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Research paper

Health Related Quality of Life after ECT for depression: A study exploring the role of different electrode-placements and pulse-widths

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ABSTRACT

Introduction: Prior research has shown large improvements in HRQOL after a course of ECT for depression. However, the effect of different types of ECT on HRQOL outcomes has not been explored. This is important due to the considerable range of ECT treatment modalities that currently exist in clinical practice.

Methods: HRQOL data from 355 depressed patients in three Australian clinical hospitals, who received ECT given with a range of treatment modalities (combinations of pulse-width and electrode-placement), were analysed. HRQOL was measured at baseline and after ECT, using the Quality of Life Enjoyment and Satisfaction Questionnaire-Short Form (Q-LES-Q-SF). The association between type of ECT and HRQOL after ECT was examined by regression analysis, controlling for variables that may affect HRQOL outcomes.

Results: There was a significant increase in HRQOL scores after ECT ($p < 0.0001$; $t = -23.4$). The magnitude of change was large (54% increase, Cohen's $d = 1.43$). Multiple regression analysis yielded a significant model ($P < 0.001$, $R^2 = 0.18$). Baseline HRQOL score ($t = 4.83$; $p < 0.0001$), age ($t = 2.75$, $p < 0.01$) and type of ECT received [Right Unilateral brief vs Bitemporal Ultrabrief ($t = -2.99$; $p < 0.01$) and Right Unilateral brief vs Bifrontal Ultrabrief ($t = -2.70$; $p < 0.01$)] were significant predictors of HRQOL after the ECT course.

Limitations: Data was collected naturalistically from clinical services, thus ECT modality was not randomly assigned. Site could have confounded results.

Conclusions: An acute course of ECT for depression produced statistically and clinically significant improvements in HRQOL. ECT treatment modality can substantially impact HRQOL outcomes, with the possibility of bilateral ultrabrief forms of ECT being less beneficial.

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1. Introduction

Electroconvulsive Therapy (ECT) is a highly effective treatment for severe or resistant forms of depression (Coffey et al., 2001). ECT treatment technique has advanced considerably in the last 50 years. As a result, ECT can be administered now with a wide range of treatment modalities, including variations in electrode placement and pulse-width. Emerging literature has shown that differences in ECT efficacy and cognitive outcomes are contingent, in part, on ECT treatment modality. For instance, Right Unilateral (RUL) Ultrabrief (UB) ECT (the combination of right unilateral electrode-placement with a pulse-width of ≤ 0.3 ms) has been shown to be comparably efficacious to brief RUL ECT (Loo et al., 2015; Sackeim et al., 2008; Tor et al., 2015) or brief bitemporal (BT) ECT (Sackeim et al., 2008), but with lesser cognitive side-effects.

Several studies have demonstrated that ECT improves Health Related Quality of Life (HRQOL) in psychiatric samples (Chanpattana and Kramer, 2003; Garg et al., 2011; McCall et al., 2006). The assessment of HRQOL is now considered important for psychiatric

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patients, as it can evaluate a broader dimension of health restoration than only the assessment of symptomatology (Rapaport et al., 2005). HRQOL is a multi-dimensional self-reported concept that captures how patients perceive the impact of a health condition and its treatment on their daily living (Stevanovic, 2011). HRQOL is profoundly impaired in patients with depression (McCall et al., 2011; Wells et al., 1989), and especially, in those referred for ECT (McCall et al., 1999). A course of ECT has been shown to significantly improve HRQOL in treatment resistant depression (McCall et al., 2006; McCall et al., 2011) not only after the ECT course, but persistently over time if remission is maintained (McCall et al., 2011). In addition, improvements in HRQOL and functioning have been found to be greater in ECT recipients compared with hospitalised depressed patients only treated with medications (Fisher et al., 2004; McCall et al., 2001).

Increases in HRQOL after ECT for depression have been mostly associated with remission status (McCall et al., 2006; McCall et al., 2011). It is also plausible, however, that different ECT treatment approaches (combination of electrode-placement and pulse-width) have differential effects on HRQOL outcomes because of their different impact on efficacy and cognitive side effects (Kellner et al., 2010; Loo et al., 2015; Sackeim et al., 1993; Sackeim et al., 2007; Sackeim et al., 2008). However, the effect of the ECT modality on HRQOL outcomes has not been thoroughly examined. The majority of studies exploring different types of ECT have focused on objective assessments of mood and cognition pre and post ECT, with no report on HRQOL measures (Kellner et al., 2010; Loo et al., 2015; Sackeim et al., 2008). On the other hand, most studies assessing HRQOL only included one form of ECT or did not analyse the effect of different ECT modalities if these were used (Antunes et al., 2009; Fisher et al., 2004; McCall et al., 2004; McCall et al., 2001; McCall et al., 2013). Only two prior studies have examined the relationship between different ECT types and HRQOL outcomes, with controversial results. In a large naturalistic study, no relationship was observed between HRQOL outcomes and the type of ECT received (BT vs RUL, or brief pulse vs sine wave) (McCall et al., 2006), although the interaction between electrode-placement and stimulus waveform was not analysed. Yet, a more recent study with random allocation of electrode-placement and only use of brief pulse ECT, found that HRQOL outcomes immediately after ECT were superior with brief pulse RUL ECT vs brief pulse BT ECT, but no relationship with ECT type was observed at 24 weeks (McCall et al., 2011).

No study to date has systematically analysed the effect of different types of ECT on HRQOL outcomes, including novel forms of ECT such as UB pulse-width ECT or bifrontal (BF) electrode-placement. Thus, the aims of this study were two-fold: 1) to assess the effect of an acute course of ECT for depression on patient self-rated HRQOL outcomes in a large clinical sample and 2) to assess the impact of different types of ECT treatment on HRQOL outcomes, while controlling for other factors that may also affect HRQOL.

2. Methods

2.1. Study design and sample

This was a prospective naturalistic study conducted at three hospital sites in Australia (2011–2014), including two private and one public hospital. Recruitment was consecutive. The study was approved by the Human Research Ethics Advisory of the University of New South Wales (HREA 2014723) and by each individual hospital. Inclusion criteria were: ≥ 18 years of age, DSM IV Major Depressive episode (Unipolar or Bipolar) and having received an acute course of ECT. Exclusion criteria were: other axis I diagnosis, including substance use disorders (except nicotine) (n=29), having received ECT courses with less than 5 ECT treatments (n=13) and being in maintenance ECT (n=74). If patients received more than 1 ECT course, only the first course was analysed. Patients who did not complete HRQOL questionnaires before and/or after ECT (n=238), or those with incomplete data on electrode-placement or pulse-width used (n=43) were excluded, leaving a sample of 355 patients. See Table 1.

Table 1
Demographic and clinical data of the sample.

	N=355
Demographic variables	
Age (yr), mean (SD)	48.6 (15.7)
Gender (male), n	115 (32.4%)
Diagnosis[a]	
MDD, n	281 (79.4%)
Bipolar I, n	69 (19.5%)
Bipolar II, n	4 (1.1%)
ECT variables	
ECT modality	
Brief Pulse ECT, n	117 (33.0%)
RUL brief, n	57 (16.1%)
BT brief, n	7 (2.0%)
BF brief, n	53 (14.9%)
Ultrabrief Pulse ECT, n	238 (67%)
RUL Ultrabrief, n	19 (5.4%)
BT Ultrabrief, n	24 (6.8%)
BF Ultrabrief, n	195 (54.9%)
Anaesthetic used[b]	
Propofol, n	89 (25.5%)
Propofol + Ketamine, n	3 (0.9%)
Thiopentone, n	256 (73.6%)
Number of ECT treatments, mean (SD)	9.3 (2.8)

Yr (Years); MDD (Major Depressive Disorder); RUL (Right Unilateral); BT (Bitemporal); BF (Bifrontal); HRQOL (Health Related-Quality of Life).

[a] Based on N=354.
[b] Based on N=348.

2.2. ECT procedures

ECT was administered using a MECTA Spectrum 5000Q® (Mecta Corp., Lake Oswego, OR) or a Thymatron System IV® device (Somatics Inc, Lake Bluff, III), three times per week. Anaesthetic induction was with thiopentone (2.5–5 mg/kg) or propofol (1–2 mg/kg) and succinylcholine as muscle relaxant (0.5–1 mg/kg). Electrode placement (RUL, BT or BF) and pulse-width (brief [0.5–1 ms] or UB [0.25–0.3 ms]) applied were decided on clinical grounds by the treating psychiatrist. See Table 2 for a breakdown of ECT modality by site (Table 2). Initial dosing was established through seizure threshold (ST) titration. Suprathreshold dosing was as follows: 6XST for RUL-UB ECT, 1–1.5XST for BT and BF UB ECT, 1–1.5XST for brief BT and BF ECT, 2.5–5XST for brief RUL ECT. Medications during the ECT course were as prescribed by patient's psychiatrist. The total number of ECT sessions received was determined by the treating psychiatrist. See Table 1.

Table 2
Distribution of ECT modality by site. RUL (Right Unilateral); BT (Bitemporal); BF (Bifrontal); UB (Ultrabrief).

	RUL Brief	RUL UB	BT Brief	BT UB	BF Brief	BF UB
Site 1, n=52	46 (13%)	3 (0.8%)	1 (0.3%)	0	2 (0.6%)	0
Site 2, n=36	10 (2.8%)	4 (1.1%)	1 (0.3%)	0	21 (5.9%)	0
Site 3, n=267	1 (0.3%)	12 (3.4%)	5 (1.4%)	24 (6.8%)	30 (8.5%)	195 (54.9%)

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