

# Electroconvulsive Therapy and Suicide Risk

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For major psychiatric disorders in which suicidality is often a symptom, electroconvulsive therapy (ECT) is an established, highly effective treatment. In fact, suicidal risk may be an indication for the use of ECT to treat those disorders. The authors present new data and review clinical experience that indicate that ECT often exerts a profound short-term beneficial effect on suicidality. Little, if any, evidence supports a long-term positive effect of ECT on suicide rates, especially if diagnostically heterogeneous groups are considered. However, patients may have been assigned ECT precisely because they were suicidal and, hence, these reports may represent underestimates. As a whole, the published reports are weakened by methodological shortcomings, such as lack of controls, weak design, and possible cohort effects. In fact, most studies were designed to examine the impact of ECT on mortality rates in general, and all but one study found reductions in overall mortality, the source of which remains undetermined. (J Clin Psychiatry 1999;60[suppl 2]:104-110)

**E**lectroconvulsive therapy (ECT) is an established and highly effective biological treatment for psychiatric disorders in which suicidality is often a symptom. ECT is most commonly used in the treatment of major depression with or without psychotic features, acute mania, and schizophrenia.<sup>1-3</sup> Although ECT is not considered a treatment for suicidal behavior *per se*, it may decrease or prevent suicidal behavior, presumably due to its effectiveness in treating the illnesses characterized by suicidal symptoms. In patients with severe affective or psychotic disorder, many texts and expert groups specify suicidality as a particular indication for the use of ECT over other treatments.<sup>1,4-6</sup> The rationale is that the onset of clinical response may be quicker and likelihood of improvement more certain with ECT relative to other treatments.<sup>7</sup> For patients with both severe depression and psychotic features, ECT may be the most effective and rapid treatment available.<sup>1,8</sup>

## ECT AND ACUTE SYMPTOMS OF SUICIDALITY

Despite the fact that ECT is specifically recommended for patients with mood disorders in whom suicidality is an important feature, there has been little study of the short-term effects of ECT on suicidal symptoms relative to the other symptoms of major depression. To provide some information on this issue, we examined scores on the suicide item on the Hamilton Rating Scale for Depression (HAM-D, 24-item) for 148 consecutive patients who participated in 2 research studies of ECT.<sup>9,10</sup> Figure 1 presents the average score on the suicide item and the average score on all other items at pre-ECT and after the ECT course, as a function of whether patients met research criteria for clinical response. It is evident in Figure 1 that both ECT responders and nonresponders had a large decrease in scores on the suicide item and that this improvement was greater than the average change on remaining items. To test this proposition, we conducted a repeated measures analysis of variance with response status as a between-subject factor and change in item score (suicide item vs. remaining items) as the repeated measures variable. As expected, there was a large effect of response status ( $F = 43.69$ ,  $df = 1,146$ ;  $p < .0001$ ), with responders evidencing larger decreases in scores than nonresponders across the item classification. However, there was also a robust effect of item classification ( $F = 14.35$ ,  $df = 1,146$ ;  $p = .0002$ ), with a greater decrease in suicide item scores than scores for remaining items, independent of response status. The interaction between response status and item classification did not approach significance ( $F = 1.39$ ,  $df = 1,146$ ; NS).

As indicated in Figure 1, after the ECT course, the mean score on the suicide item among responders was 0.07

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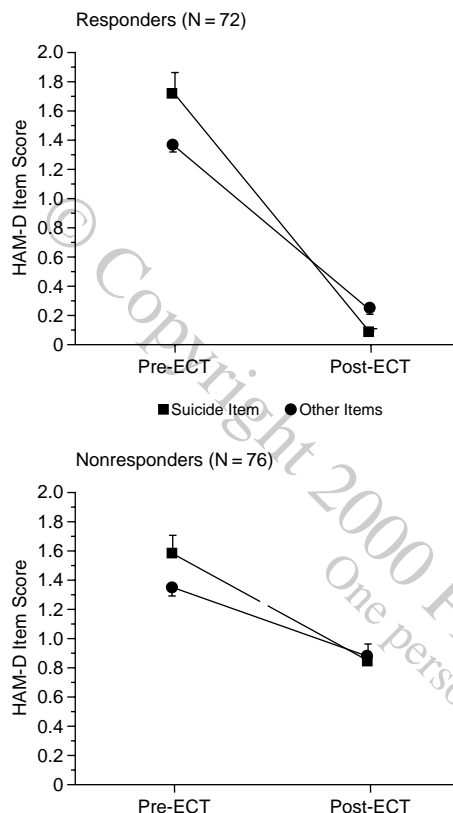
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Figure 1. Mean Score on Hamilton Rating Scale for Depression (HAM-D) Suicide Item and Remaining Items Prior to and Following ECT, as a Function of Clinical Response Status\*



\*Data from patients who participated in 2 research studies of ECT.<sup>9,10</sup>

(SD = 0.30). Among the 72 ECT responders, 1 patient had a post-ECT score of 2 on the suicide item (i.e., indicating wishes or thoughts of death), with no patient having a higher score. Consequently, when patients with major depression respond to ECT, they are extremely unlikely, at least in the short term, to manifest suicidal ideation or intent.

Another way to examine this issue is to rank the HAM-D items in their sensitivity to change over the ECT course. We performed paired-tests contrasting pre-ECT and post-ECT scores on each of the 24 HAM-D items across the sample of 148 patients. Table 1 lists the 5 items most sensitive to change. The suicide item was the fifth most sensitive, and of note, hopelessness, a key predictor of suicidal behavior, was the fourth most sensitive. This analysis of sensitivity underestimates the therapeutic effects of ECT on suicidality, since 42 of the 148 patients had scores of "0" on the suicide item at pre-ECT baseline, resulting in no possibility of change. In contrast, the diagnostic criteria for major depression required depressed mood as a prominent symptom at baseline. In short, these new data illustrate that ECT has profound and consistent short-term therapeutic effect on suicidal symptoms, justifying its consideration when suicidality is a prominent clinical fea-

Table 1. Sensitivity of HAM-D Items to Change Over the ECT Course\*

Item	t Value
Depressed mood	16.1
Work and activities	14.8
Psychic anxiety	11.9
Hopelessness	10.7
Suicide	10.5

\*Data from patients who participated in 2 research studies of ECT.<sup>9,10</sup>

ture. Indeed, in a study of 37 patients, Rich et al.<sup>11</sup> observed that during an ECT course improvement in suicidality scores was particularly rapid, often preceding changes in energy.

Rather than focusing on short-term effects, research on the relations of ECT to suicide has concentrated on a different issue. Several investigators have examined whether ECT exerts a long-term protective effect on suicide and suicidal behavior.

### ECT AND SUICIDE: REVIEW OF STUDIES

Over the past 50 years, different approaches have been used to investigate the impact of ECT on the frequency of suicidal behavior in patients with major depression and other psychiatric disorders. Many of these studies also examined the effect of ECT on mortality from all causes. Historically, the first group of studies retrospectively compared the incidence of suicidal behavior in samples culled from the era before the introduction of convulsive therapy with the incidence in samples treated in a later era, when convulsive therapies (Metrazol or ECT) were the major treatment modality in use. During the next era, investigators examined the impact of the introduction of the psychotropic agents on the frequency of suicidal behavior, assuming that the prior era reflected the use of convulsive therapies alone. Finally, several studies attempted in a more controlled fashion to measure the impact of ECT on suicidal behavior, and often mortality as well, although almost all of this work has also been retrospective.

### Comparisons of Pre-ECT and ECT Eras

Bond and Morris<sup>12,13</sup> conducted a 5-year follow-up of patients in 2 different diagnostic groups: involuntal psychosis and manic-depressive illness. For each diagnosis, they identified patients who were hospitalized during a pre-convulsive therapy era and patients treated during World War II, when the majority received ECT. There were no differences in suicide rates within either diagnostic group when the 2 eras were compared. However, among patients with involuntal psychosis, overall mortality rates were strikingly lower in the convulsive therapy group; the opposite was found among the manic-depressive patients.

Huston and Locher,<sup>14,15</sup> using a design similar to that of Bond and Morris,<sup>12,13</sup> examined suicide rates in patients with endogenous depression. One group was selected for

the diagnosis of involuntal psychosis and the other for manic-depressive illness. Within each diagnostic group, the suicide rate of ECT-treated patients was compared with the rate of patients who did not receive ECT. The non-ECT patients were treated between 1930–1939, and had received hydrotherapy, psychotherapy, group activities, and occupational therapy. The ECT group was treated between 1941–1943. Patients in either group were included only when follow-up information was deemed reliable, generally involving 3 sources of report. The ECT patients were contacted every 6 months for a maximum of 4 years, with a median follow-up of 36 months. The medians for the non-ECT groups were 77 months (involuntal psychosis) and 82 months (manic-depression). Most suicides occurred soon after initial hospitalization. In the non-ECT involuntal psychosis group, there were 9 suicides within the first 2 years, and only 1 suicide after 3 years in the ECT group. Three other suicides occurred by 77 months in the non-ECT group. For the manic-depressives, 5 suicides occurred within 14 months in the non-ECT group, and again only 1 suicide in 3 years in the ECT group; 1 more suicide occurred in the non-ECT group by 82 months. The number of suicides was small, but, impressionistically, this work suggested a decrease in completed suicide with the introduction of ECT.

Levy and Southcombe<sup>16</sup> reviewed various aspects of suicide in a state hospital. Among the analyses made, they compared suicide rates per admission in the pre-convulsive therapy era, a 45-year period from 1891–1936, with rates for the era of convulsive therapies, principally ECT, a span of 14 years from 1936–1949. The rates of 42/10,000 and 32/10,000 for each era, respectively, did not appear to differ statistically.

Karagulla<sup>17</sup> conducted a follow-up of 923 depressed patients, whose treatment was divided into 3 groups: pre-ECT era “untreated” (1900–1939), ECT era but not ECT treated, and ECT treated. The latter 2 groups were hospitalized in 1940–1948. The suicide rates for the 3 groups were similar, although use of ECT appeared to be associated with a reduced rate of suicide following the first hospitalization. During the follow-up period, the overall mortality rate in the 2 comparison groups was similar, but the rate in the ECT group was markedly reduced.

Impastato<sup>18</sup> claimed that the introduction of ECT to a large New York state hospital led to a marked decrease in annual suicide rates, which was reversed by the later substitution of psychotropic medications for ECT. However, the methods used and data supporting this claim were never presented. Contemporaneously, Beisser and Blanchette<sup>19</sup> compared a state hospital sample (N = 75) who had committed suicide with a control group who had not. They made 2 observations. First, 10 patients in the group who completed suicide had received ECT, while this was true of only 4 patients in the comparison sample. This difference was not statistically reliable. Second, the

suicide rate over the period studied, which included pre-ECT, ECT only, and combined ECT and psychotropic treatment eras, was constant except for the final year, when psychotropics became more available due to reordering of budget priorities, and the suicide rate went up sharply.

These studies provided little indication that the introduction of ECT had a clear long-term impact on suicide. The focus on patients treated in different eras, with the possibility of uncontrolled cohort effects, and the retrospective nature of these reports were critical limitations.

### Comparisons of ECT Only and Combined ECT and Psychotropic Eras

Starting in the 1960s, several studies examined the impact of the introduction of various psychotropic medications on suicide rates. As indicated, Impastato<sup>18</sup> and Beisser and Blanchette<sup>19</sup> differed in their findings concerning the effects of ECT on suicide rates, but seemed to have some common ground in noting an increase in the rate with the addition of psychotropic drugs to the treatment armamentarium.

Kline<sup>20</sup> reviewed experience with psychotropic medications in an extensive series of several thousand patients. Although he did not compare ECT with drugs in a formal study design, nor did he present findings, he claimed that there was no increase in suicide with the introduction of psychotropic medications.

Hussar<sup>21</sup> compared the mortality rate over a 4-year period when only ECT was available (1952–55) with that in a combined ECT and psychotropic treatment period (1956–59). The number of admissions was almost identical during the 2 periods. The mortality rates for cardiovascular disease and cancer were significantly greater during the period of combined treatment compared with the ECT only period. Because the hospital records were from a veterans institution, there may have been a cohort effect based on the aging of the veteran patients. In addition to the difference in medical mortality, Hussar found a significant increase in completed suicide during the later combined treatment era.

Chapman<sup>22</sup> examined the suicide rate among veterans during the period between 1946–1962. No change in suicide rate was observed with the introduction of psychotropics.

Krieger<sup>23</sup> reviewed psychological autopsies of patients who completed suicide and the use of psychotropics at a veterans institution from 1955 to 1964. The suicide rate in the early years prior to psychotropic use was lower than the rate during the period when psychotropics were in common use. These 2 time segments overlap, respectively, with the ECT only era and the combined treatment era, in which use of ECT was declining.

The predominance of evidence, albeit highly inferential, appeared to be in the direction of ECT being superior

to psychotropics (of unspecified type) in impact on suicide rate. This observation may have resulted from the fact that the first psychotropic medications introduced were anti-psychotics, a class with only modest antidepressant effects, and/or limitations in the early use of antidepressants with respect to dosage, and/or duration of treatment, in the use of continuation/maintenance pharmacotherapy, and in the potential for suicide through psychotropic overdose.

### Quasi-Controlled Studies of the Impact of ECT on Suicide Rates

Ziskind et al.<sup>24</sup> prospectively compared mortality and suicide rates of patients who did not receive convulsive therapy (N = 109) with those of patients who received either ECT (N = 30) or pentylenetetrazol (Metrazol) convulsive therapy (N = 58). The patients who did not receive convulsive treatment were characterized as having insufficient symptom severity, refused such treatment, or presented contraindications. These patients were termed "untreated." The follow-up period, ranging from 6–69 months, averaged 40 months. Both overall mortality and suicide rates were lower in the convulsive treatment group. In this study, all patients in the convulsive therapy group were hospitalized during the index episode, while this was true of only 30 of the 109 patients in the untreated group. This work lent credence to the view that ECT reduced the suicide rates in an era when other somatic treatments for severe depression, such as antidepressant medications, were not yet available. The divergence in findings between this study and those that compared cohorts hospitalized in different eras may be due to the fact that the Ziskind et al.<sup>24</sup> study was less subject to cohort effects given contemporaneous samples.

More recent studies were conducted in an era in which antidepressant medications became widely used, ECT utilization dropped sharply, and ECT samples became increasingly medication resistant.<sup>8,25</sup> Avery and Winokur<sup>26</sup> conducted a 3-year follow-up of 519 patients with depressive spectrum diagnoses. They found lower mortality from all causes, including but not specifying suicide, in the ECT as compared with inadequate antidepressant or no somatic treatment groups. The groups that received adequate antidepressant medication treatment or ECT combined with antidepressant medications were not statistically different from the other groups, but also showed trends for reduced mortality. The number of suicides over the 3-year period in the total sample was small (N = 8), precluding group comparisons. The advantage of ECT in lowering the mortality rate held when suicide was excluded.

In a subsequent study, Avery and Winokur<sup>27</sup> reported a 6-month follow-up of the same 519 patients. They found fewer suicide attempts in the ECT group compared with the adequate antidepressant medication group and the combined adequate and inadequate antidepressant medication groups, but not the untreated group, which con-

tained a large representation of the patients with depressive neuroses. The ECT and antidepressant medication groups had not differed in history of prior attempts. Taken together, these studies have often been interpreted as suggesting that ECT, in particular, has a beneficial effect on suicide rates. However, no evidence was provided of a beneficial effect of ECT on completed suicide, as opposed to mortality from other causes and suicide attempts. Other limitations included the inclusion of patients with heterogeneous depressive disorders, including dysthymia, for which ECT is rarely considered, the lack of random assignment to treatment condition, and the fact that standards for adequate antidepressant medication treatment have become stricter.

Tsuang et al.<sup>28</sup> conducted a 26-year follow-up of 74 schizoaffective patients by record review, telephone, and death certificate review. He found that patients who had received ECT had a significantly lower mortality rate, but not a lower rate of suicide. Babigian and Guttmacher<sup>29</sup> examined groups of patients registered for hospitalization in 3 consecutive 5-year periods during the modern treatment era. Although they originally included all diagnostic groups, in a final analysis, they narrowed their study to patients with "depressive diagnoses," without specifying the spectrum included. They did not find a difference in mortality or suicide rates between patients who received ECT during a first hospitalization and those who did not, except for the deaths associated with accidents and circulatory disturbances. In these categories, the mortality rate was lower among patients who had received ECT.

Milstein et al.<sup>30</sup> conducted a retrospective 5–7 year follow-up of 1494 patients with diverse diagnoses. In comparing patients who were living, those who had died due to suicide (N = 16), and those who had died due to other causes (N = 60), they found no differences in history of treatment with ECT. The comparison groups were matched for age, sex, diagnosis, and date of admission.

Elderly patients with major depression are at especially high risk for suicide. Only 1 study has focused exclusively on relative mortality rates after ECT and pharmacotherapy in a relatively large sample of elderly patients with major depression. Philibert et al.<sup>31</sup> compared short-term clinical outcome and mortality rate in patients over the age of 65 years with a diagnosis of unipolar depression. One group was treated as inpatients with pharmacotherapy (N = 84), and another group received ECT (N = 108). The ECT group had superior clinical outcome at the end of hospitalization. With a follow-up period that extended up to 10 years, patients who had received ECT had a lower mortality rate than patients treated with pharmacotherapy, despite equivalence in the rate and severity of medical comorbidity at baseline. While this study provided additional evidence that ECT may exert a beneficial effect on overall mortality rate, the causes of death were not reported, leaving the implications for suicide undetermined.

Of note, however, the lower mortality rate exhibited in the ECT group was evident from early to late in the follow-up period, suggesting either that ECT exerted a sustained benefit or that an undetected difference among the groups existed at the outset.

Isometsa et al.<sup>32</sup> examined all completed suicides in Finland (N = 1397) within a 12-month period using the psychological autopsy method. They noted that only 2 individuals (0.14%) had received ECT during the 3 months before suicide. They suspected that the quality of treatment was inadequate in both cases and that the suicides occurred during a period of depressive relapse. While this study documented a remarkably low rate of recent treatment with ECT in individuals who completed suicide, any conclusion would be impressionistic given the low base rate of ECT utilization in Finland.

Many methodological issues could be raised for this group of more recent, often quasi-controlled studies. Where the findings suggested a beneficial effect of ECT on suicide or suicidal behavior, the effects pertained to patients with more classic diagnoses of major depression (e.g., involuntional melancholia, manic-depression). There is little, if any, evidence that ECT exerts long-term impact on the suicide rate and suicidal behavior when diverse diagnostic groups are taken as a whole. More impressively, there is a consistent indication in this literature that the overall rate of mortality is reduced among patients treated with ECT relative to other regimens.

## CONCLUSIONS

Substantial clinical experience and our new data indicate that ECT often exerts a profound short-term beneficial effect on suicidality. This effect is often rapid, and is particularly marked in patients whose psychiatric disorder responds favorably to ECT. This evidence supports the long held view that ECT should be given particular consideration when suitable patients present with acute suicidality.

The comparisons of long-term outcome in patients hospitalized in the pre-ECT and ECT eras found that the introduction of ECT had little impact on suicide rates. Comparisons of ECT and combined ECT-psychotropic treatment eras again did not demonstrate a consistent impact on suicide when the change was made from use of ECT to psychotropic medications as the most common form of treatment. The findings from the quasi-controlled studies, particularly the more recent investigations, show little uniform evidence for a positive effect of ECT on long-term suicide rates, especially if diagnostically heterogeneous groups are considered.

The purpose of many of these studies was to examine the impact of ECT on mortality rates in general, with suicide only a secondary issue. Although the 2 studies by Bond and Morris<sup>12,13</sup> contradicted one another in terms of

mortality findings, all the other studies reviewed here that presented mortality statistics found reduced mortality rates in ECT-treated groups. This work spanned comparisons across the pre-ECT, ECT only, and combined ECT-psychotropic treatment eras, as well as quasi-controlled studies using contemporaneous patient groups. This issue is of consequence since an unknown percentage of deaths categorized as non-suicides, e.g., accidental deaths, were probably, in fact, suicide-related.

A more critical issue to the state of knowledge about ECT and suicide is that almost all of the evidence is flawed. Some of the reports described here presented uncritical reports of personal or institutional experience. Many of the studies were not originally designed to investigate the impact of ECT on suicide and examined changes in suicide rates as an offshoot. For studies of patients from different treatment eras, cohort effects cannot be excluded, especially in light of subsequent evidence that suicide rates may have been changing for successive birth cohorts over the last several decades.<sup>33-36</sup> Few studies were prospective, and, given the base rate of suicide, sample sizes were typically too small to detect what might be considered clinically meaningful effects.

Many studies did not report or analyze demographic or clinical variables that might have strongly influenced between-group comparisons. Demographically, age, sex, marital status, religion, and socioeconomic status have all been found related to suicidal behavior.<sup>37</sup> Symptom severity measures were generally not rigorously addressed, and concomitant factors, such as comorbidity with syndromes such as substance abuse, were seldom assessed. Measures of suicidal behavior, e.g., prior attempts, were seldom reported, and, in fact, a detailed matching for dimensions of suicidality, e.g., lethality, frequency, etc., might be critical in future group comparisons. Indeed, comparison samples sometimes differed in the representation of patients first treated in hospitals or in the community. This difference in treatment setting could have had pronounced effect on the ability to engage in suicidal behavior regardless of the treatment administered.

Nonrandom assignment to treatment conditions characterized all the reports. The uncertainty this introduces cannot be underestimated since suicidality has been a primary indication for the use of ECT since its introduction. Hence, patients may be assigned to an ECT treatment group, precisely because they are a substantial risk for suicide, making comparisons with patients receiving other forms of treatment tenuous. Matching treatment groups on standard phenomenological variables, such as overall symptom severity, may not adequately address this concern. Consequently, the hints in this literature of a protective effect of ECT may be underestimates, given the possibility that ECT samples were more prone to serious suicidal behavior. However, it is unlikely that a prospective, random assignment trial of sufficient magnitude

could now be conducted to contrast the effects of ECT and adequate pharmacotherapy conditions on subsequent suicide rate. Failure or intolerance of pharmacotherapy and clinical urgency are the most common indications for ECT. Case-control methods using rigorous matching techniques, while not optimal, may be the only realistic approach to provide better quality information.

The initial investigations into questions regarding the impact of ECT on suicide were sparked by clinical impressions and scientific curiosity. On deeper consideration, it is not clear why ECT should be considered as potentially having an impact on suicide rates beyond the short term. ECT is mainly used as an acute treatment, providing symptomatic relief during exacerbations or episodes of affective and other disorders. Relapse rates following ECT, like relapse rates following pharmacotherapy, are substantial if somatic treatment is terminated at the point of symptomatic improvement.<sup>38-42</sup> The most common approach used following treatment with ECT is to institute continuation/maintenance treatment with pharmacologic agents. In the long run, any impact on suicide rates may not necessarily be due to ECT, but may in part, or even predominantly, be due to the success of the continuation/maintenance treatment in preventing relapse and recurrence. Indeed, it can easily be imagined that a medication-resistant patient responds to ECT, is placed on pharmacotherapy only to relapse, and then becomes hopeless of more persistent improvement, ultimately committing suicide. Depending on the time frame, there may be some merit in viewing such an event as an ECT failure. Undoubtedly, however, such events should also be viewed as failures of pharmacotherapy.

Finally, the fact is puzzling that the evidence indicates that treatment with ECT is associated with a long-term protective effect against mortality. If the clinical benefit produced by ECT is generally short-term in nature, why would there be a reduced mortality rate in studies in which the follow-up period extends to several years? Clearly one possibility is that undetected cohort effects are determinative, with patients who receive ECT more likely characterized by lower levels of a risk factor for subsequent death. Another possibility is that patients who receive and respond to ECT in 1 episode are more likely to again receive ECT with recurrence, and that the repeated use of this modality with especially pronounced and rapid efficacy results in a reduction in overall mortality.

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