The Role of Maintenance ECT in Schizophrenia

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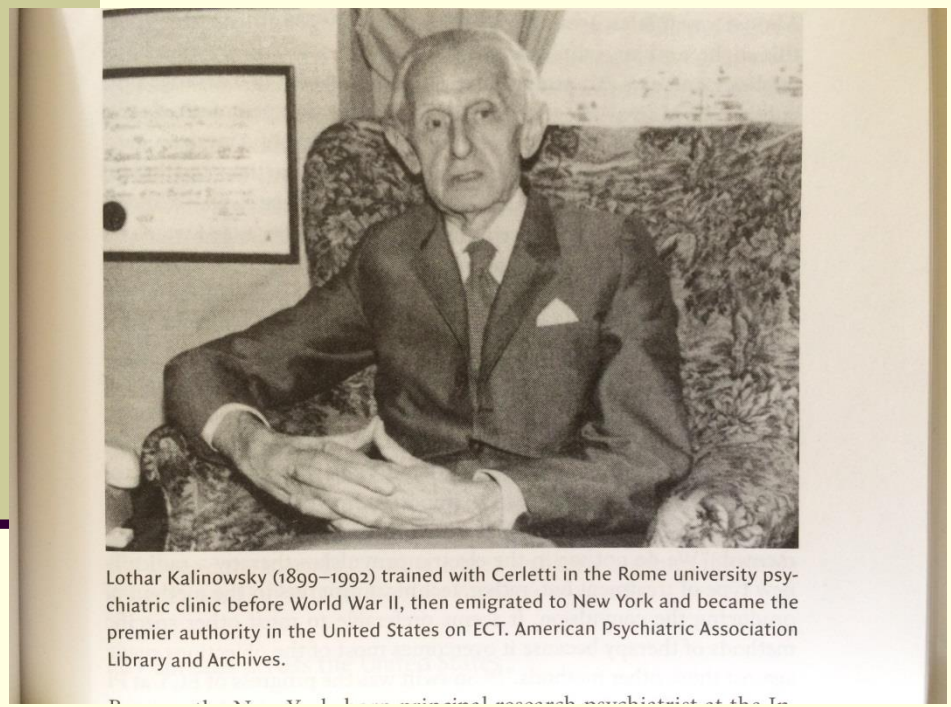
NACT meeting
25-27 May 2022; Tallinn, Estonia

First publication on mECT from Dr. Lothar Kalinowsky (1899-1992)

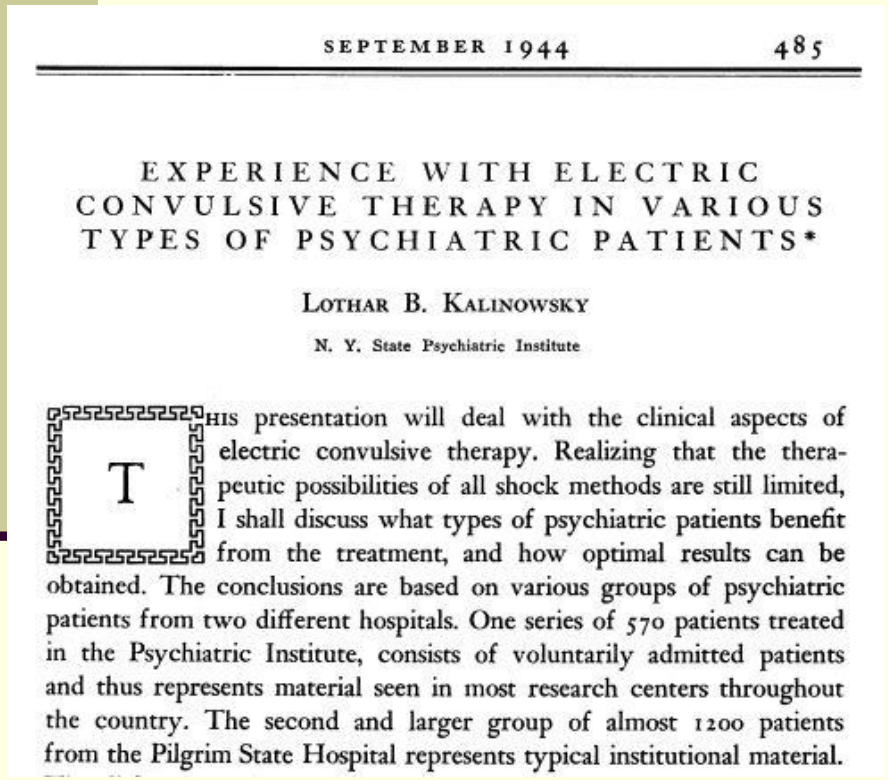


Lothar Kalinowsky (1899–1992) trained with Cerletti in the Rome university psychiatric clinic before World War II, then emigrated to New York and became the premier authority in the United States on ECT. American Psychiatric Association Library and Archives.

- Born in Berlin
- Completed his studies in medicine: 1922 Berlin
- Emigrated to Rome: 1933, worked with Cerletti
- Emigrated to London: 1938
- Arrived to the US: 1940

First publications on maintenance ECT from Kalinowsky

- **Arch Neurol Psychiatry** 1943;50:652-60.



ELECTRIC CONVULSIVE THERAPY, WITH EMPHASIS ON IMPORTANCE OF ADEQUATE TREATMENT

LOTHAR B. KALINOWSKY, M.D.
NEW YORK

The value of shock treatment of mental disease is still disputed. At present electric convulsive therapy is probably the most widely used method. With some disorders indiscriminate use is favored because of its simplicity, whereas with others inadequate application is responsible for failures. This paper represents an endeavor to give indications for the application of this therapy, on the basis of experience with more than 1,500 patients treated by the same physician in two parallel series: the one, at the New York State Psychiatric Institute and Hospital, and the other, representing institutional material, at the Pilgrim State Hospital.

Discrepancies in reports on the value of shock treatment demand a clear definition of the material from which conclusions are drawn. Statistical work on diagnostically doubtful and borderline cases is valueless at the present experimental stage. There are, however, clearcut cases of the various major psychoses in which disagreement as to diagnosis will be minimal. This "nuclear group," representing the classic textbook descriptions of the principal disorders, is found among patients committed to institutions for mental disease, rather than in the clinical material of research centers. Statistical evaluation is directed mainly toward results for such institutional patients as those listed in tables 1 and 2, not only

One special application of electric convulsive therapy in schizophrenia should be mentioned because of its practical importance. The change in the behavior of patients after as few as three or four treatments make electric convulsive therapy especially suitable for short, purely symptomatic treatment in chronic cases where no final remissions can be obtained. A maintenance treatment of one or two weekly, bi-weekly or even monthly treatments will keep the patient on a higher level. This appears to be one of the main tasks for ambulatory electric convulsive therapy. Many patients could be kept outside the institutions if psychiatrists would limit themselves in such cases to occasional symptomatic applications.

EXPERIENCE WITH ELECTRIC CONVULSIVE THERAPY IN VARIOUS TYPES OF PSYCHIATRIC PATIENTS*

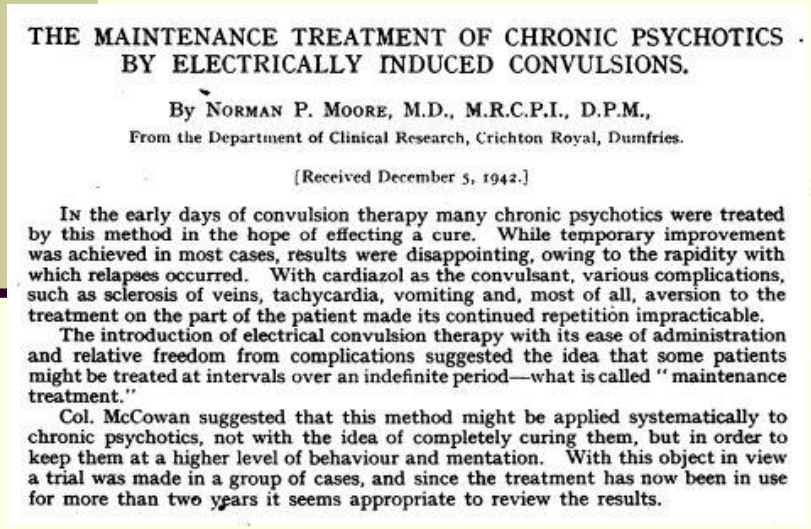
LOTHAR B. KALINOWSKY
N. Y. State Psychiatric Institute

THIS presentation will deal with the clinical aspects of electric convulsive therapy. Realizing that the therapeutic possibilities of all shock methods are still limited, I shall discuss what types of psychiatric patients benefit from the treatment, and how optimal results can be obtained. The conclusions are based on various groups of psychiatric patients from two different hospitals. One series of 570 patients treated in the Psychiatric Institute, consists of voluntarily admitted patients and thus represents material seen in most research centers throughout the country. The second and larger group of almost 1200 patients from the Pilgrim State Hospital represents typical institutional material.

Bulletin of the New York Academy of Medicine
01 Sep 1944, 20(9):485-494

Another early pioneer of mECT

- Moore MP: The maintenance treatment of chronic psychotics by electrically induced convulsions. J Ment Sci 1943;89:257-69.



THE MAINTENANCE TREATMENT OF CHRONIC PSYCHOTICS BY ELECTRICALLY INDUCED CONVULSIONS.

By NORMAN P. MOORE, M.D., M.R.C.P.I., D.P.M.,

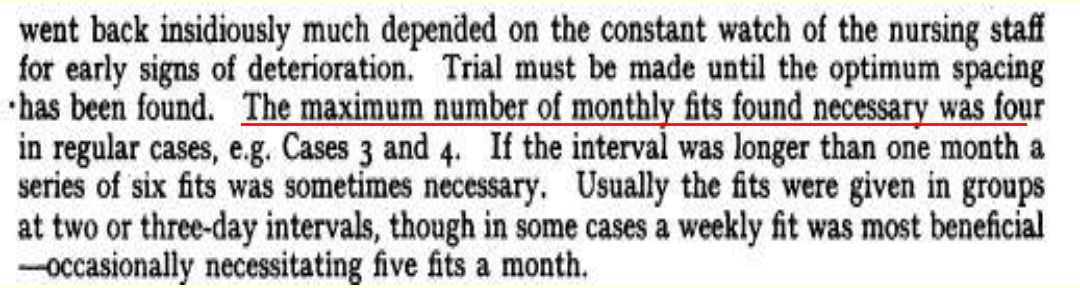
From the Department of Clinical Research, Crichton Royal, Dumfries.

[Received December 5, 1942.]

IN the early days of convulsion therapy many chronic psychotics were treated by this method in the hope of effecting a cure. While temporary improvement was achieved in most cases, results were disappointing, owing to the rapidity with which relapses occurred. With cardiazol as the convulsant, various complications, such as sclerosis of veins, tachycardia, vomiting and, most of all, aversion to the treatment on the part of the patient made its continued repetition impracticable.

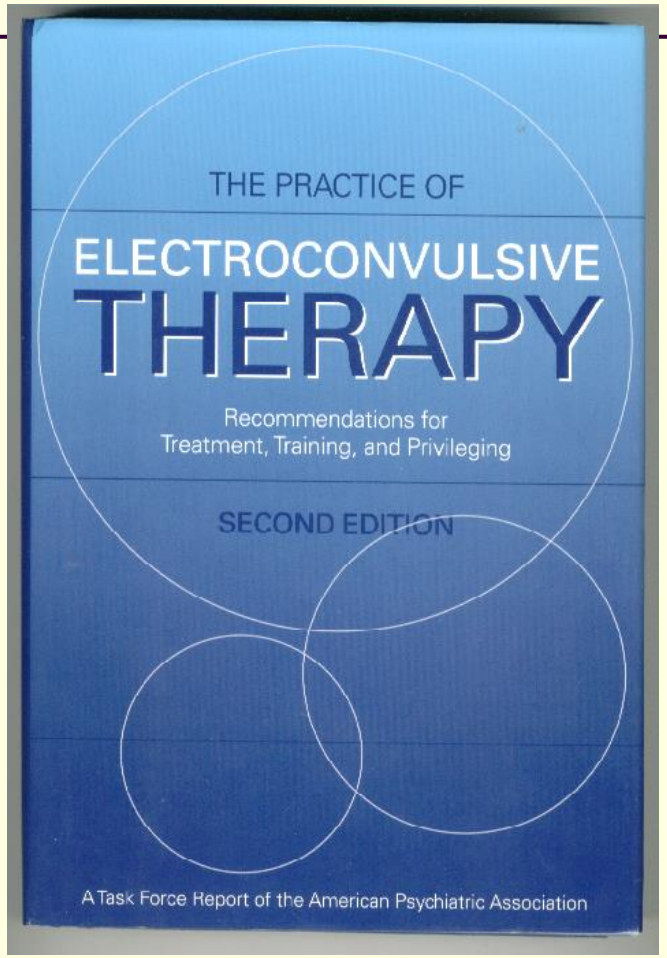
The introduction of electrical convulsion therapy with its ease of administration and relative freedom from complications suggested the idea that some patients might be treated at intervals over an indefinite period—what is called "maintenance treatment."

Col. McCowan suggested that this method might be applied systematically to chronic psychotics, not with the idea of completely curing them, but in order to keep them at a higher level of behaviour and mentation. With this object in view a trial was made in a group of cases, and since the treatment has now been in use for more than two years it seems appropriate to review the results.

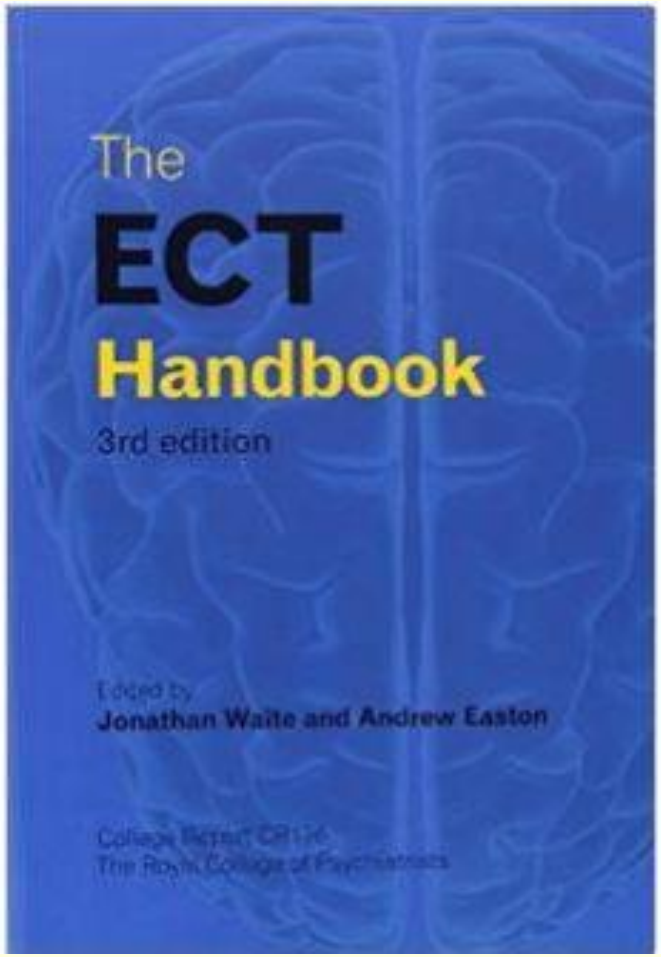


went back insidiously much depended on the constant watch of the nursing staff for early signs of deterioration. Trial must be made until the optimum spacing has been found. The maximum number of monthly fits found necessary was four in regular cases, e.g. Cases 3 and 4. If the interval was longer than one month a series of six fits was sometimes necessary. Usually the fits were given in groups at two or three-day intervals, though in some cases a weekly fit was most beneficial —occasionally necessitating five fits a month.

Role of ECT in the acute treatment of schizophrenia

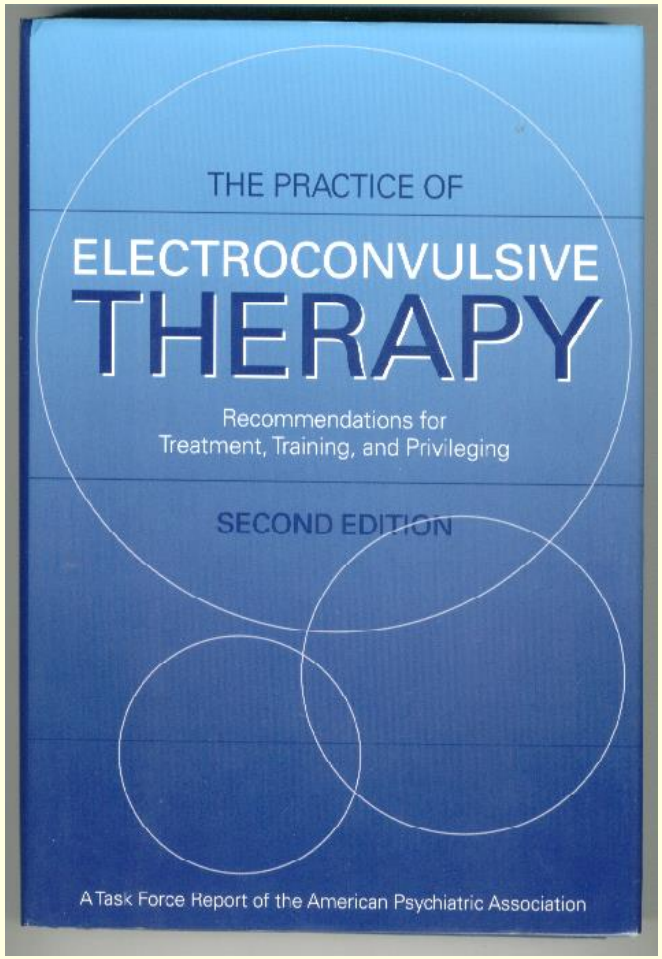


APA-2001



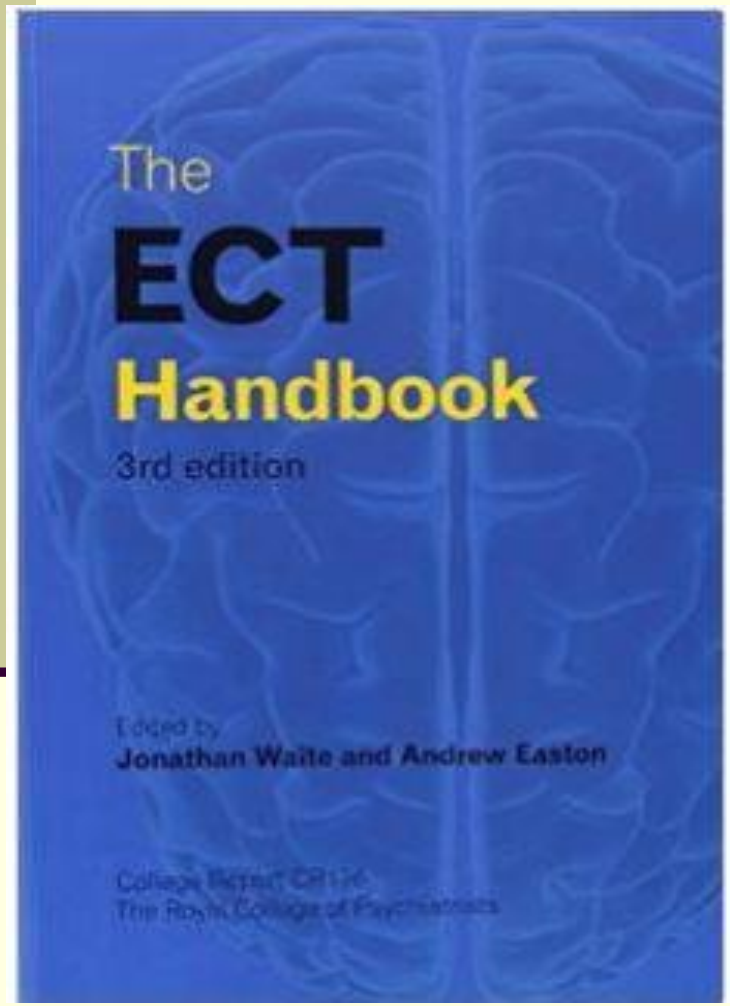
RCP-2013

APA Recommendations



- Primary use of ECT
  - catatonia
- Secondary use of ECT
  - ECT is most often used in patients who have not responded to other treatments. During the course of pharmacotherapy, reasons to consider using ECT include lack of clinical response, intolerance of side effects, deterioration in psychiatric condition, appearance of suicidality, or inanition.

RCP Recommendations



- **Schizophrenia**: The treatment of choice for acute schizophrenia is antipsychotic drug treatment. ECT may be considered as an option for TRS schizophrenia, where treatment with clozapine has already proven ineffective or intolerable (ultra resistant schizophrenia).

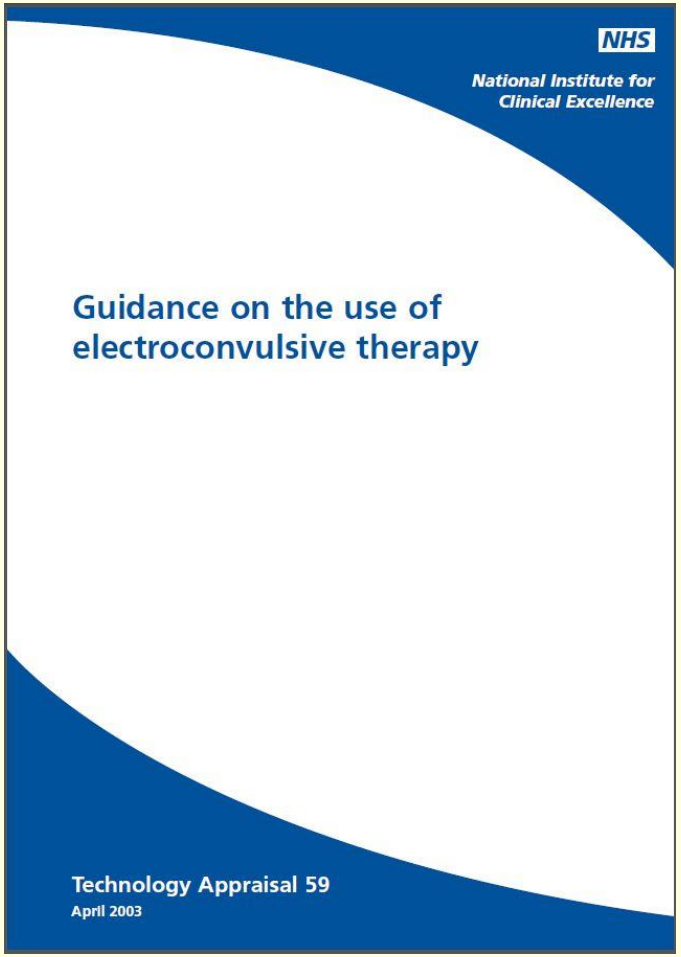
Indications of ECT use in schizophrenia-NICE

4.3.6 The Committee considered that, on the evidence put before it, the short-term effectiveness of ECT in individuals with severe depressive illness has been demonstrated. There is less robust RCT evidence to suggest that it is effective in the acute treatment of catatonia and mania. However, the Committee considered that the data appraised, taken in conjunction with the strength of clinical opinion and the experiences of users, provided a sufficient basis on which to recommend the use of ECT in restricted circumstances when the alternative treatment options have proven ineffective. The evidence for the effectiveness of ECT in schizophrenia in general was not conclusive and therefore ECT is not recommended in this population. Further research is required to establish clearly the benefits in subgroups of individuals with schizophrenia, for example those with severe symptoms of depressive illness or catatonia.

1 Guidance

1.1 It is recommended that electroconvulsive therapy (ECT) is used only to achieve rapid and short-term improvement of severe symptoms after an adequate trial of other treatment options has proven ineffective and/or when the condition is considered to be potentially life-threatening, in individuals with:

- severe depressive illness
- catatonia
- a prolonged or severe manic episode.



Electroconvulsive therapy for schizophrenia (Review)

Tharyan P, Adams CE

THE COCHRANE COLLABORATION®

This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in *The Cochrane Library* 2007, Issue 1

http://www.thecochranelibrary.com

ECT is equally or less effective than antipsychotic treatment

Publishers Since 1807

Analysis 02.01. Comparison 02 ECT with or without ANTIPSYCHOTIC DRUGS versus ANTIPSYCHOTIC DRUGS with or without SHAM ECT, Outcome 01 Global Impression: 1. Not Improved - at end of course of ECT

Review: Electroconvulsive therapy for schizophrenia

Comparison: 02 ECT with or without ANTIPSYCHOTIC DRUGS versus ANTIPSYCHOTIC DRUGS with or without SHAM ECT

Outcome: 01 Global Impression: 1. Not Improved - at end of course of ECT

Study	Treatment n/N	Control n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
01 ECT alone vs antipsychotic drugs alone					
Baker 1958	5/18	4/15		28.4	1.04 [0.34, 3.20]
May 1968	14/51	5/51		32.5	2.80 [1.09, 7.20]
Naidoo 1956	15/20	6/20		39.1	2.50 [1.22, 5.11]
Subtotal (95% CI)	89	86		100.0	2.18 [1.31, 3.63]
Total events: 34 (Treatment), 15 (Control)					
Test for heterogeneity chi-square=2.07 df=2 p=0.35 I² =3.6%					
Test for overall effect z=3.01 p=0.003					
02 ECT and placebo vs antipsychotics and sham ECT					
Bagadia 1981	15/20	12/18		78.7	1.13 [0.74, 1.70]
Girish 2003	4/8	3/6		21.3	1.00 [0.35, 2.88]
Subtotal (95% CI)	28	24		100.0	1.10 [0.74, 1.63]
Total events: 19 (Treatment), 15 (Control)					
Test for heterogeneity chi-square=0.04 df=1 p=0.84 I² =0.0%					
Test for overall effect z=0.47 p=0.6					

0.1 0.2 0.5 1 2 5 10

favours treatment favours control

(Continued . . .)

(. . . Continued)

Study	Treatment n/N	Control n/N	Relative Risk (Fixed) 95% CI	Weight (%)	Relative Risk (Fixed) 95% CI
03 ECT and antipsychotic drugs vs antipsychotic drugs alone					
Janakiramiah 1982	8/30	8/30		35.1	1.00 [0.43, 2.31]
Naidoo 1956	3/20	6/20		26.3	0.50 [0.14, 1.73]
Small 1982	15/25	9/26		38.7	1.73 [0.93, 3.21]
Subtotal (95% CI)	75	76		100.0	1.15 [0.73, 1.82]
Total events: 26 (Treatment), 23 (Control)					
Test for heterogeneity chi-square=3.53 df=2 p=0.17 I² =43.4%					
Test for overall effect z=0.61 p=0.5					

0.1 0.2 0.5 1 2 5 10

favours treatment favours control

Why is the topic important at all?

Psychiatry and Clinical Neurosciences 2015; 69: 489–496 doi:10.1111/pcn.12283

Regular Article

Use of electroconvulsive therapy for Asian patients with schizophrenia (2001–2009): Trends and correlates

Yu-Tao Xiang, MD, PhD,[1,2]* Gabor S. Ungvari, MD, PhD,[7,8] Christoph U. Correll, MD,[9] Helen F. K. Chiu, FRCPsych,[2] Kelly Y. C. Lai, FRCPsych,[2] Chuan-Yue Wang, MD, PhD,[4] Tian-Mei Si, MD, PhD,[5] Edwin H. M. Lee, MRCPsy,[3] Yan-Ling He, MD,[6] Shu-Yu Yang, PhD,[10] Mian-Yoon Chong, MD, PhD,[11] Ee-Heok Kua, MD,[12] Senta Fujii, MD,[15] Kang Sim, MD,[13] Michael K. H. Yong, MD,[13] Jitendra K. Trivedi, MD,[17†] Eun-Kee Chung, MD,[18] Pichet Udomratn, MD,[19] Kok-Yoon Chee, MD,[20] Norman Sartorius, MD,[21] Chay-Hoon Tan, MD[14] and Naotaka Shinfuku, MD[16]

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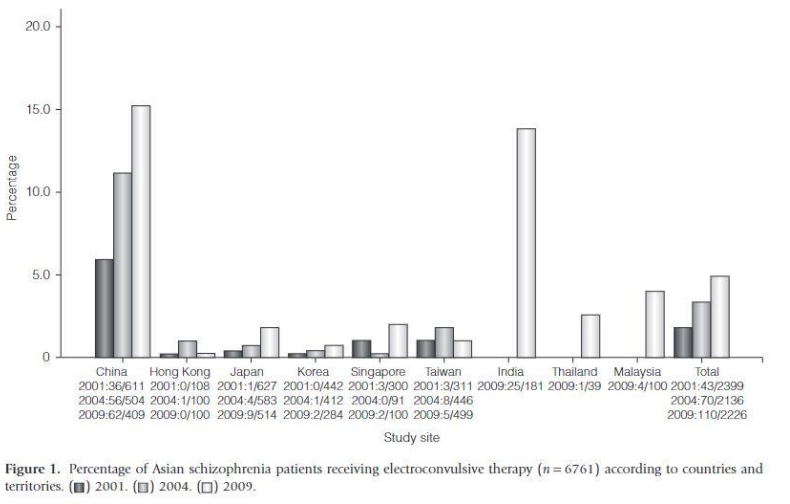
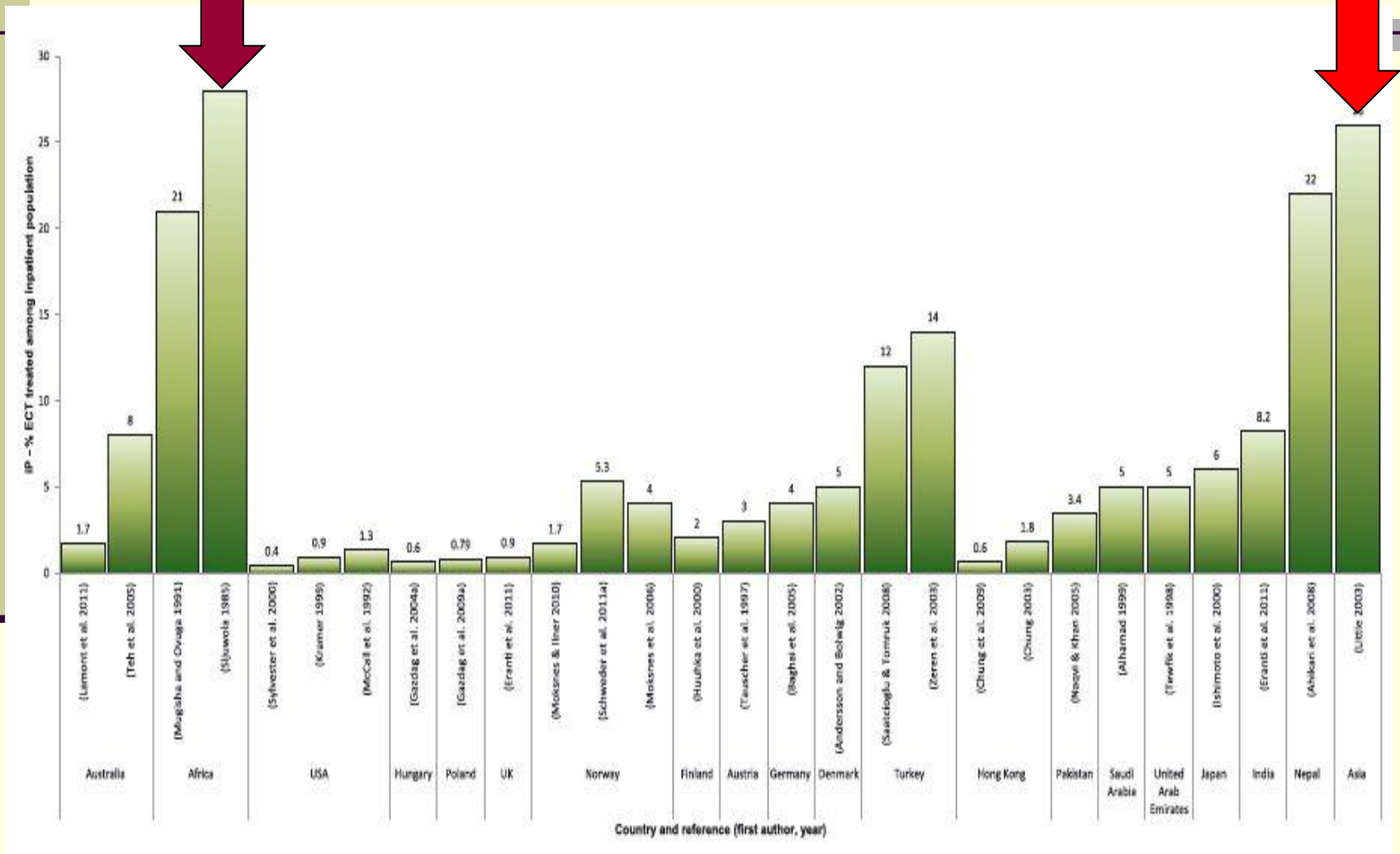


Figure 1. Percentage of Asian schizophrenia patients receiving electroconvulsive therapy ($n = 6761$) according to countries and territories. (■) 2001. (▨) 2004. (□) 2009.

Rates of ECT treated inpatients



ECT use in the treatment of schizophrenia (Brain and Behavior, 2012)

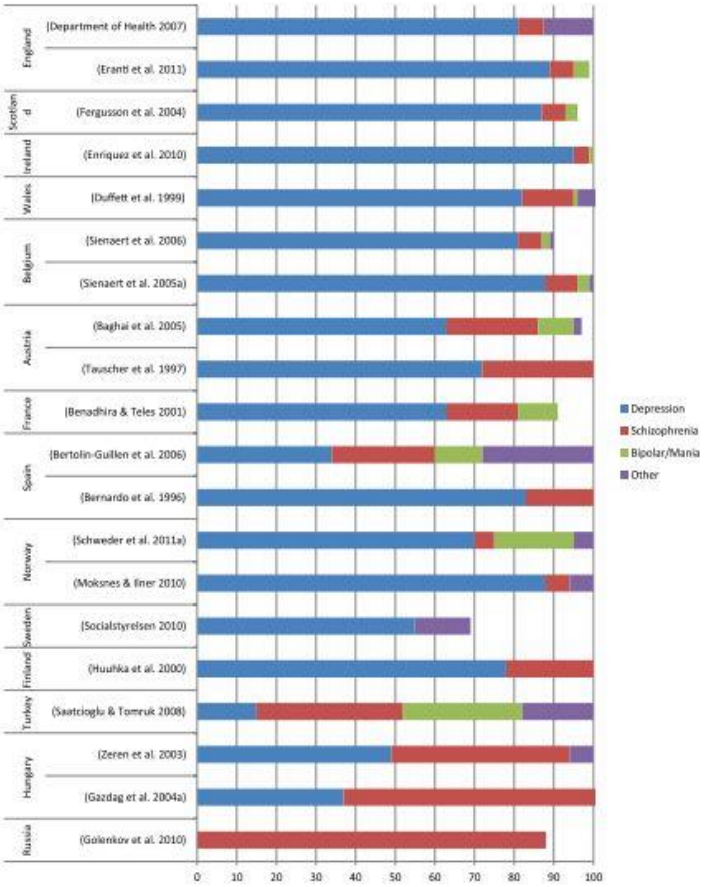


Figure 5. Diagnoses and ECT in Europe.

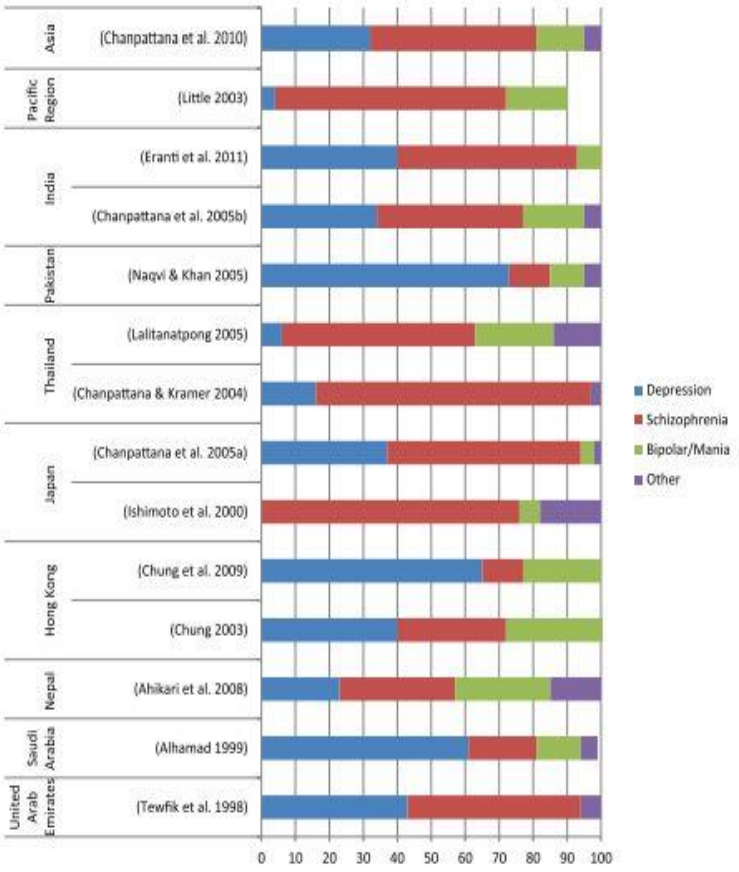
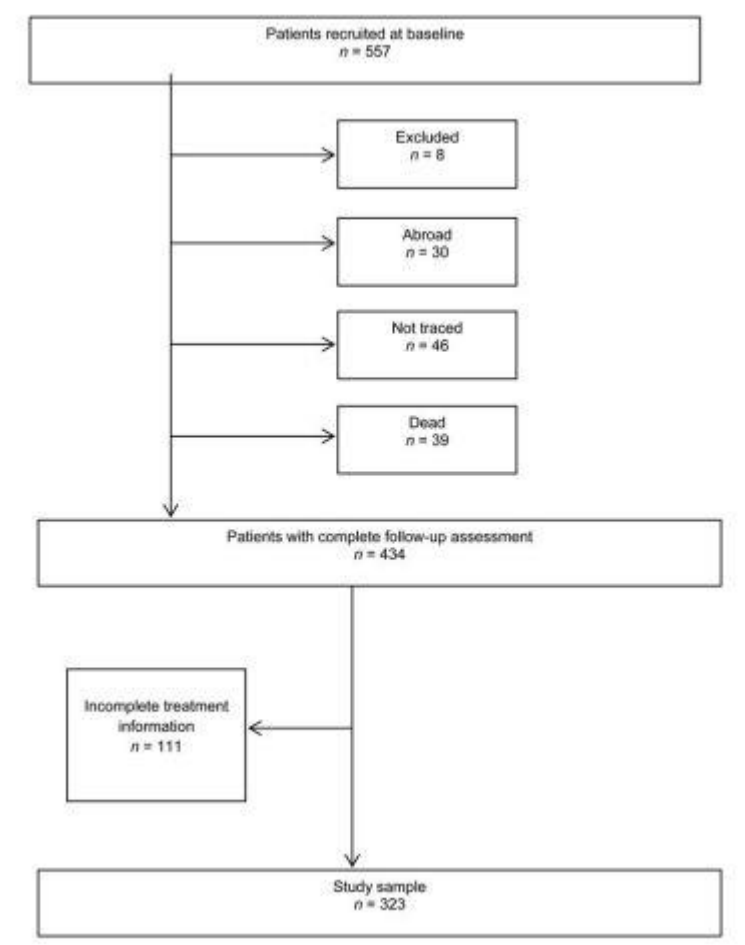


Figure 6. Diagnoses and ECT in Asia.

Diagnostic indications of ECT treated patients in Central-Eastern-Europe

	Main diagnostic indication
Slovakia(2008-10)	affective disorders 64.1%
Estonia(2010)	schizophrenia: 48%
Lithuania(2010)	schizophrenia: 86%
Hungary(2014)	schizophrenia: 38%
Bulgaria(2010)	depression
Croatia(2012-13)	schizophrenia: 63%
Poland(2005)	depression
Serbia(2012)	depression 67%
Latvia(2010)	catatonia
Ukraine(2011)	affective disorders 71%

Prevalence of TRS in schizophrenia



Psychological Medicine (2017), **47**, 1981–1989. © Cambridge University Press 2017
doi:10.1017/S0033291717000435

ORIGINAL ARTICLE

Antipsychotic treatment resistance in first-episode psychosis: prevalence, subtypes and predictors

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[10] *Health Service and Population Research Department, Centre for Epidemiology and Public Health, Institute of Psychiatry, King's College London, London, UK*

Background. We examined longitudinally the course and predictors of treatment resistance in a large cohort of first-episode psychosis (FEP) patients from initiation of antipsychotic treatment. We hypothesized that antipsychotic treatment resistance is: (*a*) present at illness onset; and (*b*) differentially associated with clinical and demographic factors.

Method. The study sample comprised 323 FEP patients who were studied at first contact and at 10-year follow-up. We collated clinical information on severity of symptoms, antipsychotic medication and treatment adherence during the follow-up period to determine the presence, course and predictors of treatment resistance.

Results. From the 23% of the patients, who were treatment resistant, 84% were treatment resistant from illness onset. Multivariable regression analysis revealed that diagnosis of schizophrenia, negative symptoms, younger age at onset, and longer duration of untreated psychosis predicted treatment resistance from illness onset.

Conclusions. The striking majority of treatment-resistant patients do not respond to first-line antipsychotic treatment even at time of FEP. Clinicians must be alert to this subgroup of patients and consider clozapine treatment as early as possible during the first presentation of psychosis.

Received 9 December 2016; Revised 26 January 2017; Accepted 27 January 2017; First published online 11 April 2017

Key words: Schizophrenia, First-Episode- Psychosis, Treatment-Response, Clozapine, Treatment-Resistant.

ECT for TRS schizophrenia-response to the NICE report (Tailand, India)

REVIEW

ECT for Treatment-Resistant Schizophrenia: A Response from the Far East to the UK. NICE Report

Worrawat Chanpattana, MD, and Chittaranjan Andrade, MD†*

Background: There is controversy about the proper place of electroconvulsive therapy (ECT) in the management of the schizophrenic patient, and the important issues related to theory and practice remain to be resolved, especially in the context of medication-resistant schizophrenia.

Method: We briefly summarize existing research in the field. We next use a narrative method to describe in a single article the large body of research from Thailand that, during the past decade, has systematically studied issues related to the use of ECT in medication-resistant schizophrenia. We integrate the findings of the Thai efforts with the results of other research and consider the theoretical and practical importance of the reviewed work.

Results: The ECT treatment data validate a BRPS cutoff of 25 as a definition of recovery in patients with treatment-refractory schizophrenia, and a cutoff of 37 as a definition of subsequent relapse or suitability for entry into a treatment protocol. A 3-week post-ECT stabilization period identifies patients who maintain improvement and who can be legitimately considered to have sustained response to ECT. Clinical characteristics of such responders and symptoms responsive to ECT are described. Higher stimulus dose hastens response to ECT but does not improve responsiveness. Continuation ECT (C-ECT) combined with maintenance-neuroleptic medication is associated with better treatment outcome than either treatment alone. The combined treatment also improves quality of life and functioning in the long-term.

Conclusions: These findings convey several useful thoughts for research into and the practice of ECT for schizophrenia.

Key Words: electroconvulsive therapy (ECT), schizophrenia, treatment resistance, Thailand, continuation ECT (C-ECT), maintenance ECT (M-ECT), treatment frequency, stimulus dosing, efficacy, prediction of response, symptoms responsive to ECT, quality of life and social functioning

(*J ECT* 2006;22:4–12)

Schizophrenia is a severe and debilitating psychiatric disorder. In the United States alone, it is estimated to cost over $40 billion each year[1]; beyond economic terms, the social and emotional prices that are paid by the patients and their families are inestimable. Schizophrenia is clearly a major public health concern for every country.

Antipsychotic drugs are the mainstay of treatment for patients with schizophrenia; however, there is a marked heterogeneity of response, and a substantial minority of patients, between one fifth and one third, derives little benefit from conventional antipsychotic drug therapy.[2–6] More favorable responses are obtained from the atypical antipsychotic drugs[7–9]; among these, clozapine is the best established for patients with treatment-resistant schizophrenia (TRS), with a response rate of about 50%.[10–12] Unfortunately, many TRS patients are unable to take clozapine for various reasons, and among those who do benefit, response is often only partial.[11,13,14] Therefore, the search for other and potentially better treatment options for TRS is a matter of importance.

Electroconvulsive therapy (ECT) has been used to treat schizophrenia ever since the procedure was introduced in 1938.[15] The introduction of effective pharmacological treatments for schizophrenia and mood disorders led to a drop in the use of ECT during the 1960s and 1970s. When the limitations in the efficacy of antipsychotic drugs and the adverse effects of these agents were recognized, interest in ECT as a treatment for TRS returned.[16] Nevertheless, although the efficacy of ECT in major depression is well supported,[17–19] the indications for its use in schizophrenia and its place in the treatment hierarchy for patients with this disorder are less clear because of the dearth of quality research in the field.

The American Psychiatric Association (APA) and the Royal College of Psychiatrists (RCP) have issued official guidelines that are cautious or even discouraging on the role of ECT in schizophrenia.[17–19] These positions are summarized in Tables 1 and 2. In a Cochrane review, Tharyan and Adams[20] suggested that ECT, combined with antipsychotic medication, may be considered as an option for patients with schizophrenia, particularly those in whom rapid global improvement and reduction of symptoms is desired, and those who show limited response to medication alone; these reviewers emphasized that there is no clear evidence to refute the use of ECT in schizophrenia. Other reviews also suggest that there is a lack of consensus about the role of ECT in schizophrenia.[21–24]

The most critical position was adopted by the National Institute for Clinical Excellence (NICE), UK.[25] In its guidance, NICE observed that the evidence for the effectiveness of ECT in schizophrenia in general is not conclusive, and therefore ECT cannot be recommended for this population. Another critical observation was that ECT is not more effective, and

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Supported by Grant BRG 3980009 from the Thailand Research Fund, Office of the Prime Minister, and Grant SWU 1112544 from Srinakharinwirot University, Bangkok, Thailand.

Reprints: Worrawat Chanpattana, Department of Psychiatry, Bangkok Hospital, 2 Soi Soonvijai 7, New Petchburi Road, Bangkok 10320, Thailand (e-mail: worch@loxinfo.co.th).

TABLE 5. ECT for Schizophrenia: General Conclusions From Clinical Research Published During 1980 and Afterwards[22–24]

1. In patients who are acutely ill and in those who have not been preselected for poor response to neuroleptic drugs, there is no short-term or intermediate-term advantage for ECT over drugs.
2. In patients who show poor response to neuroleptic drugs, ECT (particularly in combination with antipsychotic drugs) is probably superior to neuroleptic drugs alone.
3. Therapeutic advantages with ECT over drugs usually do not persist beyond the initial month.
4. M-ECT may help maintain therapeutic gains in patients who benefit from ECT but who deteriorate with subsequent antipsychotic drug therapy. Gains with M-ECT may persist for as long as a year after the ECT course.

Cochrane Library review on ECT for TRS, 2019

Cochrane Library

Cochrane Database of Systematic Reviews

Electroconvulsive therapy for treatment-resistant schizophrenia (Review)

Sinclair DJM, Zhao S, Qi F, Nyakyoma K, Kwong JSW, Adams CE

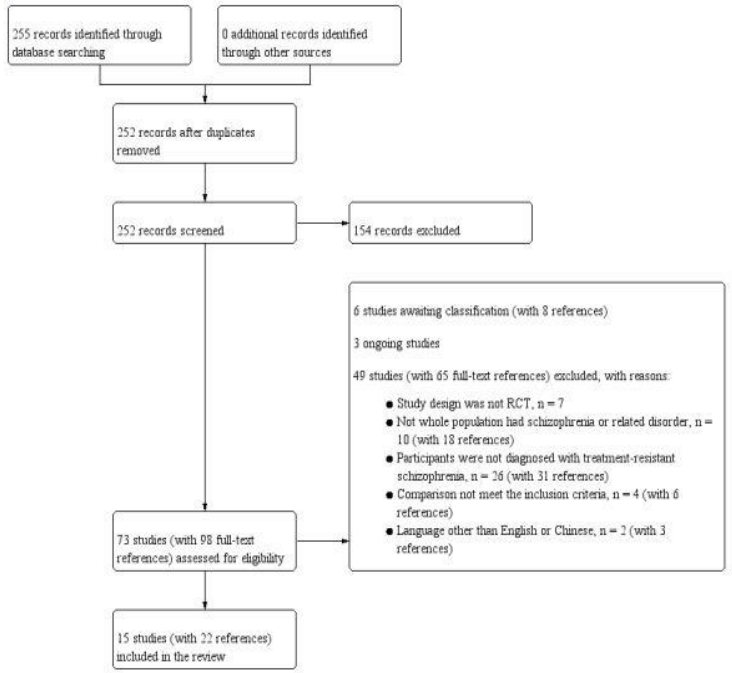
Sinclair DJM, Zhao S, Qi F, Nyakyoma K, Kwong JSW, Adams CE.
Electroconvulsive therapy for treatment-resistant schizophrenia.
Cochrane Database of Systematic Reviews 2019, Issue 3. Art. No.: CD011847.
DOI: 10.1002/14651858.CD011847.pub2.

5. Frequency of treatment

ECT administered fortnightly or monthly versus any other treatment

Electroconvulsive therapy is normally administered at least weekly. In some situations, it is given less often and may be called 'maintenance' ECT. We defined 'maintenance' ECT as ECT that is delivered either fortnightly or monthly for at least six sessions. We planned to compare maintenance ECT with any other pharmacological or non-pharmacological treatment strategies. We did not identify any studies with this comparison for inclusion in the review.

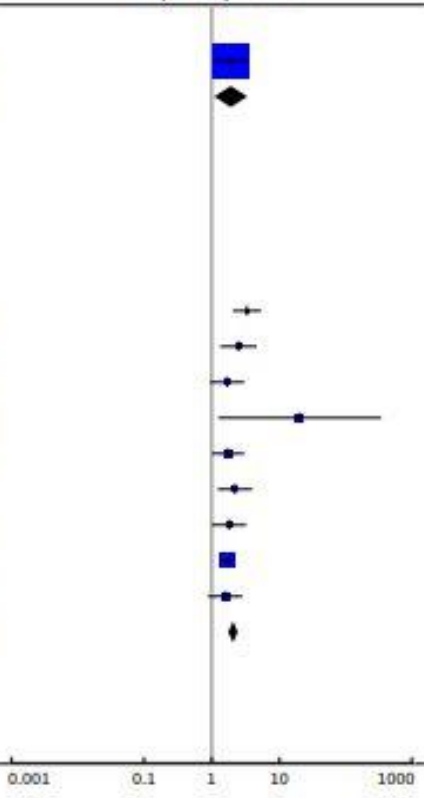
Figure 1. Study flow diagram.



Cochrane Library review on ECT for TRS, 2019 – results, clinical response

Analysis 3.1. Comparison 3 ECT plus standard care versus standard care, Outcome 1 Response to treatment - clinically important response (as defined by each study).

Study or subgroup	ECT + antipsychotics n/N	Antipsychotics n/N	Risk Ratio M-H, Fixed, 95% CI	Weight	Risk Ratio M-H, Fixed, 95% CI
3.1.1 Short term					
Wang 2013	21/36	11/36		100%	1.91[1.09,3.36]
Subtotal (95% CI)	**36**	**36**		**100%**	**1.91[1.09,3.36]**
Total events: 21 (ECT + antipsychotics), 11 (Antipsychotics)					
Heterogeneity: Not applicable					
Test for overall effect: Z=2.24(P=0.02)					
3.1.2 Medium term					
Cai 2008	43/50	13/50		10.28%	3.31[2.05,5.35]
Chen 2012	23/36	9/35		7.22%	2.48[1.34,4.59]
Jiang 2009	18/34	11/35		8.57%	1.68[0.94,3.02]
Petrides 2015	10/20	0/19		0.4%	20[1.25,319.22]
Wang 2008	21/38	12/38		9.49%	1.75[1.01,3.03]
Wang 2011	22/37	10/37		7.91%	2.2[1.22,3.98]
Yang 2005	18/30	10/30		7.91%	1.8[1,3.23]
Zhang 2010	86/123	49/123		38.74%	1.76[1.37,2.24]
Zhang 2012	19/42	12/42		9.49%	1.58[0.88,2.84]
Subtotal (95% CI)	**410**	**409**		**100%**	**2.06[1.75,2.42]**
Total events: 260 (ECT + antipsychotics), 126 (Antipsychotics)					
Heterogeneity: $Tau^2=0$; $Chi^2=10.11$, df=8(P=0.26); $I^2=20.87\%$					
Test for overall effect: Z=8.73(P<0.0001)					



Maintenance ECT-NICE

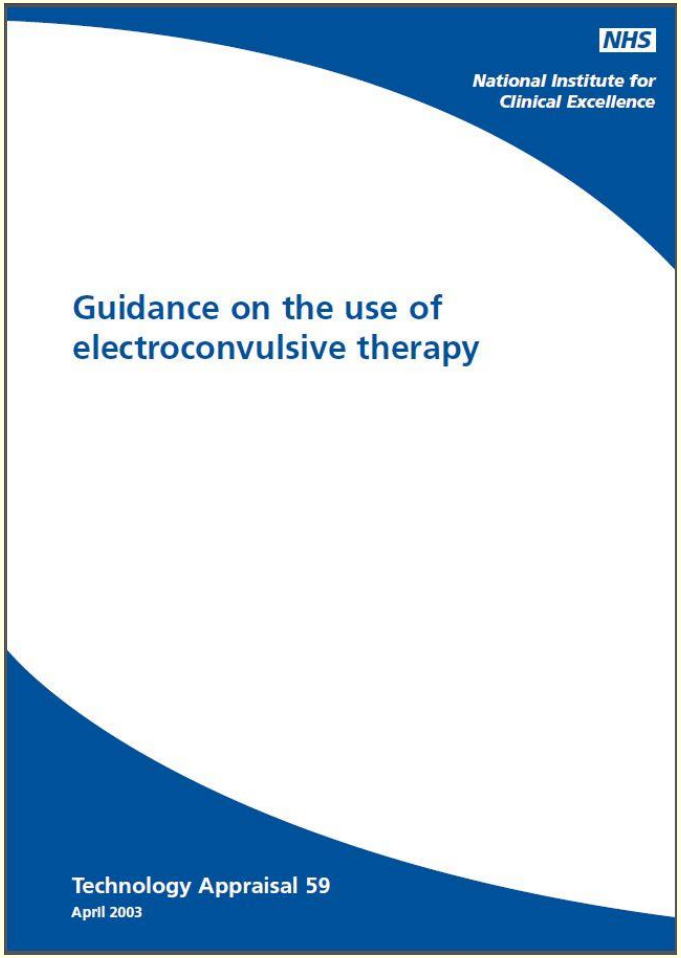
1.6 Clinical status should be assessed following each ECT session and treatment should be stopped when a response has been achieved, or sooner if there is evidence of adverse effects. Cognitive function should be monitored on an ongoing basis, and at a minimum at the end of each course of treatment.

1.7 It is recommended that a repeat course of ECT should be considered under the circumstances indicated in 1.1 only for individuals who have severe depressive illness, catatonia or mania and who have previously responded well to ECT. In patients who are experiencing an acute episode but have not previously responded, a repeat trial of ECT should be undertaken only after all other options have been considered and following discussion of the risks and benefits with the individual and/or where appropriate their carer/advocate.

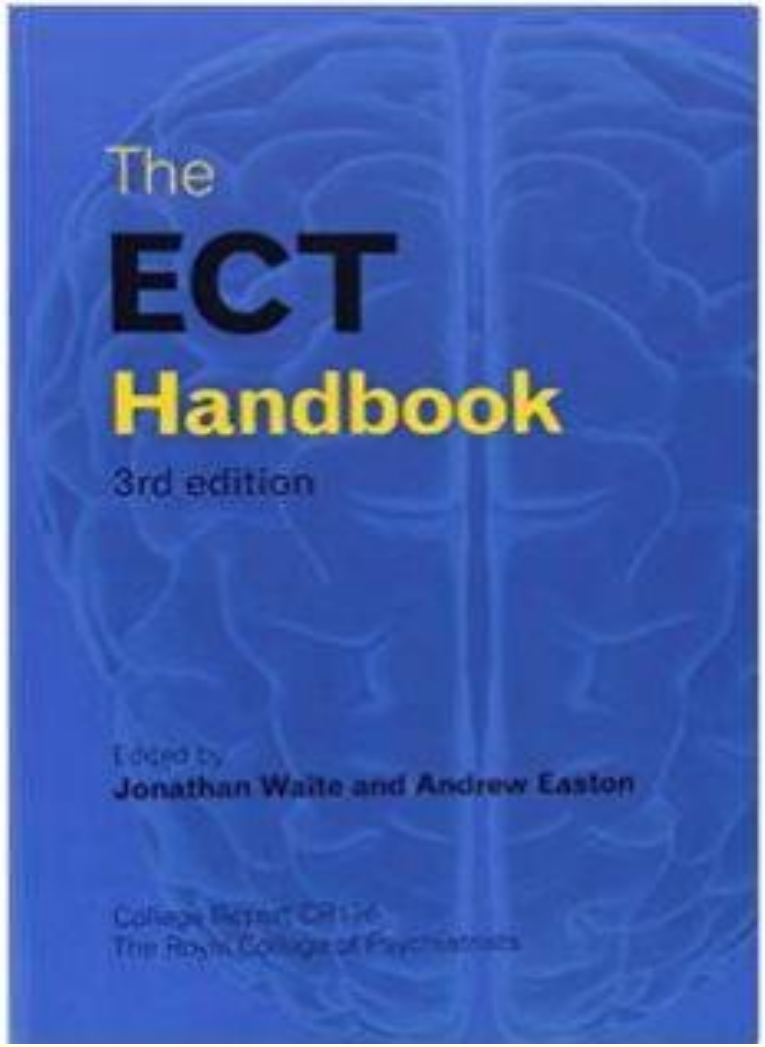
1.8 As the longer-term benefits and risks of ECT have not been clearly established, it is not recommended as a maintenance therapy in depressive illness.

1.9 The current state of the evidence does not allow the general use of ECT in the management of schizophrenia to be recommended.

1.10 National information leaflets should be developed through consultation with appropriate professional and user organisations to enable individuals and their carers/advocates to make an informed decision regarding the appropriateness of ECT for their circumstances. The leaflets should be evidence based, include information about the risks of ECT and availability of alternative treatments, and be produced in formats and languages that make them accessible to a wide range of service users.



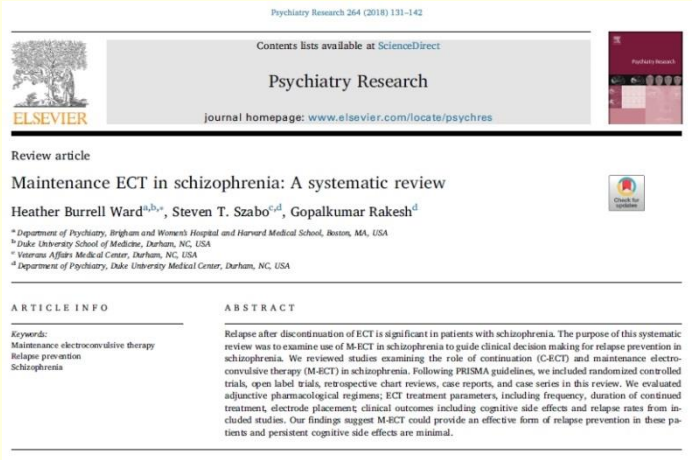
RCP Recommendations-mECT in schizophrenia



- **Schizophrenia**: There is presently no evidence to support the use of ECT in maintenance treatment in schizophrenia.

Let’s look at the scientific evidences!
Has mECT really no place in
the treatment of schizophrenia?

Literature on maintenance ECT in schizophrenia - scarce



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journal homepage: www.elsevier.com/locate/psychres

Review article

Maintenance ECT in schizophrenia: A systematic review

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ARTICLE INFO

Keywords:
Maintenance electroconvulsive therapy
Relapse prevention
Schizophrenia

ABSTRACT

Relapse after discontinuation of ECT is significant in patients with schizophrenia. The purpose of this systematic review was to examine use of M-ECT in schizophrenia to guide clinical decision making for relapse prevention in schizophrenia. We reviewed studies examining the role of continuation (C-ECT) and maintenance electroconvulsive therapy (M-ECT) in schizophrenia. Following PRISMA guidelines, we included randomized controlled trials, open label trials, retrospective chart reviews, case reports, and case series in this review. We evaluated adjunctive pharmacological regimens; ECT treatment parameters, including frequency, duration of continued treatment, electrode placement; clinical outcomes including cognitive side effects and relapse rates from included studies. Our findings suggest M-ECT could provide an effective form of relapse prevention in these patients and persistent cognitive side effects are minimal.

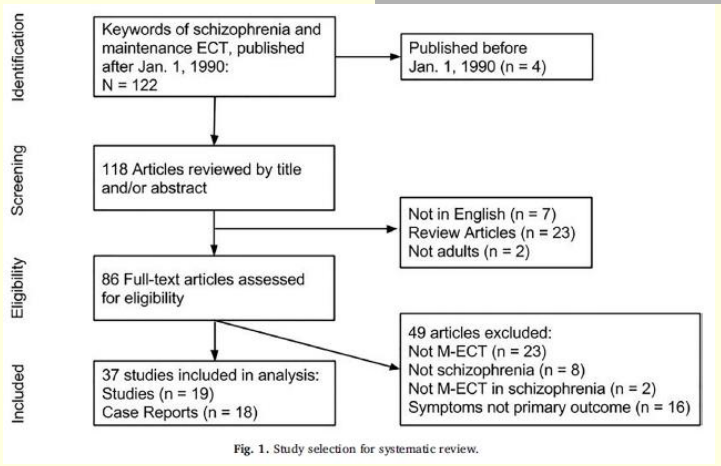
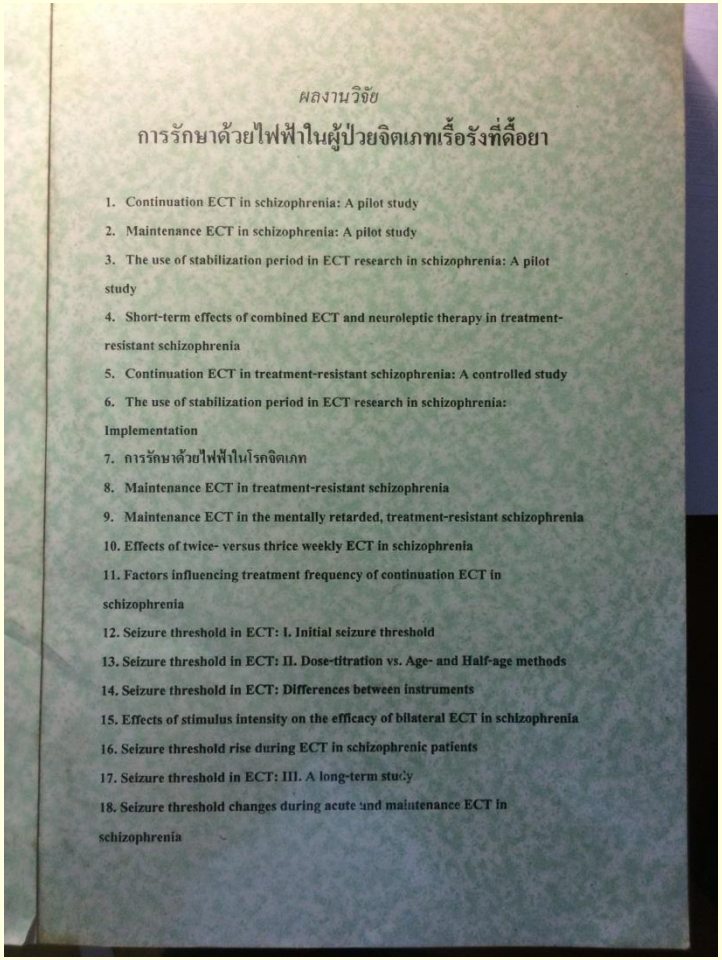


Fig. 1. Study selection for systematic review.

- 2 RCTs
- 17 retrospective chart reviews or open label studies

- 1/A) Chanpattana W. et al. Continuation ECT in treatment-resistant schizophrenia: a controlled study. J. ECT 1999; 15 (3), 178–192.
- 1/B) Chanpattana W. and Kramer B.A. Acute and maintenance ECT with flupenthixol in refractory schizophrenia: sustained improvements in psychopathology, quality of life, and social outcomes. Schizophr. Res. 2003; 63 (1–2), 189–193.
- 2) Yang Y. et al. The maintenance of modified electroconvulsive therapy combined with risperidone is better than risperidone alone in preventing relapse of schizophrenia and improving cognitive function. Arq. Neuropsiquiatr. 2016; 74 (10), 823–828.

Prof. Worrawat Chanpattana- Thailand



ผลงานวิจัย

การรักษาด้วยไฟฟ้าในผู้ป่วยจิตเภทเรื้อรังที่ดื้อยา

1. Continuation ECT in schizophrenia: A pilot study
2. Maintenance ECT in schizophrenia: A pilot study
3. The use of stabilization period in ECT research in schizophrenia: A pilot study
4. Short-term effects of combined ECT and neuroleptic therapy in treatment-resistant schizophrenia
5. Continuation ECT in treatment-resistant schizophrenia: A controlled study
6. The use of stabilization period in ECT research in schizophrenia: Implementation
7. การรักษาด้วยไฟฟ้าในโรคจิตเภท
8. Maintenance ECT in treatment-resistant schizophrenia
9. Maintenance ECT in the mentally retarded, treatment-resistant schizophrenia
10. Effects of twice- versus thrice weekly ECT in schizophrenia
11. Factors influencing treatment frequency of continuation ECT in schizophrenia
12. Seizure threshold in ECT: I. Initial seizure threshold
13. Seizure threshold in ECT: II. Dose-titration vs. Age- and Half-age methods
14. Seizure threshold in ECT: Differences between instruments
15. Effects of stimulus intensity on the efficacy of bilateral ECT in schizophrenia
16. Seizure threshold rise during ECT in schizophrenic patients
17. Seizure threshold in ECT: III. A long-term study
18. Seizure threshold changes during acute and maintenance ECT in schizophrenia

Continuation ECT in TRS - Phase I.

The Journal of ECT
15(3):178–192 © 1999 Lippincott Williams & Wilkins, Inc., Philadelphia

Continuation ECT in Treatment-Resistant Schizophrenia: A Controlled Study

Worrawat Chanpattana, M.D., *M. L. Somchai Chakrabhand, M.D., †Harold A. Sackeim, Ph.D., *Wanchai Kitaroonchai, M.D., ‡Ronnachai Kongsakon, M.D., §Pisarn Techakasem, M.D., ‖Wanchai Buppanharun, M.D., §Yingrat Tuntirungsee, M.D., and Nitchawan Kirdcharoen, M.D.

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TABLE 1. *Demographics and clinical characteristics of Phase I study (N = 101)*

Variable	Responders (N = 58) Mean ± SD (range)	Nonresponders (N = 43) Mean ± SD (range)	P
Age (yr)	33.2 ± 8.0 (20–49)	38.6 ± 7.2 (21–49)	<.001
Sex	28 female, 30 male	25 female, 18 male	N.S.
Education (yr)	9.1 ± 3.5 (4–16)	8.6 ± 3.1 (4–14)	N.S.
Subtype*	44P (75.9%), 10D, 2C, 2U	24P (55.8%), 11D, 1C, 7U	<.05
Onset of illness (yr)	20.8 ± 5.3 (12–35)	20.5 ± 4.2 (15–33)	N.S.
Duration of illness (yr)	12.4 ± 6.7 (3–27)	18.1 ± 7.7 (3–32)	<.001
Duration of current episode (yr)	1.9 ± 2.0 (1 mo–9 yr)	6.5 ± 5.4 (4 mo–27 yr)	<.001
Prior psychiatric admissions	8.1 ± 6.1 (0–26)	5.9 ± 4.3 (1–16)	<.05
Prior failure of adequate NT trials	3.3 ± 1.2 (2–7)	3.6 ± 1.3 (2–6)	N.S.
Ave. duration of each NT trial (mo)	22.1 ± 20.5 (1.5 mo–17 yr)	25.8 ± 25.1 (2 mo–12 yr)	N.S.
Mean CPZ equivalent dose (mg)	1,231.5 ± 295.2 (825–2,080)	1,239.1 ± 280.2 (833–1,950)	N.S.
Prior failure of flupenthixol	22.41%	20.93%	N.S.
Prior failure of atypical NT	15.52%	25.58%	N.S.
Family history of schizophrenia (in first-degree relatives)	13.79%	22.86%	N.S.
BPRS			
at entry	49.1 ± 9.6 (37–67)	51.4 ± 9.4 (37–77)	N.S.
end of phase I study (1 week after the last ECT treatment)	18.7 ± 7.2 (3–33)	39.4 ± 8.3 (28–64)	<.001
% of reductions	60.6 ± 17.2 (17.5–91.9%)	21.7 ± 17.7 (49.3–29.2% increase)	<.001
MMSE			
at entry	24.1 ± 4.3 (13–30)	20.8 ± 5.2 (12–30)	<.001
end of phase I study	26.4 ± 4.6 (13–30)	21.5 ± 5.1 (14–30)	<.001
% of increments	10.7 ± 17.5 (66.7–27.8% decrease)	7.0 ± 3.0 (78.6–36% decrease)	N.S.
GAF			
at entry	30.9 ± 5.7 (22–45)	24.8 ± 3.8 (20–35)	<.001
end of phase I study	49.6 ± 9.7 (30–65)	31.0 ± 4.9 (22–38)	<.001
Dosage of flupenthixol (mg)	21.0 ± 4.2 (9–24)	23.6 ± 1.5 (18–24)	<.001
Number of ECT treatments	13.9 ± 4.8 (7–25)	20.4 ± 0.8 (20–24)	<.001
Seizure duration (per ECT session)			
motor (sec)	40.2 ± 10.4 (21–67)	36.0 ± 6.6 (26–58)	<.02
EEG (sec)	45.9 ± 12.9 (28–76)	43.9 ± 6.4 (33–55)	N.S.
Average stimulus charge (mC, per ECT session)	243.1 ± 118.6 (54–525.5)	289.8 ± 101.3 (101.9–496.1)	<.05
Anesthetics & muscle relaxants (per ECT session)			
Thiopental (mg)	150.6 ± 28.8 (75–250)	146 ± 19.8 (100–197.1)	N.S.
Ketamine (mg)	50.6 ± 6.7 (50–75)	52.8 ± 7.0 (50–75)	N.S.
Succinylcholine (mg)	26.3 ± 9.2 (12.5–75)	24.8 ± 6.7 (12.5–75)	N.S.

Other abbreviations: NT, neuroleptic; CPZ, chlorpromazine; N.S., not statistically significant.
*subtype: P, paranoid; D, disorganized; C, catatonia; U, undifferentiated.

- **Phase I.-acute treatment**
  - 58 responder,
  - 43 non-responders,
  - 13 dropped out

3-week stabilization period

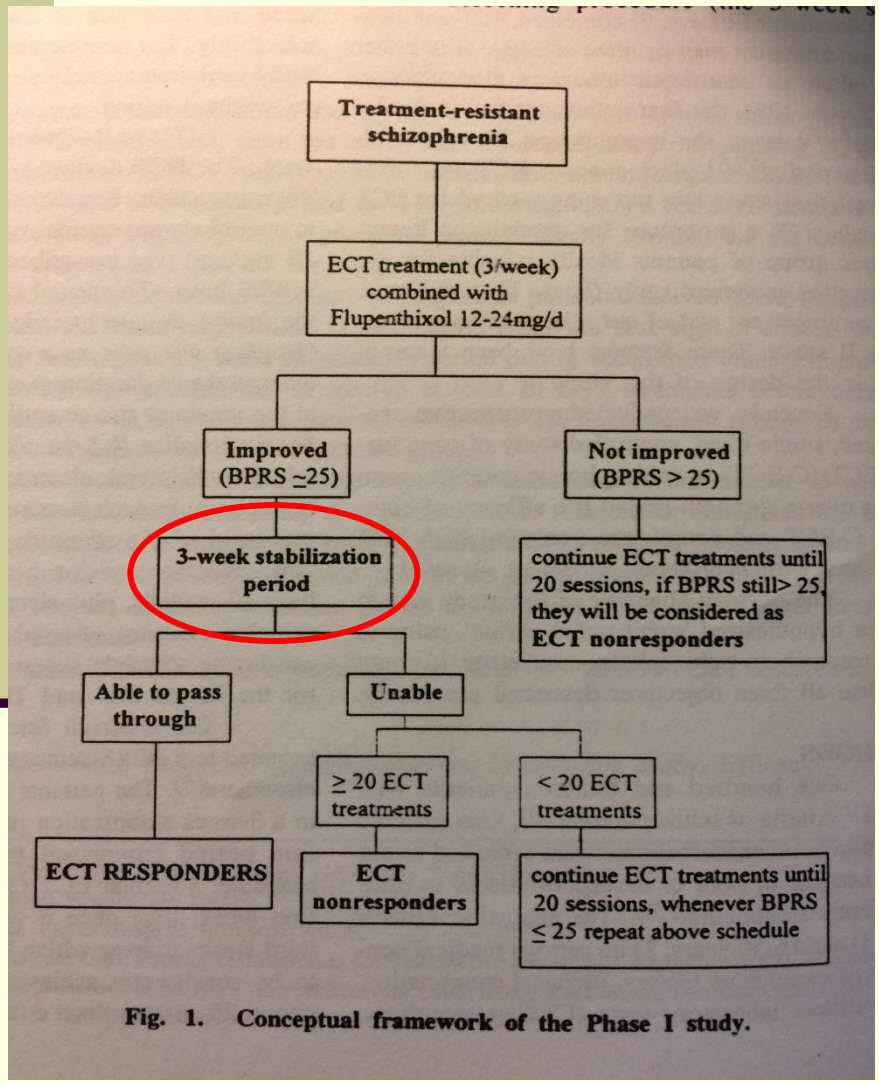

Fig. 1. Conceptual framework of the Phase I study.

- Patient improved (BPRS≤25)
- ECT schedule:
  - 1st week: 3
  - 2nd and 3rd week: 1
- If BPRS rose above 25 (and total number of ECT less than 20)
  - Return to regular schedule

Continuation ECT in TRS – Phase II.

The Journal of ECT
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Continuation ECT in Treatment-Resistant Schizophrenia: A Controlled Study

Worrawat Chanpattana, M.D., *M. L. Somchai Chakrabhand, M.D., †Harold A. Sackeim, Ph.D., *Wanchai Kitaroonchai, M.D., ‡Ronnachai Kongsakon, M.D., §Pisarn Techakasem, M.D., ‖Wanchai Buppanharun, M.D., §Yingrat Tuntirungsee, M.D., and Nitchawan Kirdcharoen, M.D.

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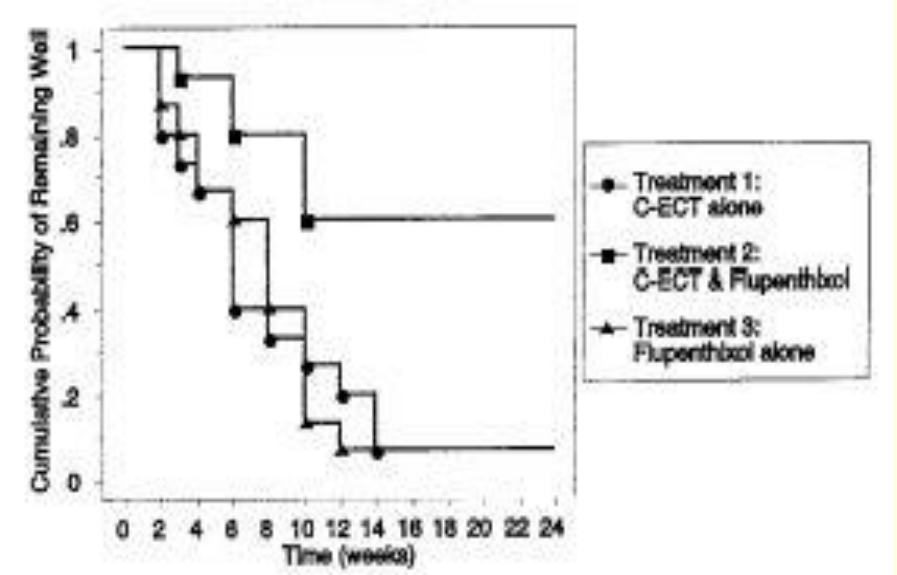
- Treatment schedule:
  - Weekly treatment for 1 month
  - Biweekly treatment for 5 months
  - Flupenthixol 12mg/day

- Phase II.-continuation treatment (started 1 week after Phase I.)
- Group I: cECT alone
- Group II: cECT+flupenthixol
- Group III: flupenthixol alone



Second publication - observational study
46 TRS patients on mECT+flupenthixol

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Schizophrenia Research 63 (2003) 189–193

SCHIZOPHRENIA RESEARCH

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Acute and maintenance ECT with flupenthixol in refractory schizophrenia: sustained improvements in psychopathology, quality of life, and social outcomes ☆

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[b]Cedars Sinai Medical Center, Los Angeles, CA, USA

Received 22 December 2001; accepted 30 April 2002

Phase II: 1 year
6 dropouts
Biweekly: 33, Triweekly: 6, Monthly: 7

Table 1
Changes in outcome measures

	Baseline	Phase II entry	6 months	Phase II end
QLS	36.7 ± 5.4	66.3 ± 9.9[1]	67.8 ± 13.3	67.8 ± 21.1
SOFAS	38.4 ± 5.7	60.5 ± 7.5[2]	62.0 ± 9.2	63.5 ± 11.8
GAF	30.5 ± 4.1	50.9 ± 7.5[3]	54.5 ± 11.5[4]	57.3 ± 13.1[5]
BPRS, total	48.5 ± 7.3	14.6 ± 6.5[6]	16.2 ± 9.3	17.1 ± 9.9
BPRS, negative	8.6 ± 3.5	5.1 ± 3.0[7]	5.7 ± 3.6	6.5 ± 4.0[8]
BPRS, positive	18.6 ± 4.3	3.1 ± 2.8[9]	3.7 ± 3.5	4.0 ± 3.7
MMSE	26.8 ± 3.2	29.0 ± 1.7[10]	29.6 ± 0.8[11]	29.7 ± 0.9

Comparisons between two most adjacent ratings using the paired *t*-tests. (1) $t=21.88$, $df=1,45$, $p<0.0001$; (2) $t=17.03$, $df=1,45$, $p<0.0001$; (3) $t=18.05$, $df=1,45$, $p<0.0001$; (4) $t=2.29$, $df=1,45$, $p=0.027$; (5) $t=2.16$, $df=1,45$, $p=0.037$; (6) $t=23.06$, $df=1,45$, $p<0.0001$; (7) $t=8.18$, $df=1,45$, $p<0.0001$; (8) $t=2.17$, $df=1,45$, $p=0.035$; (9) $t=21.75$, $df=1,45$, $p<0.0001$; (10) $t=5.56$, $df=1,45$, $p<0.0001$; (11) $t=3.27$, $df=1,45$, $p=0.002$.

QLS: Quality of Life Scale
SOFAS: Social and Occupational Functioning Scale
GAF: Global Assessment of Functioning
BPRS: Brief Psychiatric Rating Scale
MMSE: Mini Mental State Examination

Maintenance treatment with mECT+risperidon – an RCT from China, 2016 (Arq Neuropsiquiatr)

DOI: 10.1590/0004-282X20160130

ARTICLE

The maintenance of modified electroconvulsive therapy combined with risperidone is better than risperidone alone in preventing relapse of schizophrenia and improving cognitive function

Manutenção de eletroconvulsoterapia modificada combinada com risperidona é melhor do que a risperidona isoladamente na prevenção de recidivas de esquizofrenia e melhoras da função cognitiva

Ying Yang[1,2], Xiaojing Cheng[2*], Qingzhi Xu[2], Renjun Li[2], Zengxun Liu[2], Liping Wang[2], Yanqing Zhang[3], Guoqiang Ren[2], Jintong Liu[1,2]*

ABSTRACT

Objective: To evaluate the effect of maintenance modified electroconvulsive therapy (MECT) on schizophrenic patients. **Methods:** From June 2012 to June 2014, 62 patients with schizophrenia, who had recovered from a successful course of acute MECT, were recruited. Thirty-one patients received maintenance MECT and risperidone, as the experimental group. Another 31 patients were enrolled in the control group, and received risperidone only. The effects on cognitive functions, clinical symptoms and relapse rate were determined. **Results:** Patients in the experimental group had a lower relapse rate and longer relapse-free survival time than the controls. Relative to the baseline evaluation, patients showed statistically significant improvement in verbal memory and visual memory. At the final assessment, the scores of verbal and visual memory were remarkably lower in the experimental group than the controls but there was no significant difference in other tests. **Conclusion:** Maintenance MECT plus medication is superior to medication alone in preventing relapse and improving cognitive function.

Keywords: schizophrenia; electroconvulsive therapy; risperidone; cognition.

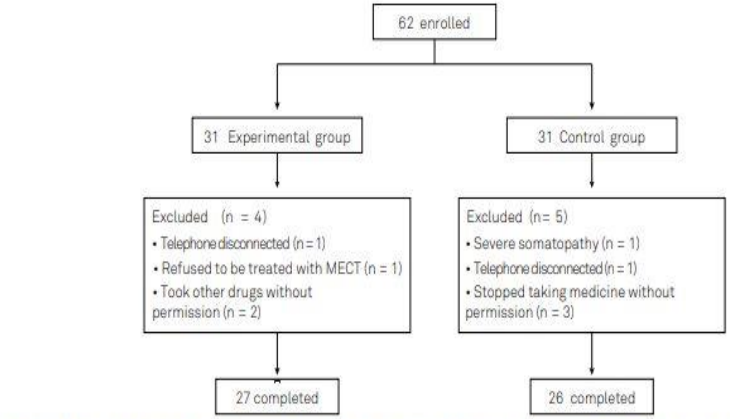


Figure 1. Flow of patients with schizophrenia through a randomized, prospective controlled trial evaluating the efficacy of maintenance modified electroconvulsive therapy (MECT).

- mECT shedule:
  - 1st month: weekly
  - 2nd month: biweekly
  - Afterwards: monthly
- Risperidone dose: 6-8 mg/day

Maintenance treatment with mECT+risperidon – relapse rate

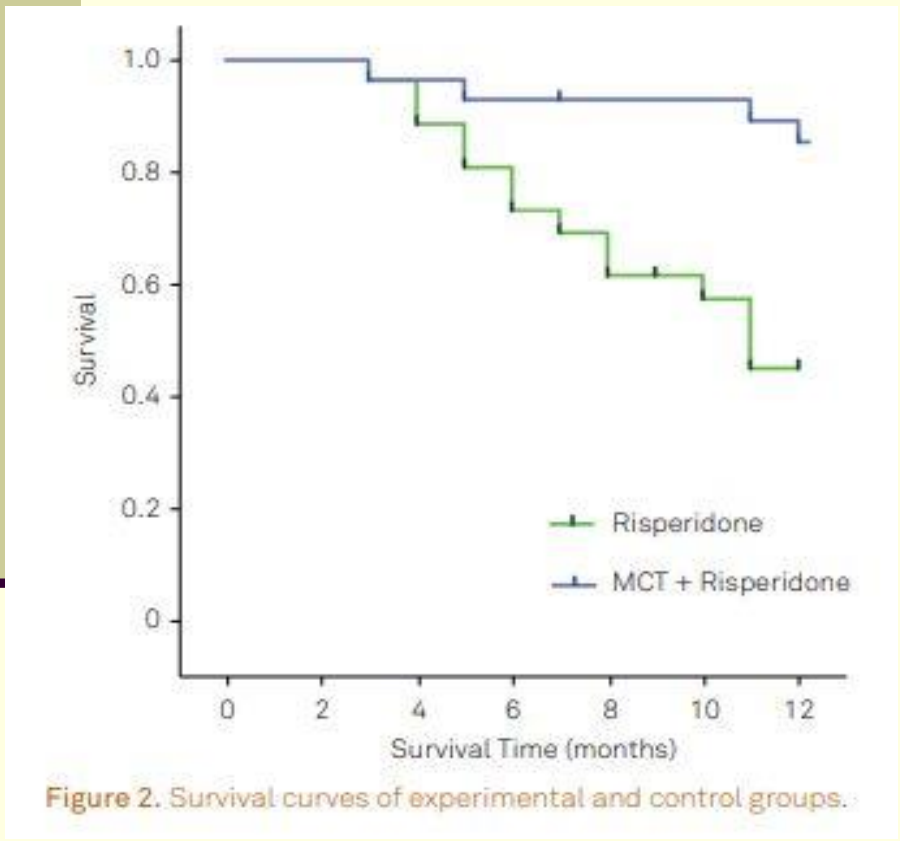


Figure 2. Survival curves of experimental and control groups.

- **Experimental group**: 4 out of 27relapsed
- The four participants relapsed in the 3rd, 5th, 11th and 12th month.
- The probability of being relapse-free for 12 months was 0.86 ± 0.07.
- The average survival time from baseline to relapse was 11 months (95%CI: 10–12 months).
- **Control group**: 14 out of 26 relapsed
- These 14 participants relapsed in the 3rd (1 case), 4th (2 cases), 5th (2 cases), 6th (2 cases), 7th (1 case), 8th (2 cases), 10th (1 cases) and 11th (3 cases) month
- The probability of remaining relapse-free for 12 months was 0.49 ± 0.10.
- The average survival time was nine months (95%CI: 8–11 months

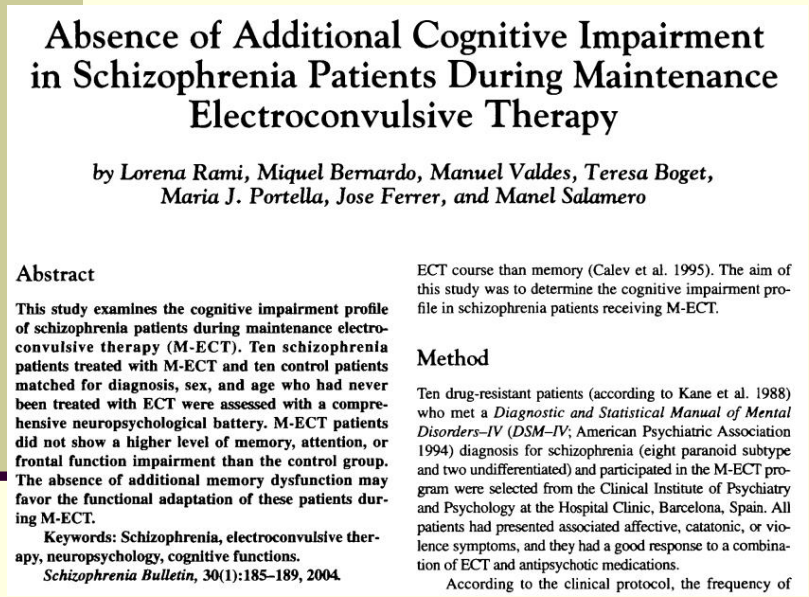
Maintenance treatment with mECT+risperidon – impact on cognitive function

Table 2. Comparison of cognitive function of control and experimental groups.

Variables	Baseline evaluation		Final evaluation	
	Experimental group	Control group	Experimental group	Control group
Trail making test	41.45 ± 3.47	40.94 ± 2.54	41.16 ± 4.05	39.61 ± 4.29
Symbolic coding	40.65 ± 5.64	41.97 ± 6.48	41.19 ± 6.04	42.03 ± 6.72
Verbal memory	36.32 ± 3.64	37.81 ± 3.95	44.58 ± 3.01[a]	46.84 ± 5.35[*a]
Spatial span	40.00 ± 3.73	40.68 ± 4.76	40.61 ± 4.13	41.81 ± 4.32
Number sequences	40.71 ± 3.57	41.48 ± 3.52	41.61 ± 3.27	40.87 ± 3.00
Maze test	38.42 ± 3.85	39.61 ± 4.38	39.90 ± 2.84	40.74 ± 3.92
Visual memory	40.97 ± 4.38	39.45 ± 4.09	43.06 ± 4.82[a]	46.23 ± 3.86[*a]
Semantic fluency	43.00 ± 4.18	42.03 ± 4.75	42.29 ± 3.55	42.71 ± 4.94
Emotion management	43.61 ± 5.75	42.61 ± 5.21	44.10 ± 5.85	43.16 ± 7.25
Continuous performance test	43.16 ± 6.14	41.87 ± 5.50	43.42 ± 6.05	40.90 ± 5.92

Note: All values are exhibited as mean ± standard deviation; *$p < 0.05$ vs. experimental group at baseline evaluation; *$p < 0.05$ vs. control group at baseline evaluation; [a]$p < 0.05$ vs. experimental group at final evaluation.

Impact of mECT on cognitive function - a study from Spain in 2004



Absence of Additional Cognitive Impairment in Schizophrenia Patients During Maintenance Electroconvulsive Therapy

by Lorena Rami, Miquel Bernardo, Manuel Valdes, Teresa Boget, Maria J. Portella, Jose Ferrer, and Manel Salamero

Abstract

This study examines the cognitive impairment profile of schizophrenia patients during maintenance electroconvulsive therapy (M-ECT). Ten schizophrenia patients treated with M-ECT and ten control patients matched for diagnosis, sex, and age who had never been treated with ECT were assessed with a comprehensive neuropsychological battery. M-ECT patients did not show a higher level of memory, attention, or frontal function impairment than the control group. The absence of additional memory dysfunction may favor the functional adaptation of these patients during M-ECT.

Keywords: Schizophrenia, electroconvulsive therapy, neuropsychology, cognitive functions.

Schizophrenia Bulletin, **30(1):185–189, 2004.**

ECT course than memory (Calev et al. 1995). The aim of this study was to determine the cognitive impairment profile in schizophrenia patients receiving M-ECT.

Method

Ten drug-resistant patients (according to Kane et al. 1988) who met a *Diagnostic and Statistical Manual of Mental Disorders–IV* (*DSM–IV*; American Psychiatric Association 1994) diagnosis for schizophrenia (eight paranoid subtype and two undifferentiated) and participated in the M-ECT program were selected from the Clinical Institute of Psychiatry and Psychology at the Hospital Clinic, Barcelona, Spain. All patients had presented associated affective, catatonic, or violence symptoms, and they had a good response to a combination of ECT and antipsychotic medications.

According to the clinical protocol, the frequency of

- 10 schizophrenia patients on mECT
  - Mean number of previous ECT sessions: 27
  - Mean time of mECT: 13.5 months
  - Mean intersession interval: 37±12 days
  - Bifrontotemporal ECT
- 10 matched control patients never treated with ECT
  - Diagnosis
  - Age
  - Sex

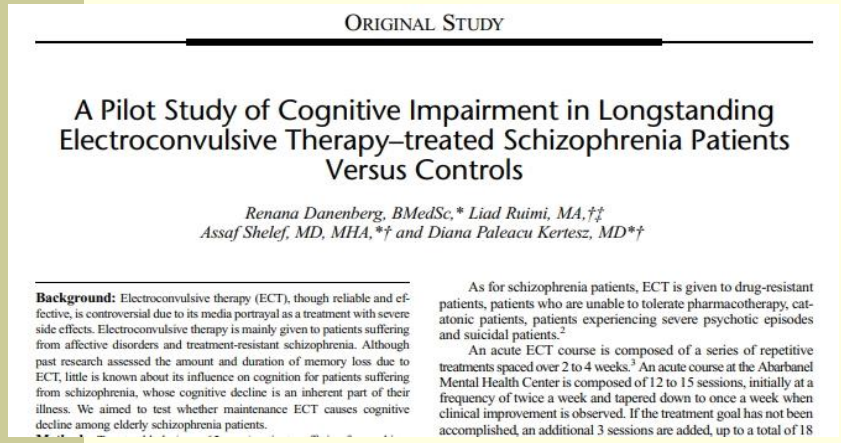
Impact of mECT on cognitive function - results

Table 3. Cognitive case-control comparisons using Wilcoxon rank test

Variable	M-ECT group		Comparison group		Wilcoxon rank test	
	Mean	SD	Mean	SD	*z*	*p*
Memory						
RAVLT Total Learning	15.8	(6.3)	13.5	(5.9)	–1.1	0.26
RAVLT (% recall in delay)	76.6	(14.6)	67.8	(17.9)	–1.4	0.17
Logical Memory	5.9	(1.4)	6.8	(1.9)	–1.1	0.26
Frontal tests						
Trail Making, Part B (sec)	88.9	(24.1)	97.5	(44.5)	–0.9	0.37
FAS (total words)	29.3	(11.9)	32.0	(10.1)	–0.6	0.57
Digits Backward	4.3	(0.7)	3.7	(1.1)	–1.6	0.11
Digit Symbol-Coding	46.8	(13.7)	46.6	(14.5)	–0.2	0.80
Tower of Hanoi	15.5	(8.1)	13.7	(10.7)	–1.3	0.20
Attention						
Trail Making Test, Part A (sec)	37.9	(16.2)	47.1	(20.5)	–1.7	0.08
Digits Forward	5.6	(0.9)	5.9	(1.1)	–0.4	0.70
Intelligence						
Similarities	19.1	(9.8)	14.3	(3.7)	–1.3	0.18
Block Design	32.6	(8.9)	31.2	(8.0)	–0.3	0.80

Note.—M-ECT = maintenance electroconvulsive therapy; RAVLT = Rey Auditory Verbal Learning Test; SD = standard deviation.

Maintenance ECT and cognitive deficit
a study from Israel, J ECT, 2021



ORIGINAL STUDY

A Pilot Study of Cognitive Impairment in Longstanding Electroconvulsive Therapy–treated Schizophrenia Patients Versus Controls

Renana Danenberg, BMedSc, Liad Ruimi, MA,†‡*
Assaf Shelef, MD, MHA,† and Diana Paleacu Kertesz, MD*†*

Background: Electroconvulsive therapy (ECT), though reliable and effective, is controversial due to its media portrayal as a treatment with severe side effects. Electroconvulsive therapy is mainly given to patients suffering from affective disorders and treatment-resistant schizophrenia. Although past research assessed the amount and duration of memory loss due to ECT, little is known about its influence on cognition for patients suffering from schizophrenia, whose cognitive decline is an inherent part of their illness. We aimed to test whether maintenance ECT causes cognitive decline among elderly schizophrenia patients.

As for schizophrenia patients, ECT is given to drug-resistant patients, patients who are unable to tolerate pharmacotherapy, catatonic patients, patients experiencing severe psychotic episodes and suicidal patients.[2]

An acute ECT course is composed of a series of repetitive treatments spaced over 2 to 4 weeks.[3] An acute course at the Abarbanel Mental Health Center is composed of 12 to 15 sessions, initially at a frequency of twice a week and tapered down to once a week when clinical improvement is observed. If the treatment goal has not been accomplished, an additional 3 sessions are added, up to a total of 18

Methods: Twenty elderly (age >65 years) patients suffering from schizophrenia and schizoaffective disorder who received maintenance ECT were matched with 20 controls suffering from the same illnesses that have never been treated with ECT. The match was based on age, sex, and illness duration. The participants were evaluated using the Montreal Cognitive Assessment for cognitive decline and a Positive and Negative Syndrome Scale (PANSS) for illness severity.

Maintenance ECT and cognitive deficit - results (a study from Israel, J ECT, 2021)

TABLE 2. A Comparison of PANSS and MoCA Test Scores Between the Treatment Group and the Control Group

	ECT	Control	*P*
PANSS total, M (SD)	62.55 (24.60)	68.2 (26.28)	0.492
PANSS positive, M (SD)	10.75 (4.29)	13.95 (5.88)	0.03*
PANSS negative, M (SD)	20.45 (11.06)	17 (11.18)	0.401
PANSS general, M (SD)	31.35 (11.94)	37.25 (16.11)	0.169
MoCA total, M (SD)	13 (6.62)	16.75 (6.08)	0.06
MoCA naming, M (SD)	1.32 (1.2)	2.21 (1.03)	0.011*
MoCA abstraction, M (SD)	0.84 (0.77)	1.58 (0.69)	0.002†
MoCA delayed-recall, M (SD)	0.32 (0.75)	0.58 (1.12)	0.287

*$P < 0.05$.
†$P < 0.01$ remaining significant following Bonferroni correction.

To our surprise, no significant differences were found for either the total MoCA scores or for the delayed-recall subscale, when comparing treated patients with controls. For the ECT group, we found a naming impairment that correlated with the positive symptoms of schizophrenia before Bonferroni correction and an impairment in abstraction that correlated significantly with the negative and total PANSS scores. These associations were not found for the control group.

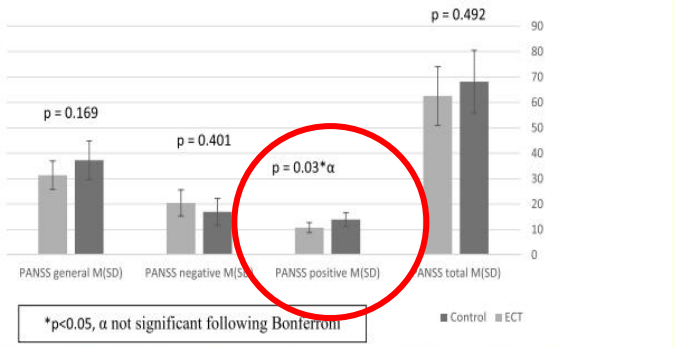


FIGURE 1. A comparison of PANSS positive, negative, general, and total scores between the treatment group and the control group.

TABLE 3. Pearson Correlations Between PANSS Scores and Naming and Abstraction Scores of the Treatment Group, Compared With Those of the Control Group

	ECT		Control	
Variables	**Naming**	**Abstraction**	**Naming**	**Abstraction**
PANSS total	−0.391	−0.497 *	−0.171	0.18
PANSS general	−0.397	−0.443	−0.063	0.311
PANSS positive	−0.449 *	−0.179	0.05	0.303
PANSS negative	−0.266	−0.556 *	−0.366	−0.257

*$P < 0.05$.

Effect of mECT on hospital re-admission – a study from Izrael, 2015

ORIGINAL STUDY

Acute Electroconvulsive Therapy Followed by Maintenance Electroconvulsive Therapy Decreases Hospital Re-Admission Rates of Older Patients With Severe Mental Illness

Assaf Shelef, MD, MHA,† Doron Mazeh, MD,*† Uri Berger, MA,‡ Yehuda Baruch, MD, MHA,*† and Yoram Barak, MD, MHA*†*

Objectives: Electroconvulsive therapy (ECT) is a highly effective treatment for patients with severe mental illness (SMI). Maintenance ECT (M-ECT) is required for many elderly patients experiencing severe recurrent forms of mood disorders, whereas M-ECT for schizophrenia patients is a poorly studied treatment. We report on the outcomes in aged patients with SMI: schizophrenia and severe affective disorders treated by M-ECT of varying duration to prevent relapse after a successful course of acute ECT. The study measured the effectiveness of M-ECT in preventing hospital readmissions and reducing admission days.

Method: A retrospective chart review of 42 consecutive patients comparing the number and length of psychiatric admissions before and after the start of M-ECT was used. We analyzed diagnoses, previous ECT treatments, number of ECT treatments, and number and length of psychiatric admissions before and after M-ECT.

antidepressants regimens make the elderly an especially attractive group to study in the context of M-ECT.

The elderly patients experiencing mood disorders are frequently challenged by chronic relapsing illnesses and thus the evaluation of relapse prevention strategies is crucial.[3] Patients with severe mood disorders, for which treatment with ECT is indicated, often remit after an acute course of ECT.[4–6] Having achieved remission of the index depressive episode, it is sensible to consider continuation ECT or M-ECT to prevent relapse of the current episode or recurrence of a new episode, respectively.[6] However, the terms continuation ECT and M-ECT are often used interchangeably and indiscriminately when describing the use of ECT after remission of the acute episode.[4–6] Results from the few studies assessing the influence of age on the efficacy of ECT were inconsistent and ECT seemed to be equally efficacious

TABLE 1. Patient Characteristics at Start of Acute ECT Treatment

Age, mean (SD) [range], y	71.54 (6.96) [60–83]
Sex, n (%)	
Female	29 (69)
Marital status, n (%)	
Married	27 (64)
Bachelor	4 (9)
Divorced	3 (7)
Widow	8 (18)
Accommodation, n (%)	
Home	39 (93)
Nursing home	3 (7)
Psychiatric diagnosis, n (%)	
Severe psychotic unipolar depression	14 (33.3)
Severe nonpsychotic unipolar depression	6 (14.2)
Bipolar affective disorder	2 (4)
Schizophrenia	20 (48)
Duration of illness, mean (SD) [range], y	22.4 (16.4) [1–63]
No. previous hospitalizations, mean (SD) [range]	6.14 (6.99) [0–30]
Legal status of acute ECT, n (%)	
Involuntary	6 (14)
Medical comorbidity (mean number of conditions)	1.38 (1.2)

Effect of mECT on hospital re-admission - results

We compared number of admissions and inpatient stay for the actual period during which ECT was administered (acute phase ECT plus M-ECT) with the exact period preceding the index ECT phase. For example, in the case of a patient given acute phase ECT plus M-ECT over a span of 8 months, the comparison period refers to the 8 months before the ECT treatment.

TABLE 3. Number of Psychiatric Admissions and Hospitalization Days Before and During M-ECT Period [Mean (SD), 34 (29.8) Months]

	Before M-ECT	During M-ECT	*t*	*df*	*P*
Admission (n)	1.88 (0.237)	0.38 (0.113)	5.67	41	<0.001
Admission, d	215.93 (461.95)	12.45 (29.66)	2.833	41	<0.01

Paired sample *t* test was used.

mECT in TRS compared with clozapine – a new RCT from India 2022

Schizophrenia Bulletin
https://doi.org/10.1093/schbul/sbac027

Comparison of Acute Followed by Maintenance ECT vs Clozapine on Psychopathology and Regional Cerebral Blood Flow in Treatment-Resistant Schizophrenia: A Randomized Controlled Trial

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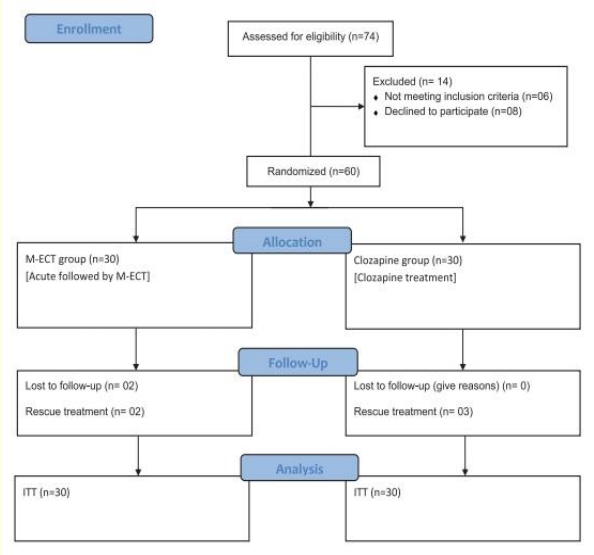

- ECT arm:
  - aECT: 6/2 weeks
  - cECT:
  - 1 month: 1/week
    - 2 months: 1/forthnight
    - 3 months: 1/month
- Clozapine arm:
  - Start with 12.5 mg on the frst day
  - Gradually increase (with 25 mg every two days) till the target dose of 250–400 mg/day in two divided doses reached
  - The median stable dose of clozapine was 350 mg/day

mECT in TRS compared with clozapine – results - PANSS

Table 2. Improvement of Different Outcome Parameters Over Time (After Intention-to-Treat Analysis)

Parameter	Time Points, Sphericity, Intragroup Comparisons	Group-1 (M-ECT) ($n = 30$)	Group-2 (Clozapine) ($n = 30$)	Between the Group Comparison (P value)[b]
PANSS-P	Baseline	35.65 ± 0.89	35.78 ± 0.95	.925
	6 week	20.42 ± 0.74	29.93 ± 0.82	<.001
	12 week	15.62 ± 0.79	23.70 ± 1.07	<.001
	24 week	13.39 ± 0.70	19.89 ± 1.03	<.001
	Mauchly's test of sphericity (P value)	<0.001	<0.001	
	Greenhouse–Geisser (Ɛ)	0.515	0.613	
	P value (with Greenhouse–Geisser correction)[a]	<0.001	<0.001	
	Baseline vs 6 weeks	<0.001	<0.001	
	6 weeks vs 12 weeks	<0.001	<0.001	
	12 weeks vs 24 weeks	<0.001	<0.001	
PANSS-N	Baseline	36.96 ± 1.16	37.41 ± 1.21	.791
	6 week	26.23 ± 1.07	32.56 ± 1.23	<.001
	12 week	22.12 ± 1.03	28.04 ± 1.19	<.001
	24 week	19.96 ± 1.03	25.15 ± 1.39	<.001
	Mauchly's test of sphericity (P value)	<0.001	<0.001	
	Greenhouse–Geisser (Ɛ)	0.542	0.552	
	P value (with Greenhouse–Geisser correction)[a]	<0.001	<0.001	
	Baseline vs 6 weeks	<0.001	<0.001	
	6 weeks vs 12 weeks	<0.001	<0.001	
	12 weeks vs 24 weeks	<0.001	<0.001	
PANSS-G	Baseline	70.69 ± 1.77	70.85 ± 1.83	.950
	6 week	46.15 ± 1.86	60.00 ± 1.90	<.001
	12 week	38.27 ± 1.06	50.74 ± 1.92	<.001
	24 week	34.42 ± 1.23	43.44 ± 2.05	<.001
	Mauchly's test of sphericity (P value)	<0.001	0.048	
	Greenhouse–Geisser (Ɛ)	0.464	0.752	
	P value (with Greenhouse–Geisser correction or Huynd–Feldt correction)[a]	<0.001	<0.001	
	Baseline vs 6 weeks	<0.001	<0.001	
	6 weeks vs 12 weeks	<0.001	<0.001	
	12 weeks vs 24 weeks	<0.001	<0.001	
PANSS-T	Baseline	143.31 ± 2.58	144.04 ± 3.26	.862
	6 week	92.81 ± 2.11	122.48 ± 3.24	<.001
	12 week	76.00 ± 2.54	102.48 ± 3.63	<.001
	24 week	67.77 ± 2.67	88.48 ± 4.01	<.001
	Mauchly's test of sphericity (P value)	<0.001	<0.001	
	Greenhouse–Geisser (Ɛ)	0.515	0.609	
	P value (with Greenhouse–Geisser correction)[a]	<0.001	<0.001	
	Baseline vs 6 weeks	<0.001	<0.001	
	6 weeks vs 12 weeks	<0.001	<0.001	
	12 weeks vs 24 weeks	<0.001	<0.001	

mECT in TRS compared with clozapine – results – GAF, MOCA, CGI

Table 2. Continued

Parameter	Time Points, Sphericity, Intragroup Comparisons	Group-1 (M-ECT) ($n = 30$)	Group-2 (Clozapine) ($n = 30$)	Between the Group Comparison (P value)[b]
GAF	Baseline	24.85 ± 1.09	22.11 ± 1.50	.149
	6 week	53.08 ± 1.76	30.59 ± 1.45	<.001
	12 week	63.39 ± 1.92	44.82 ± 2.38	<.001
	24 week	68.12 ± 2.06	51.33 ± 2.94	<.001
	Mauchly's test of sphericity (P value)	0.001	<0.001	
	Greenhouse–Geisser (E)	0.708	0.572	
	P value (with Greenhouse–Geisser correction)[a]	<0.001	<0.001	
	Baseline vs 6 weeks	<0.001	<0.001	
	6 weeks vs 12 weeks	<0.001	<0.001	
	12 weeks vs 24 weeks	<0.001	<0.001	
MOCA	Baseline	19.08 ± 0.43	19.22 ± 0.40	805
	6 week	20.27 ± 0.37	20.07 ± 0.39	722
	12 week	20.35 ± 0.35	20.74 ± 0.34	426
	24 week	20.46 ± 0.42	20.96 ± 0.32	.340
	Mauchly's test of sphericity (P value)	<0.001	<0.001	
	Greenhouse–Geisser (E)	0.662	0.596	
	P value (with Greenhouse–Geisser correction)[a]	<0.001	<0.001	
	Baseline vs 6 weeks	<0.001	<0.001	
	6 weeks vs 12 weeks	0.49	<0.001	
	12 weeks vs 24 weeks	0.42	0.01	
CGI-SCH-S	Baseline	6.192 ± 0.09	6.185 ± 0.11	.961
	6 week	3.69 ± 0.11	5.11 ± 0.13	<.001
	12 week	3.12 ± 0.12	4.15 ± 0.17	<.001
	24 week	3.00 ± 0.12	3.78 ± 0.19	<.001
	Mauchly's test of sphericity (P value)	<0.001	0.012	
	Greenhouse–Geisser (E)	0.656	0.732	
	P value (with Greenhouse–Geisser correction)[a]	<0.001	<0.001	
	Baseline vs 6 weeks	<0.001	<0.001	
	6 weeks vs 12 weeks	<0.001	<0.001	
	12 weeks vs 24 weeks	0.083	0.022	
CGI-SCH-I	6 week	2.27 ± 0.12	3.29 ± 0.10	<.001
	12 week	2.04 ± 0.14	2.67 ± 0.13	.002
	24 week	2.00 ± 0.14	2.56 ± 0.15	.007
	Mauchly's test of sphericity (P value)	<0.001	<0.001	
	Greenhouse–Geisser (E)	0.582	0.687	
	P value (with Greenhouse–Geisser correction)[a]	0.039	<0.001	
	6 weeks vs 12 weeks	0.056	<0.001	
	12 weeks vs 24 weeks	0.327	0.185	

Data presented as mean ± SEM.
[a]Intra-group (repeated measure ANOVA).
[b]Inter-group (repeated measure ANOVA).

mECT in TRS compared with clozapine – results – cerebral blood flow

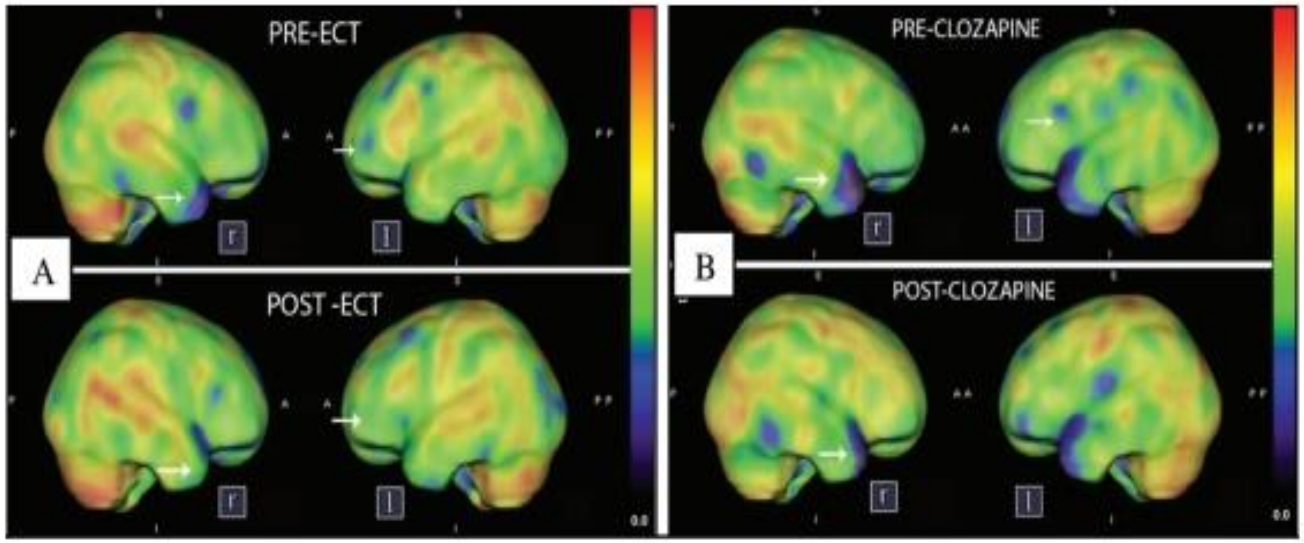

Fig. 3. SPECT-CT 3-D stereotactic surface projection (3D-SSP) maps of the brain of single exemplar cases from the M-ECT and clozapine groups: (A) A patient in the M-ECT group, showing significant improvement in perfusion in the left prefrontal cortex and right temporal cortex in post treatment scan as compared to base-line scan. (B) A patient in the Clozapine group, showing improvement in perfusion in the left prefrontal cortex, partial improvement in right temporal cortex and no improvement in left temporal cortex in post treatment scan compared to base-line scan.

Relapse after discontinuation of mECT a study from Finland (J ECT, 2012)

ORIGINAL STUDY

One-Year Follow-Up After Discontinuing Maintenance Electroconvulsive Therapy

Kaija Huuhka, MD, PhD, Merja Viikki, MD, PhD,†‡ Tarja Tammentie, RN, PhD,* Kati Tuohimaa, RN,* Minna Björkqvist, RN,* Hanna-Mari Alanen, MD, PhD,* Esa Leinonen, MD, PhD,*† and Olli Kampman, MD, PhD†§*

Objectives: Electroconvulsive therapy (ECT) has been established as an effective method in the treatment of severe depressive or psychotic disorders. Its efficacy is greatest in severe major depressive disorder (MDD) with or without psychotic symptoms. However, maintaining remission after a successful course of short-term ECT is often difficult owing to resistance to medication in these patients. Therefore, the relapse rate after short-term ECT is high; 40% to 60% of patients relapse even with adequate antidepressant continuation therapy. The risk of relapse is greatest during the first months after discontinuation of short-term ECT. Continuation/maintenance (c/m) ECT is an option in maintaining remission, but systematic data and clinical guidelines are lacking. The point at which to discontinue this treatment has not been adequately established.

Methods: Altogether 45 consecutive patients treated with c/mECT after short-term ECT to prevent relapse were followed up 1 year after discontinuation of this treatment.

Results: Twenty (44%) of 45 patients relapsed during follow-up, all within the first 8 months. Patients having a diagnosis other than MDD (bipolar disorder, depressive episode type I, schizophrenia, and schizo-

Electroconvulsive therapy has also proven efficacious in schizophrenia.[5] In contrast to pharmacotherapy, short-term ECT is usually discontinued immediately after remission is achieved. In addition, patients with severe MDD and TRD, for whom ECT shows the best efficacy, are also most prone to relapse after any treatment. Therefore, the high relapse rate is a major problem in ECT practice. Sackeim et al[6] reported that without continuation pharmacotherapy, almost all ECT remitters will relapse, mainly during the first 6 months. Effective pharmacotherapy lowers the relapse rate to approximately 40%.[6]

Continuation/maintenance ECT (cmECT) has been reported to be a safe and effective treatment to prevent relapse,[7] although no difference in relapse rate or time were found when cECT and pharmacotherapy were compared during 6 months of remission after short-term ECT.[8] Both treatments were found to be equally effective and well tolerated. Although c/mECT is mostly used in the treatment of mood disorders, it may also be beneficial in schizophrenia.[5,9] It has been reported to be useful and safe even in selected adolescent patients with severe TRD.[10]

- Diagnostic distribution:
- MDD (n = 34)
- Bipolar disorder type I, depressive episode (n = 6)
- Schizophrenia (n = 3)
- Schizoaffective disorder (n = 2).

- The decision to discontinue c/mECT was made according to the criteria below:
  - Patient in remission for at least 6 months
  - Patient refusing to continue c/mECT
  - Medical reasons for discontinuation

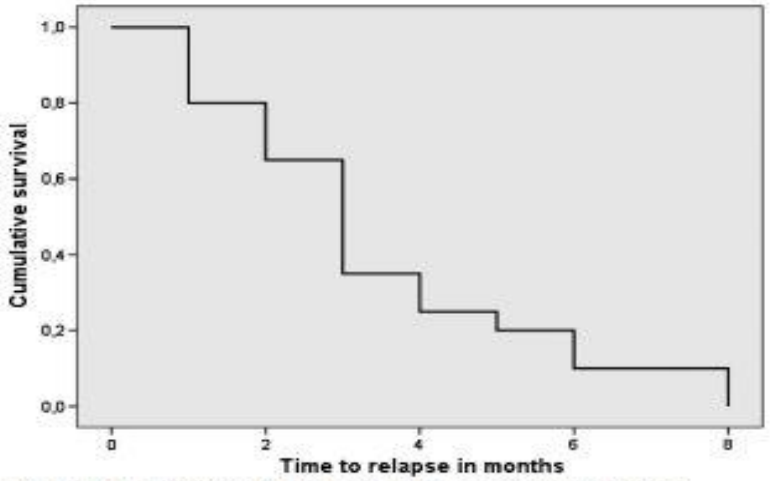

FIGURE 1. Time to relapse (months) after discontinuation of c/mECT.

Relapse after discontinuation of mECT a retrospective study from Spain, 2020

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ORIGINAL ARTICLE

Clinical outcome after discontinuation of maintenance electroconvulsive therapy. A retrospective follow-up study☆

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Materials and methods: Retrospective evaluation of 73 patients who were discontinued from c/m-ECT. The minimum evaluation time was one year. The need of hospital admission or a new acute course of ECT was considered a relapse. The recurrence rate was calculated as a percentage and the estimated time to recurrence was analyzed through a survival analysis. Possible associations between clinical variables and recurrence were analyzed by univariate and multivariate Cox analysis.

Relapse after discontinuation of mECT a study from Spain - results

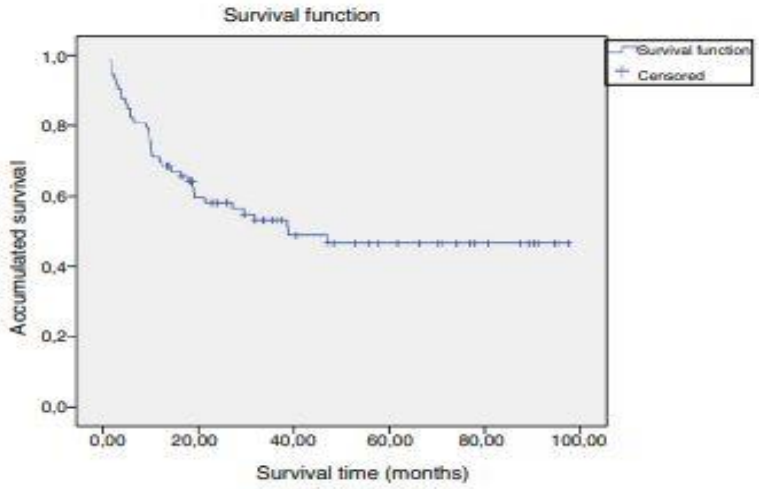

Fig. 1 Time to relapse.

Table 1 Percentage of recurrences according to the interval between C/M-ECT sessions.

Interval between sessions	Recurrences (%)
One week	6/6 (100)
Two weeks	8/11 (72.72)
Three weeks	2/4 (50)
Four weeks	12/30 (40)
Six weeks	1/5 (20)
Eight weeks	5/13 (38.46)
Twelve weeks	0/2 (0)
Other	2/2 (100)

Table 2 Univariate Cox regression analysis: time to relapse.

Variables	HR	Confidence interval 95%	p value
Male gender	1.127	.585–2.170	.720
Age, years	1.011	.989–1.033	.334
Diagnosis (not MDD)	1.223	.625–2.393	.556
Psychotic symptoms	1.411	.548–3.631	.475
Age of onset of disorder, years	1.011	.993–1.028	.225
Duration of disease, years	.996	.973–1.019	.731
Previous episodes, number	1.117	1.047–1.192	.001
Previous acute ECT, number	1.139	.970–1.337	.113
Reason for withdrawal of C/M-ECT (other than remission>6 months)	2.477	1158–5.298	.019
Continuation ECT (<6 m)	1.846	.928–3.671	.081
C/M-ECT sessions, number	1.003	.994–1.012	.465
Interval between sessions<1 month	3.158	1.611–6.191	.001
Use of AD	.771	.369–1.614	.491
Use of AP	3.415	.818–14.262	.092
Use of BZD	1.128	.569–2.238	.730
Use of mood stabilisers	.665	.336–1.318	.243

AD: antidepressants; AP: antipsychotics; BZD: benzodiazepines; MDD: major depressive disorder.

Retrospective controlled study of clozapine vs clozapine+mECT (2019, South Korea)

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Long-term clinical efficacy of maintenance electroconvulsive therapy in patients with treatment-resistant schizophrenia on clozapine

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ABSTRACT

Electroconvulsive therapy (ECT) has been suggested as a treatment for augmenting the response to clozapine in patients that do not respond well to clozapine alone and maintenance ECT (M-ECT) had also been recommended to sustain improvement. This retrospective study of up to 2 years of observation was conducted to explore whether M-ECT is beneficial for long-term maintenance of the symptom remission elicited by acute ECT. Positive and Negative Syndrome Scale (PANSS) were plotted for each patient and compared using a linear mixed-effect model. A total of thirty-eight patients were followed and classified into three groups: (1) clozapine alone (CZP, $n = 15$), (2) acute ECT only (A-ECT, $n = 11$), and (3) acute ECT with M-ECT (M-ECT, $n = 12$). The mean number and interval of ECT sessions during the maintenance period in the M-ECT group were 39.0 ± 26.7 and 15.6 ± 8.4 days, respectively. The slope of the M-ECT group eventually declined, but that of the A-ECT group gradually increased back to the pre-ECT level. No persistent or serious adverse effects were observed. In conclusion, A-ECT augmented the effect of clozapine, but M-ECT was required for sustaining symptom improvement.

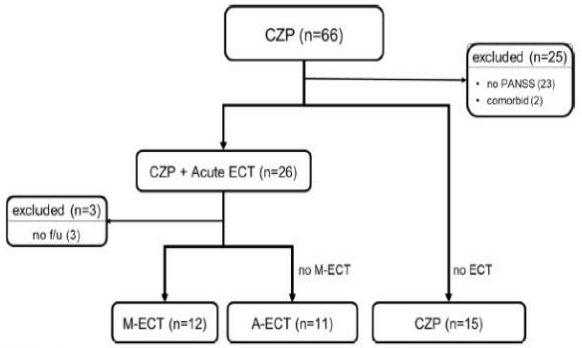


Fig. 1. Flowchart of patients with schizophrenia using clozapine. CZP, clozapine; PANSS, Positive and Negative Syndrome Scale; ECT, electroconvulsive therapy; A-ECT; acute ECT without maintenance ECT, M-ECT, maintenance ECT.

Retrospective controlled study of clozapine+mECT - results

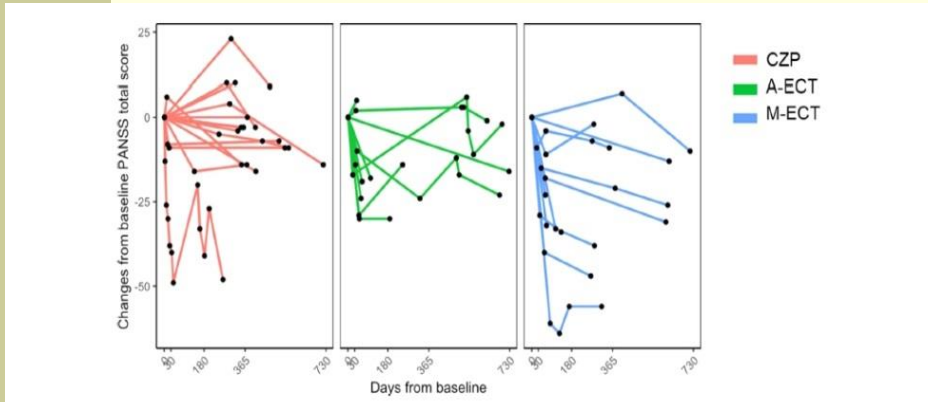
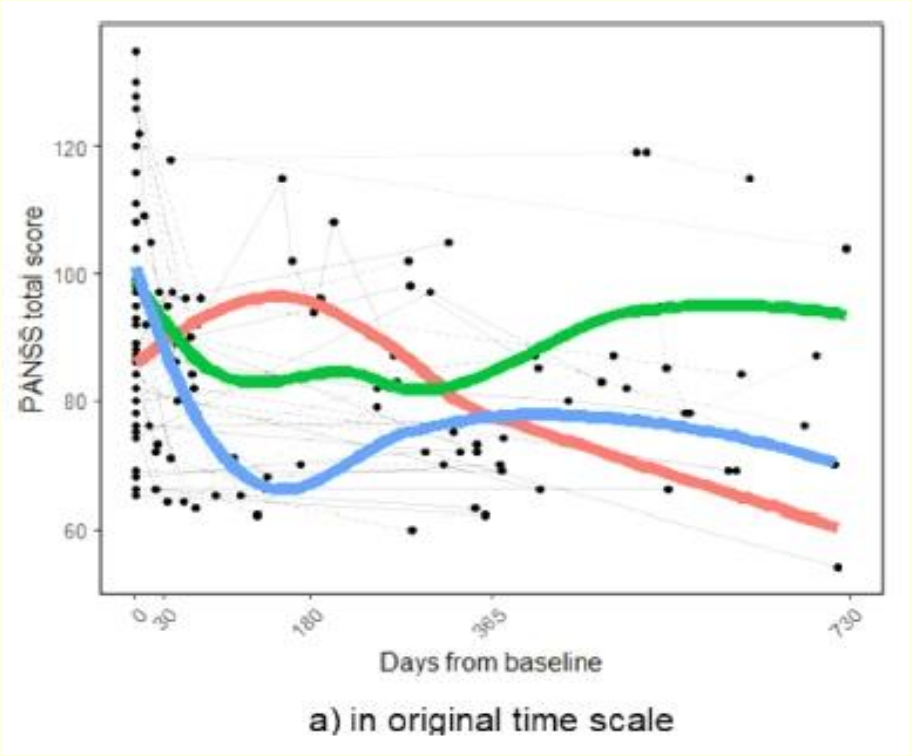


Fig. 2. Individual trajectories of changes in the baseline PANSS total score in the three groups (CZP, A-ECT and M-ECT) of patients with schizophrenia on clozapine PANSS, Positive and Negative Syndrome Scale; ECT, electroconvulsive therapy; CZP, clozapine; A-ECT, acute ECT without maintenance ECT; M-ECT, maintenance ECT.



Questionnaire for surveying ECT utilisation rate in 2014 in Hungary

- 1) Do you apply ECT in your unit/hospital/department? Yes/No
  (if answer is NO, please continue with the **second questionnaire)**
  2) How many patients received ECT in 2014? ……..
  3) How many patients were treated altogether in your unit/hospital/department in 2014? ……..
  4) What was the gender distribution of the ECT treated patients? Male: Female:
  5) What were the diagnostic indications of the ECT (list was given)?
  6) Do you apply ECT in patients
  below the age of 18? Yes/No
  above the age of 70? Yes/No
  in pregnancy? Yes/No
  7) How many is the mean number of sessions in a treatment course? ….....
  8) How many was the highest number of sessions in a treatment course? .....
  9) How many patients have received repeated treatment course in 2014? ……..
  10) How frequent were the sessions? 1/week, 2/week, 3/week, 4/week
  11) Do you perform maintenance ECT in your unit/hospital/department? Yes/no
  12) How many patients received maintenance ECT in your unit/hospital/department in 2014? …….
  13) Which electrode position do you use for the stimulation? Bifrontal, Bitemporal, Frontotemporal, Unilateral
  14) What kind of machine do you use for ECT? …….
  15) What kind of anaesthetic do you use for ECT? …….
  16) What kind of technique do you use for monitoring the convulsion? Observation, Cuff method, EEG, EMG, None
  17) What is the seizure duration level which is accepted to be effective in your unit/hospital/department? EEG: observed:
  18) Do you measure seizure threshold before starting ECT treatment? Yes/No/Sometimes
  19) What kind of method do you use to determine the intensity of the initial stimulation? Age method, Half-age method, Titration method, Other regulation, Fixed intensity, Other:
  20) What kind of medical consultations/examinations do you perform before starting ECT? (a list of anwers is given)
  21) What were the most common contraindications of the treatment? (a list of answers is given)
  22) Do you find useful the ECT protocol, which was released in 2005? Yes/No
  23) Is there anything missing from the protocol?

Results of the nationwide surveys – maintenance ECT

Slovakia(2008-10)	13 settings (39%)
Estonia(2010)	4 settings (80%)
Czech Republic(2014)	3 settings (11%)
Lithuania(2010)	No
Hungary(2014)	2 settings (8%)
Bulgaria(2010)	1 setting (25%)
Croatia(2012-13)	No
Poland(2005)	5 settings (20%)
Serbia(2012)	1 setting (100%)
Latvia(2010)	No
Ukraine(2011)	2 settings (25%)

Survey of ECT referrals in Hungary

The World Journal of Biological Psychiatry, 2009; 10(4): 900–904

ORIGINAL INVESTIGATION

Survey of referrals to electroconvulsive therapy in Hungary

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Abstract

Background. The diagnostic distribution of patients treated with electroconvulsive therapy (ECT) in Hungary is significantly different from that in Western Europe or the USA. In Hungary most of the treated patients are diagnosed with schizophrenia. *Aim.* To analyze the practice of referring patients for ECT in Hungary. *Methods.* Questionnaires containing socio-demographic data were mailed to all Hungarian psychiatric units where ECT was used ($n = 34$), and all of the psychiatrists working there were invited to participate. Respondents were asked to rate how often they considered ECT for various symptoms/syndromes on a five-point Likert Scale. *Results.* A total of 78 questionnaires were returned. Altogether, 89% of the respondents have referred patients to ECT, and 54.8% had done so in the last year. The respondents had most frequently recommended ECT for antipsychotic and antidepressant-resistant patients, catatonic symptoms, or patients with previous good treatment response to ECT. *Conclusion.* Considering the very high Hungarian suicide rate, the low referral rate in cases of severe suicidal intent and threat is surprising. The respondents also rarely considered ECT for NMS or severe depression. The discrepancy between current referral practices and standard recommendations could be decreased with more ECT training courses.

Key words: *ECT, schizophrenia, depression, biological treatment, referral*

Most common indications of ECT

Clinical conditions	mean±SD
Depressive symptoms not responding to adequate antidepressant pharmacotherapy after 2 years	3,81±1,294
Psychotic symptoms not responding to adequate antipsychotic pharmacotherapy after 2 years	3,72±1,312
Psychotic symptoms not responding to adequate anti psychotic pharmacotherapy after 1 year	3,67±1,260
If ECT proved successful in the treatment of the previous episode	3,65±0,937
Psychotic state showing mainly catatonic features	3,62±1,101
Stuporous state	3,56±1,080
Depressive symptoms not responding to adequate an tidepressant pharmacotherapy after 1 year	3,53±1,282

Take home message

- ‘‘there is little doubt that ECT is efficacious in the treatment of schizophrenia. . .[and]. . . regardless of chronicity, schizophrenic patients who have exhausted pharmacological alternatives deserve a course of ECT.’’
- Fink and Sackeim (1996)
- And in case of good response, maintenance ECT should be considered.
- Gazdag (2022)

Thank you very much for your attention!