Relationship of Electroconvulsive Therapy to Course in Affective Illness: A Collaborative Study*

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Summary. Bipolars treated with electroconvulsive therapy (ECT) during the index episode were matched on the variables of age, sex, previous admissions and previous hospitalizations with 23 bipolars who did not receive ECT. A similar match was made for 42 unipolars who were under the age of 40 at time of admission. All patients were followed for 5 years. Those patients treated with ECT, both bipolars and unipolars, had the same numbers of episodes in follow-up as their matched groups. However, in both bipolar and unipolar ECT-treated patients, there were more follow-up rehospitalizations. The reason for this is not known but three possibilities exist. Successful treatment with ECT may make the family and patient more prone to consider rehospitalization. Secondly, the originally treated ECT patients may have had more aggressive doctors who were more likely to rehospitalize. Finally, ECT may change the course of an individual's illness in such a way that more severe episodes occur and rehospitalizations are necessary. The findings suggest the need for long-term studies following ECT on clinical and biological variables.

Key words: Electroconvulsive therapy – Affective illness

Introduction

In evaluating bipolar patients admitted to the University of Iowa Hospitals in 1940–1949, electroconvulsive thera-

py (ECT) was one of the factors related to multiple episodes (Winokur and Kadrmas 1988). In 1940 no bipolar patient received ECT; and thereafter, in the early part of the decade 50% of the patients were so treated. ECT was the only effective treatment for depression or mania and by the middle of the 1940s 92% of the patients who were admitted with a bipolar illness received the treatment. There was no differential assignment of patients; once it was noted to be effective, almost all patients received ECT. Of 60 bipolar patients who received convulsive therapy in that decade, there was a significant increase in total episodes during the period of observation, as well as in the numbers of manias and depressions specifically. The treatment was clearly effective for the termination of a bipolar episode, but patients who received ECT were more likely to have multiple episodes from onset of illness until the end of follow-up. Prior hospitalizations to the index admission were seen equally in both groups, 25% of those who received no convulsive therapy as opposed to 29% of those who did receive ECT. A satisfactory explanation for the finding was not forthcoming.

In a study of 125 unipolar depressive who received no somatic treatment and 128 unipolars who received ECT, the treated patients who were younger than 40 years showed significant increases in subsequent episodes and subsequent hospitalizations when compared with untreated patients under 40. ECT in this study clearly decreased the amount of chronicity in older patients. Like the bipolars described above, all of these ECT-treated patients were consecutively admitted in the 1940s when virtually all depressives who were admitted received treatment. The untreated patients who were the controls had been consecutively admitted between 1935 and 1938. There were no differences between the two groups in episodes before the index admission (Wesner and Winokur 1989).

Because these studies were done prior to the use of other effective treatments for either depression or mania and prior to prophylaxis for either and at a time when ECT was unmodified with anesthesia and muscle relaxants, it seemed reasonable to look at a modern sample of

bipolar and unipolar patients in order to determine if ECT, as given in recent years, had any relationship to course.

Methodology

These data are derived from the National Institute of Mental Health (NIMH) Collaborative Study of the Psychobiology of Depression, described elsewhere in detail (Katz et al. 1979; Keller et al. 1984; Coryell et al. 1984). Intake of affectively ill patients occurred in five different centers (Rush Medical College, Chicago; University of Iowa Psychiatric Hospital, Iowa City; Harvard Medical School, Boston; Columbia University Medical School, New York; and Washington University School of Medicine, St. Louis) and included inpatients and outpatients with major depression, mania, or schizoaffective disorder.

All patients were evaluated using the Schedule for Affective Disorders and Schizophrenia (SADS) and a variety of other standardized evaluations (Endicott and Spitzer 1978). They were re-interviewed at 6-month intervals using the Longitudinal Interval Follow-up Evaluation (LIFE) (Shapiro and Keller 1979; Keller et al. 1987). Change points in psychopathologic states were recorded by filling in week by week psychiatric status ratings on a quantitative scale of severity for each affective disorder diagnosed at entry or at any time during the follow-up period.

A global assessment scale (GAS) score was determined for each month of follow-up (Endicott et al. 1976). This 100-point scale is used to evaluate both psychopathology as well as psychosocial functioning as affected by psychopathology. The GAS is a measure of severity.

A weekly record was obtained of all medication taken during the follow-up period. The data were converted to drug equivalences and condensed to scales meant to reflect the intensity of somatic therapy used in depression and mania (Coryell et al. 1989). Active treatment for major depression was any tricyclic antidepressant given in doses equivalent to more than 100 mg imipramine, any monoamine oxidase inhibitor given in doses equivalent to more than 30 mg tranylcypromine, any lithium or ECT. Active treatment for mania was any lithium, any ECT or neuroleptics given in doses equivalent to more than 300 mg chlorpromazine.

Both the development of new episodes as well as subsequent hospitalizations were recorded. A remission was defined as 8 consecutive weeks with no more than 1-2 symptoms to no more than a mild degree (ratings of 1 or 2 on a 6-point scale). New episodes for mania were defined as a full syndrome following remission; for unipolar depressions, remissions and new episodes were defined similarly.

This study is concerned with patients who had a diagnosis of either schizoaffective mania, mania or non-bipolar primary major depression (primary unipolar depression) at admission. We evaluated only those patients who had received ECT during the index episode and compared them with patients who did not receive ECT at index.

Only patients who were aged 40 years or younger were used for the unipolar depression comparisons. As depressive patients become older, they show longer duration of episodes and ECT shortens such episodes (Huston and Locher 1948a, b). This poses a problem in that effective treatment may shorten the episode but not get rid of the underlying pathophysiology. Thus, a recurrence may be just an extension of the same episode. We opted to study younger patients whose naturally occurring episodes are shorter. Further, later onset unipolar depressives have a lower family history of affective illness than early onset depressives, suggesting the possibility that late onset or sporadic depression could be a separate illness from the early onset form (Winokur 1979).

To control for the effects of past psychopathology and behaviour, we selected bipolars and primary unipolar depressives who had undergone a remission in the follow-up and for whom we were able to find appropriate matches on the variables of age, sex,

and number of prior episodes and hospitalizations to the index admission. There were 23 manics or schizoaffective manics for whom we were able to find appropriate matches and 42 unipolar depressives who were aged 40 or younger. For continuous variables, the groups were compared parametrically using t-tests and analysis of variance and non-parametrically using Kruskal-Wallis χ^2 tests. For categorical variables, the groups were compared using χ^2 test.

Results

The Bipolar Comparison

Twenty-three manic or schizoaffective manic patients who received ECT at the time of the index episode were compared with 23 patients who did not receive ECT. There was no significant difference between groups on diagnosis, age, sex, number or previous episodes and number of previous hospitalizations.

The mean duration of illness prior to intake was equal in both groups. No ECT, 38.7 (102.1) weeks, ECT, 37.7 (45.7) weeks, $P = 0.96$. The parentheses contain the standard deviations. However, the median number of weeks hospitalized at index from intake to recovery was 3 for the no-ECT group and 7 for the ECT group, $P < 0.001$. For the 75% quartile, the number of weeks hospitalized was 5 for the no-ECT group and 16 for the ECT group. The difference is probably accounted for by the fact that some ECT patients were tried on medication prior to ECT, thus accounting for more hospital time. Twelve of the 23 bipolars (52%) who received ECT during the index episode did not receive ECT during the index admission. Schizoaffective disorder was diagnosed in 5 (22%) of the no-ECT bipolars vs 2 (9%) of the ECT bipolars, $P = 0.218$. The GAS score for severity at intake was 33.4 (9.3) for the no-ECT bipolars vs 30.1 (9.4), $P = 0.237$. Table 1 gives the results. The 23 patients who received no ECT were followed up somewhat longer after recovery. The reason for this was that a certain number of patients did not receive ECT at index admission but at some time later on in the index episode. This made it necessary to evaluate the number of subsequent episodes and the number of subsequent hospitalizations per year of follow-up after recovery. In Table 1, the mean number of hospitalizations per year of follow-up separates the two groups; the ECT group had more. Using median number of episodes and hospitalizations and a non-parametric statistic, the finding becomes even more striking. On the other hand, neither the mean nor median numbers of episodes differentiated the two groups. There is no significant difference in the two treatment groups as regards episodes of mania or episodes of depression, taken separately. We compared the two groups as regards severity of manias or depressions for subsequent episodes after recovery, and there was no difference. There was no significant difference in the two groups of time from intake to recovery. As regards psychotic symptoms (delusions or hallucinations), 48% of the 23 ECT patients and 57% of the 23 non-ECT patients showed such symptoms.

As it was possible that a difference in severity in follow-up was related to the hospitalization difference, we

Table 1. Pre-index characteristics and follow-up data in 23 manic/schizoaffective manic pairs

	No ECT	ECT	
n	23	23	
Female/male	9/14	9/14	
	Mean (SD)	Mean (SD)	P
No. of years followed up after recovery	4.2 (1.3)	3.4 (1.3)	0.06
No. of previous hospitalizations	4.5 (5.2)	5.0 (5.2)	0.77
Age	41.2 (12.4)	41.7 (14.2)	0.91
No. of previous episodes	7.1 (7.2)	6.6 (6.3)	0.86
No. of subsequent episodes/year of follow-up after recovery	0.689 (0.70) Median = 0.602	0.619 (0.66) Median = 0.421*	0.73
No. of subsequent hospitalizations/ of follow-up after recovery	0.28 (0.65) Median = 0.0	0.69 (0.98) Median = 0.421**	0.10

* Kruskal-Wallis: $\chi^2 = 0.2$, $df = 1$, $P = 0.6358$
** Kruskal-Wallis: $\chi^2 = 8.0$, $df = 1$, $P = 0.0046$

Table 2. Lithium prophylaxis on recovery: Effect on episodes and hospitalizations

	n	Mean	SD	t	P
No. of episodes					
Lithium	39	0.69	0.69	0.8115	0.4215
No lithium	7	0.46	0.59		
No. of rehospitalizations					
Lithium	39	0.37	0.57	1.14	0.2950
No lithium	7	1.10	1.68		

Table 3. Pre-index characteristics and follow-up in 42 primary unipolar depression pairs

	No ECT	ECT	
N	42	42	
Female/male	26/16	26/16	
	Mean (SD)	Mean (SD)	P
No. of previous episodes	1.1 (1.2)	1.3 (1.8)	0.54
No. of previous hospitalizations	0.74 (1.43)	0.83 (0.96)	0.72
Age	30.8 (6.2)	29.5 (6.3)	0.34
No. of years followed up after recovery	3.9 (1.3)	3.6 (1.4)	0.47
No. of subsequent episodes/year followed up after recovery	0.487 (0.43) Median = 0.418	0.487 (0.50) Median = 0.426*	0.99
No. of rehospitalizations/year followed up after recovery	0.080 (0.22) Median = 0.00	0.363 (0.71) Median = 0.00**	0.02

* Kruskal-Wallis: $\chi^2 = 0.02$, $df = 1$, $P = 0.8888$
** Kruskal-Wallis: $\chi^2 = 6.24$, $df = 1$, $P = 0.0125$

received ECT at index admission. However, the number of rehospitalizations without ECT also differed. The mean number (standard deviation) of rehospitalizations with no ECT for the no ECT bipolars was 0.275 (0.650) (median = 0.0); for the ECT bipolars, 0.599 (1.015) (median = 0.23). Using a parametric statistic $t = 1.288$, $P = 0.20$; for the nonparametric, Kruskall-Wallis $\chi^2 = 3.17$, $df = 1$, $P = 0.08$; thus between the bipolars, the difference approached significance even for the number of rehospitalizations that did not lead to ECT.

We were interested in evaluating the influence of having been placed on lithium at recovery on the groups that were and were not treated with ECT. However, the group that had neither lithium nor ECT numbered 3 and the group that had ECT but no lithium numbered 4. Consequently, we combined groups and simply looked at the effect of being put on lithium. Table 2 contains these data. Lithium showed no significant effect on episodes or hospitalizations but in keeping with expectation the patients on lithium had one-third the number of subsequent hospitalizations. Of 20 patients who had lithium but no ECT, the mean number of hospitalizations was 0.23 (0.61); but of the 19 patients that had both lithium and ECT, the mean number of hospitalizations was 0.52 (0.50), $P = 0.11$, a trend suggesting that the ECT effect was notable even in the presence of lithium prophylaxis.

The Unipolar Comparison

For the matched unipolar groups, there were no differences in sex, number of previous episodes or number of previous hospitalizations.

As regards other comparisons, the duration of index episode prior to intake was 83.7 (147.7) weeks for the 42 no-ECT unipolars vs 55.1 (72.5) weeks for the 42 ECT

compared the ECT bipolars to the no-ECT bipolars on the variable of the highest GAS score after recovery from index episode. There were no significant differences; the highest GAS score for the ECT group was 70.7 (8.7) and for the no-ECT group 75.1 (10.4), $P = 0.12$.

During the index episode 2 of the 23 no-ECT manics were not hospitalized. These were removed from the comparison and the remaining 21 no-ECT manics were compared with a matched group of 21 manics who had ECT. As in the previous comparison, no difference in subsequent episodes was found. The data for the 21 no-ECT patients showed a mean of 0.30 (0.68) hospitalizations versus a mean for the 21 ECT patients of 0.73 (1.0), $P = 0.12$. The median of hospitalizations for the no-ECT group was 0.0 and for the ECT group 0.44, Kruskal-Wallis $\chi^2 = 6.13$, $df = 1$, $P = 0.013$. This controlling for hospitalization at index episode made no difference. ECT was still related to increased hospitalizations in follow-up.

The data for the bipolars were analyzed to determine whether rehospitalizations occurred specifically for ECT. All subsequent courses of ECT occurred in patients who

Table 4. ECT and tricyclic prophylaxis at recovery in unipolars: relation to episodes and hospitalizations

ECT	Tri-cyclics	n	Episodes n (SD)	Hospitalizations n (SD)
–	–	16	0.30 (0.31)	0.05 (0.21)
–	+	26	0.60 (0.46)	0.10 (0.22)
+	–	11	0.37 (0.40)	0.41 (0.97)
+	+	31	0.53 (0.53)	0.35 (0.62)

unipolars who received ECT during the index episode. The standard deviation for the no ECT group was twice as high as that for the ECT group. This difference was also found between the bipolar groups and suggests that the no-ECT groups contained some patients with a long duration of illness. The reason for this is unknown, but it is noteworthy that the groups were well controlled for the number of prior episodes and hospitalizations. Also, in a combined analysis of bipolars and unipolars ($n = 65$) there was no difference in number of weeks of active treatment between the ECT and no-ECT groups. Further, the standard deviation differences may be partially the result of the ECT groups receiving the more effective treatment which did not allow for longer episodes of illness. The median number of weeks hospitalized for the no-ECT unipolars was 2 and for the ECT unipolars 6, $P < 0.001$. For the 75% quartile, the number was 4 weeks for the no-ECT patients and 14 for the ECT patients. Like the bipolars, the greater length of hospitalization in the ECT patients is probably accounted for by their first being treated with medication and later with ECT. Of those who received ECT during the index episode, some did not receive ECT during the index admission. None in either of the two unipolar groups had ever had a manic episode, nor had any in the two groups ever met criteria for the schizoaffective, depressed diagnoses. However, those who received ECT were more likely psychotic at intake (26% vs 5%, $P = 0.007$) and the intake GAS score was lower (more severe) for the ECT group (33 vs 39, $P < 0.003$).

As with the bipolars, there is no significant difference between the no-ECT and the ECT treated groups on the number of subsequent episodes per year followed up after recovery, but the number of rehospitalizations per year followed up after recovery is significantly higher in the group that received ECT (Table 3). When the medians are evaluated, the finding is the same and at the same level of significance.

Of the 42 unipolar no-ECT patients, 13 of them were not inpatients at intake but all 42 of the ECT patients were hospitalized at intake. The difference was quite significant, $P < 0.001$. To control for the fact that hospitalized patients might be more severe and more likely to have subsequent hospitalizations after recovery, we matched the 29 hospitalized no-ECT patients with 29 of the hospitalized ECT patients and compared them on subsequent episodes and hospitalizations. As for the whole group comparisons, subsequent episodes did not separate the two groups. However, the mean number of subsequent hospitalizations were 0.095 (0.248) for the

no-ECT group and 0.456 (0.834) for the ECT group, $t = 2.2315$, $df = 56$, $P = 0.03$. The median for the 29 no-ECT group was compared with the median for the ECT group and like the parametric comparison the difference was significant, $P = 0.04$, with the ECT group having more hospitalizations.

As it was possible that a difference in severity in follow-up was related to the hospitalized difference, we compared the highest GAS scores in follow-up between the ECT unipolars, 75.3 (8.4) with the no-ECT unipolars 76.1 (7.8). The differences were not significant ($P = 0.62$).

In the group of unipolars, evaluation was made of the effect of being placed on tricyclics after improvement. There were four groups (Table 4). Analysis of variance revealed that ECT was associated with more rehospitalizations ($P = 0.018$) but there was no tricyclic effect or ECT tricyclic interaction on subsequent rehospitalizations. There was neither a main effect of ECT nor an ECT x tricyclic interaction on number of subsequent episodes, but there was a main effect of tricyclics ($P = 0.042$). That effect, however, was opposite to the predicted direction. Those patients placed on tricyclics after recovery were significantly more likely to have new episodes.

As noted above, the unipolar index non-ECT patients were less severely ill and had less psychiatric symptomatology than the unipolar index ECT patients. We controlled for this by dropping all psychotic probands and controlling for the GAS (severity) scores. As a result, we had a decrease to 27 unipolar matches. Again, there was no difference between groups for subsequent episodes per year of follow-up. However, the mean number of subsequent hospitalizations was 0.0498 (0.1594) for the no-ECT group and 0.2077 (0.4326) for the ECT group, $t = 1.7799$, $P = 0.8439$. The medians for both groups were 0.0 and 0.0, Kruskal-Wallis $\chi^2 = 3.75$, $P = 0.0527$. Though this just misses significance, the ratio of subsequent episodes is 4:1, similar to the 4.5:1 ratio in the entire group of 42.

For the unipolars, the data were analyzed to determine if rehospitalizations occurred specifically for ECT. Non-ECT-associated rehospitalizations in the no-ECT group was 0.075 (0.201) (median = 0); for the ECT group 0.260 (0.573) (median = 0). Using a parametric statistic $t = 1.9637$, $P = 0.0549$. For the nonparametric statistic, Kruskal-Wallis $\chi^2 = 4.05$, $df = 1$, $P < 0.04$.

Combined (Bipolars and Unipolars) Comparisons

Combining the groups (bipolars and unipolars, 65 subjects), for the variable of subsequent rehospitalizations not associated with ECT, the index no-ECT group showed a mean number and standard deviation 0.146 (0.427) and the index ECT combined group 0.380 (0.769), $t = 2.1443$, $P = 0.0344$. For the nonparametric statistic, the difference was even more significant ($P < 0.012$).

Thus, the rehospitalization differences between patients treated or untreated with ECT were not simply a reflection of readmitting patients for a new course of ECT.

Table 5. Analysis of covariance dependent variable: number of subsequent hospitalizations

Source	df	F	P
Amount of follow-up after recovery	1	31.3	0.0001
Psychotic or not at intake	1	0.0	0.9674
Inpatient or not at intake	1	0.1	0.7165
Bipolar or not	1	5.4	0.0217
ECT or not	1	5.4	0.0215

It is possible that the increased hospitalization rate in follow-up in the ECT patients simply reflects the fact that those patients were more likely to be inpatients and, therefore, were more likely to be hospitalize again. We controlled for that, comparing two groups of 33 patients, all of whom had been hospitalized prior to recovery. The ECT group was significantly more likely to show subsequent hospitalizations ($P < 0.03$).

As there are five participating centers in this study, we evaluated the 65 ECT patients versus the 65 no-ECT patients to determine whether any of the centers markedly accounted for the administration of ECT. No center was significantly more likely to prescribe ECT in these matched groups.

The 65 ECT patients were compared with the 65 no-ECT patients on the variables of number of weeks of active treatment for depression, psychosis and mania, after excluding the number of weeks of treatment with ECT. There were no differences in the amount of active treatment for either depression, psychosis or mania between the groups. We did the same type of comparison but included the number of weeks attributable to ECT, and, again, there were no significant differences.

Finally to control for the possibility that some of our variables depended on each other, we performed an analysis of covariance with the following independent variables: (1) amount of follow-up after recovery; (2) psychotic or not psychotic; (3) inpatient or not inpatient; (4) bipolar or unipolar; (5) GAS at intake; (6) ECT vs no ECT at index episode. This analysis of covariance model was used to predict the number of subsequent hospitalizations per year of follow-up after recovery. The amount of follow-up after recovery is a continuous covariate. All other variables are dichotomous. The F tests are based on the partial sums of squares after controlling for all other variables in the model. Table 5 presents the results. As may be noted when these other variables are controlled, ECT remains a factor related to subsequent hospitalization. As would be predicted from the natural history of bipolar and unipolar illness, bipolars are more likely to have subsequent episodes and hospitalizations.

Discussion

Previous data suggested that ECT was associated with an increase of episodes over a period of observation in manic and depressed patients (Winokur and Kadrmas 1988; Wesner and Winokur 1989). However, those data relate to the time when ECT was unmodified; and there was no effective anti-manic or antidepressive treatments, or any prophylactic therapy. The Collaborative Depression Study provided an opportunity to look at a modern sample. Other studies have taken up the question of increased rehospitalization after ECT as related to treatment. Avery and Winokur (1978) found that in a large group of affectively disordered patients there was an equal proportion of rehospitalizations in a 6-month period when the groups were divided into those with ECT (5%), adequate and inadequate antidepressant (5%) and neither antidepressant nor ECT treatment (7%). This only refers to the first 6 months after discharge and this amount of follow-up is inadequate to assess the possible influence of treatment.

Though we cannot be certain of the mechanism, the data suggest that modern administration of ECT is associated with increased hospitalizations over time. Interestingly, only hospitalizations appear significantly related to the treatment, not number of episodes. This may well be due to the fact that our present method for picking up episodes depends on arbitrary definitions of numbers of symptoms and periods of time. On the other hand, subsequent hospitalizations tell us something about both severity as well as seriousness as viewed by the community, specifically the family and friends of the patient.

The data suggest that there is a relationship between ECT and a relapsing course in affective illness; however, this might be a social effect. Increased rehospitalizations over time might be due to the possibility that successful treatment brings a patient to the hospital more frequently than if the patient did not have as good a response to other treatment modalities. Thus, the difference between groups may not necessarily reflect more severe psychopathology or more episodes, but instead could reflect a help-seeking phenomenon. Another explanation for the differences could be that physicians who prescribe ECT may treat more aggressively in general and, therefore, may be more likely to hospitalize in the future if they continue to care for the patient.

The dissociation between the increase in number of hospitalizations in ECT-treated patients and the lack of increase in number of subsequent episodes may point to potentially important problems with current diagnostic criteria for affective disorders. Diagnoses by various criteria sets at this point are made on a syndromal basis. The simple fact that an individual meets criteria for an episode means that the individual receives the diagnosis. Perhaps the criteria pick up too many people and create groups which are too heterogeneous with regard to severity and course. From Table 1, it is easy to see that both groups of patients with or without ECT have many more episodes than they have hospitalizations. Is an episode as defined by syndrome criteria really discriminating? The criteria for a depression are broad and define a syndrome which may be the result of multiple causes, unrelated to each other.

Coryell et al. (1981) explored the effect of case definition on affective disorder rates. In data that came out of the NIMH Collaborative Study of the Affective Disorders, the rates of affective disorder among relatives of

patients across five centers were evaluated. Four of these centers were urban centers and one was a rural center. For the broadest criteria (Research Diagnostic Criteria), there was a highly significant difference in the rates of affective disorder in relatives between the urban centers and the rural center, the latter being lower. As one went to more restrictive criteria, i.e. from the Feighner criteria to the Feighner criteria plus treatment with medication to the Feighner criteria plus medication plus hospitalization, it was noted that the differences became less; and in the last group, when hospitalization was brought in as a criterion, all centers had equal rates. Thus, each criteria set appeared to be picking up a different type of depression. A similar qualitative distinction between types of data for diagnosis occurred in another study. Winokur (1983) evaluated the mobidity risks for affective disorder of personally examined family members of bipolar and unipolar patients and compared them with the morbidity risks for controls. There was a twofold increase in affective disorder in the personally examined family members of the patients. Most importantly, however, was the finding that psychiatric hospitalization records in deceased relatives of affectively disordered patients was 8–9 times as frequent as in deceased relatives of controls. Again, there seems to be a qualitative difference in depression as evidenced by hospitalization over that simply picked up by an interview schedule which diagnoses by a set of symptoms. In the present study, there was a clear difference in number of hospitalizations after remission in the ECT-treated patients, but no difference in the number of episodes. It is possible that hospitalizations were identifying more meaningful episodes than are found by the occurrence of a syndrome made up of symptoms.

In the bipolars, the correlation of hospitalizations and episodes was only 0.31 and in the unipolars the correlation was 0.54. Thus, hospitalizations are not a perfect reflection of number of episodes. Other factors must be involved in causing hospitalization.

We looked at the influence of lithium on bipolar patients who did and did not receive ECT and found that there was no significant difference in number of rehospitalizations per year after recovery. However, there was a trend ($P = 0.11$) that suggested that even on lithium, the ECT patients were more likely to have a hospitalization in follow-up than the no-ECT patients.

For the unipolar depressives, there is a similar finding as with the bipolars. In the total group of matched pairs, there is a significant increase in number of rehospitalizations in the ECT-treated group. This, however, is not found in the number of subsequent episodes. Here, however, an influence of treatment was noted; tricyclics were not associated with prevention of episodes. The finding was an association with more episodes in follow-up, quite contrary to expectation (Klerman 1978).

In conclusion, the efficacy of ECT in depressions and manias has been demonstrated numerous times (Black et al. 1987; Abrams 1988). Its use continues to be appropriate for patients who are not manageable by other somatic therapies and may well be the treatment of choice in certain kinds of affective disorder patients and other remitting illnesses. It may well be life saving in preventing suicide as well as deaths from inanition and overexertion. Thus, the findings in this paper should not be used to determine the use of ECT for patient care. Their value is in helping to untangle the pathophysiology of the affective disorders. Also, it would be useful to assess longer term biological changes as well as social or clinical differences that might account for the increased hospitalization rate.

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