics, while 24 facilities reported that a minority or no patients were withdrawn.

There was considerable variability in whether patients were routinely evaluated with respect to cognitive status, before, during, or after ECT. In general, facilities that routinely evaluated cognitive status did so at all three time periods (before, during and after ECT). Five facilities reported that cognitive evaluation was never or hardly ever conducted, seven facilities reported that it was sometimes done and 47 facilities reported that it was usually or always done.

The facilities reported a remarkable percentage of patients (85%) benefited clinically from ECT. The vast majority of patients received continuation pharmacotherapy after ECT and only 15·9% of patients in the region received continuation ECT. On average, the respondents estimated that 46·2% of patients had cognitive impairment following ECT. Notably, some facilities stated that this occurred in 0% or 100% of patients. Recent literature has suggested that relapse rates in the year following ECT may be 60% and higher (Sackeim *et al.* 1993; American Psychiatric Association, 2000). The facilities estimated that the relapse rate is only 20·2% (weighted mean), a striking contrast.

These data demonstrate considerable variation in the conduct of ECT in community settings, with the practice variations often departing from expert recommendations (American Psychiatric Association, 1990, 2000). To quantify one dimension of this variability, we computed a simple index, providing a theoretical estimate of the extent to which the ECT practices reported by each facility would be expected to accentuate cognitive side effects. The formula involved multiplying the percentage of patients treated at each facility with a specific practice variant by a weighting factor for that practice technique. The weighting factors chosen were: waveform (sine wave 2; brief pulse 0), electrode placement (bilateral 3; right unilateral 0), dosing strategy (fixed 2; formula 1; titration 0), and seizures per session (multiple monitored ECT 3; one seizure per session 0). The weighting factors were based on the relative effects sizes in the research literature for these practices for the impact of these practices on cognitive side effects, with higher weights associated with more severe short- and long-term cognitive side effects (Cronholm & Ottoson, 1963; Maletzky, 1986; Weiner *et al.* 1986; Sackeim *et al.* 1993, 2000; McElhiney *et al.* 1995).

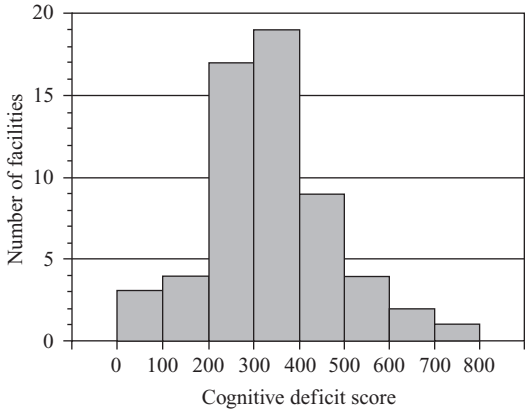


FIG. 1. Distribution of scores on cognitive deficit index by number of facilities.

Fig. 1 presents a frequency histogram for these derived 'cognitive deficit' scores. The scores were normally distributed (Shapiro–Wilk test, $P = 0{\cdot}28$), with a range of 0 to 740, a mean of 325·53 (S.D. = 136·27, weighted mean = 344·33, coefficient of variation = 42%). We computed Spearman rho values for the relations between this derived index and the number of ECT patients treated at the facility annually, the percentage of patients aged > 60 years, and the estimate by the facility of the rate of post-ECT cognitive impairment. None of these correlations approached significance. In contrast, there was a significant inverse correlation ($r = -0{\cdot}39$, $N = 59$, $P = 0{\cdot}002$) between this cognitive index and the frequency with which the facilities reported assessing cognitive status following ECT. In sum, practice variations which the research literature and expert opinion suggest are associated with more pronounced cognitive side effects were not related to the facilities' extent of ECT use, use in the elderly, or clinician perceived cognitive effects, but were associated with less frequent assessment of cognitive status.

DISCUSSION

The 59 facilities surveyed varied considerably in many aspects of ECT practice: stimulus wave-

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form, electrode placement, stimulus dosing, primary anaesthetic agent, physiological monitoring, frequency of cognitive assessment, and so on. In a number of instances, the practices reported by the facilities clearly departed from the 'standards' in the field (American Psychiatric Association, 1990; Royal College of Psychiatrists, 1995). It should be appreciated that, as yet, there are no data indicating that this variability in community practice has clinically significant impact on the long-term benefits or risks of ECT. This is an issue that we are in the process of investigating. Nonetheless, the marked departures from the field's standard of care and the wide variability in how ECT is conducted undoubtedly raise public health concerns.

To concretize the extent of variability in practice patterns, we derived a theoretical index of the extent to which the practice at a particular facility would accentuate cognitive side effects. We found that the more intensive the form of ECT at a facility, the less likely was that facility to assess cognitive status following the treatment course. This association may be a reflection of the belief that all the cognitive effects of ECT are short-lived, justifying the use of the highest intensity form of treatment without ongoing cognitive evaluation. The demonstrations of persistent amnestic effects of ECT challenge this perspective (Weiner *et al*. 1986; McElhiney *et al*. 1995; Sackeim *et al*. 2000).

The survey of ECT practices had limitations. Only 69% of the facilities that offered ECT in the region returned the survey, possibly introducing sampling bias. However, to our knowledge, all high volume ($\geqslant$ 100 patients per year) facilities completed the survey. The survey only included facilities in the New York City metropolitan region, and the degree of regional and international diversity in practice patterns is unknown.

Finally, this study did not audit actual practices, but relied on the report of the Directors of ECT Services. Concerned about the correspondence between the reports and actual patterns of practice, we also reviewed the medical charts of 30 consecutive patients who received ECT at each of six of the highest volume ECT facilities who participated in the survey (data not shown). When discrepancies were found between the survey results and the review of medical records they were consistently in the direction of the self-report survey overestimating the percentage of patients who received unilateral ECT, who underwent empirical titration (as opposed to fixed dose stimulation), and who received ECT due to medication resistance. The results of this chart review suggested that if there were a bias in the findings of the survey, it was in the direction of the reports by ECT service directors being more in line with guideline recommendations than the actual practices of the facilities. Consequently, it seems fair to conclude that there is considerable variation in the nature of ECT practices in this region, and many patients are treated in a fashion that markedly departs from published recommendations.

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