The Journal of ECT
19(1):38–44 © 2003 Lippincott Williams & Wilkins, Inc., Philadelphia

Effects of Animal-Assisted Therapy on Patients' Anxiety, Fear, and Depression Before ECT

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Summary: *Objective:* To determine whether animal-assisted therapy (AAT) is associated with reductions in fear, anxiety, and depression in psychiatric patients before electroconvulsive therapy (ECT). *Materials and Methods:* Before their scheduled ECT treatment, 35 patients were assigned on alternate days to the treatment condition, consisting of a 15-minute AAT session, and the standard (comparison) condition, consisting of 15 minutes with magazines. Visual analogue scales were used to measure anxiety, fear, and depression before and after treatment and standard conditions. *Results:* The effect of AAT on fear was significant in both the mixed-model, repeated-measures analysis of covariance (ANCOVA) ($p = 0.0006$) and the secondary analysis ($p = 0.0050$), which covaried out all of the demographic conditions (gender, race, marital status, pet ownership, age), condition order, and the pretest rating. The effect of AAT on anxiety approached significance in the ANCOVA ($p = 0.0982$), but in the secondary analysis, the effect was not significant ($p = 0.6498$). The AAT effect on depression was not significant in ANCOVA ($p = 0.7665$) or in the secondary analysis ($p = 0.9394$). A least squares mean analysis showed that AAT reduced fear by 37% and anxiety by 18%. There was no demonstrated effect of AAT on depression. *Conclusions:* Animal-assisted therapy may have a useful role in psychiatric and medical therapies in which the therapeutic procedure is inherently fear-inducing or has a negative societal perception.

Key Words: Electroconvulsive therapy—Animal-assisted therapy.

INTRODUCTION

As is common with other medical procedures, patients undergoing electroconvulsive therapy (ECT) often report increased fear and anxiety (1–3). Despite the introduction of ECT modified with general anesthesia and other technologic and medical safety innovations, fear before ECT continues to be evident. Interestingly, fear has been associated with ECT since its inception (1). Several authors have reported that between 29 and 75% of their patients fear ECT (4–6). Such fear can lead to noncompliance with the treatment plan and refusal of treatment (1,4,5).

A few studies have looked at the effectiveness of educational interventions developed to address the fear and anxiety experienced by patients undergoing ECT; however, the results are mixed. Cohen (7) found no reductions in anxiety after pre-ECT education that included emotional support, and Battersby et al. (8) found no reductions in fear after an educational video. In contrast, Harrison and Kaarsemaker (9) reported reduced anxiety when an educational video and written information were provided before ECT, although results were based on patient self-reports in follow-up phone interviews.

A growing number of studies are documenting the benefits of interaction with companion animals for psychiatric patients. Two different types of animal activities are defined in the literature: *animal-assisted therapy* (AAT), the intentional incorporation of trained animals by healthcare professionals into patients' treatment plans; and the less structured *animal-assisted activities* or animal visitation (10). However, most studies appear to use the term *AAT* to encompass both types of activities. Barker and Dawson (11) reported reduced anxiety in hospitalized psychiatric patients with a variety of disorders after 30 minutes of interaction with a therapy dog and its handler. Marr et al. (12) investigated the effectiveness of AAT with hospitalized psychiatric patients, randomly assigning patients to rehabilitation groups with and without AAT. They found increased prosocial behaviors in the AAT group. Barak et al. (13) reported increased social functioning after 1 year for patients randomly assigned to AAT compared with a control group.

Focusing on geropsychiatric patients, Zisselman et al. (14) randomly assigned patients to AAT or an exercise group and reported decreased irritability in women, but not men, for both groups. Kanamori et al. (15) studied a similar patient group in Japan—elderly patients with dementia in a psychiatric day care center—and reported decreased aggressiveness, anxiety, phobias, and caregiving burden for the patients assigned to AAT compared with matched controls.

The purpose of this study was to determine whether

Received July 29, 2002; accepted November 22, 2002.

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AAT is associated with reductions in fear, anxiety, and depression in psychiatric patients before ECT. Also of interest is whether any effect that may be found is related to pet ownership. These symptoms were selected for study because 1. a reduction in anxiety was found in a previous study of psychiatric patients after AAT (11), and 2. both patient fear and patient anxiety have been identified as symptoms of concern in the ECT literature. Although these constructs are not mutually exclusive, they were both considered important to assess in this study. Depression was included as a null hypothesis. A brief interaction with a therapy dog was not expected to impact depression significantly that was refractory to pharmacologic treatment and severe enough to warrant ECT.

MATERIALS AND METHODS

A controlled crossover design was used in which subjects served as their own controls. Patients were assigned on alternate days to the treatment condition, consisting of a 15-minute AAT session, and the comparison condition, consisting of 15 minutes with magazines. It was not possible to blind subjects to the conditions in this study. Pretests and posttests were administered for both conditions. A university institutional review board for the protection of human subjects approved the study design and procedures, and all patients provided consent to participate.

Subjects

Subjects were selected from adult inpatients and outpatients scheduled for ECT on Fridays in an academic medical center. ECT is conducted on a hospital psychiatry floor in a fully equipped ECT suite. Patients are referred for ECT by attending psychiatrists on the inpatient services, psychiatrists in the community, or state mental health facilities. Typically, these patients have severe depression, bipolar, or psychotic disorders that have been refractory to psychopharmacologic interventions. Referred patients are screened for appropriateness for ECT by the ECT attending psychiatrist.

For this study, eligible patients were age 18 years or older who provided informed consent. Exclusion criteria were involuntary patients, patients with known allergies to dogs, patients deemed by the attending psychiatrist to be unable to provide informed consent, and patients identified by the ECT attending psychiatrist as posing a risk to the therapy dog because of a history of aggression toward people or animals. Patients were asked about dog phobia during the informed consent process and were excluded if they responded affirmatively.

Intervention

The treatment condition consisted of 15 minutes of interaction with a therapy dog and its handler. Adhering to the university hospital's psychiatry AAT policy, the therapy dog and handler participating in this study were nationally certified (Delta Society Pet Partners) as a therapy dog-handler team. The handler was instructed to focus conversation on the therapy dog and the patient's experience with pets. The intervention took place in ECT holding rooms, private patient rooms in which patients change into hospital gowns, have vital signs assessed, and wait for their treatments. Although physical interaction with the therapy dog, such as petting and hugging, was permitted, it was not suggested, and patients were allowed to determine the level of interaction.

The comparison (standard) condition consisted of 15 minutes with magazines provided to the patient. The magazines were news-related magazines such as *Time* and *Newsweek*, entertainment magazines, or outdoor magazines. The terrorist attacks of September 11, 2001, occurred during this study, and subsequently, the news magazines were omitted from the study to avoid the possibility of increasing patient anxiety and fear by media coverage.

Instruments

Because a previous study involving the same type of patients revealed that they could not complete simple self-report instruments, visual analogue scales (VASs) were used to collect patient self-reported levels of anxiety, fear, and depression (Barker SB, Rasmussen KF, Best AM, unpublished data, 2001). These scales had been used successfully with this population previously and consisted of a 15-cm line on a page anchored on the left end with the label "none" and on the right end with "the most severe imaginable." There was a separate page for each mood assessed, and a research assistant read the instructions to each patient. Although reliability and validity have been established for VASs with other patient populations, such as patients with pain (16), such data have not been reported for assessing psychiatric symptoms in chronically mentally ill patients. In an effort to assess the validity of the VAS with the subject population, nurses completed the same VAS after interaction with the patient, and patients were briefly interviewed after AAT to obtain patient ratings of AAT effectiveness.

Demographic information was collected from the patient by the research assistant or from patient records by the principal investigator. Data collected were age, gender, marital status, current living arrangement, and number of previous ECT treatments.

A brief interview was developed by the senior author to obtain patient perceptions of the effectiveness of the AAT intervention. After both the treatment and comparison conditions, patients were asked what, if anything, made them feel better on that day. To assess the patients' opinions of this novel intervention (therapy dog), patients were then asked to rate how helpful the dog was in lessening feelings

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of anxiety, fear, and depression. This question was asked after all other ratings and questions were completed. Responses were solicited using a 4-point Likert scale ranging from "not at all" to "very much." Finally, patients were asked whether they wanted to spend time with the dog on subsequent ECT days and whether they owned a pet.

Procedures

Each Friday morning, the ECT attending psychiatrist or ECT nurse identified appropriate study subjects from those scheduled for ECT. These were patients who met the inclusion and exclusion criteria. The ECT psychiatrist or nurse then asked the patients whether they were interested in participating in a study of patient mood before ECT. For patients agreeing to participate, informed consent was obtained by a research assistant, followed by administration of the pretest, consisting of the VASs for anxiety, fear, and depression, presented in random order. Patients were then assigned to the treatment or comparison condition on a rotating basis on different days.

In consideration of the therapy dog and in keeping with our psychiatry AAT policy, a maximum of four patients were assigned to the treatment condition to be seen individually on any one day. Therefore, the therapy dog worked directly with patients for a maximum of 60 minutes. The standard condition, providing magazines, was conducted at the same time of day.

After 15 minutes of the treatment or standard condition, the research assistant again administered the VASs in random order, followed by the brief interview. Patients were then thanked for their participation.

Nurses were also asked to complete the VASs based on their assessment of the patients' moods from recent interactions with the patients that morning. Time of scale completion was noted to correlate nurse ratings with the appropriate patient pretest or posttest ratings. Nurses were blind to the purpose of their scale completion (for comparison with patient scale ratings to assess scale validity).

Statistical Analysis

The following analyses were conducted:

1. Pearson correlations were used to investigate the reliability and validity of the VAS scores. Correlational analyses were conducted on the relationship between the patient-completed and nurse-completed VAS, between patient preintervention and postintervention VAS ratings, and between patient interview ratings of AAT effectiveness and effectiveness as indicated by preintervention and postintevention VAS differences.
2. A mixed-model, repeated-measures analysis of covariance (ANCOVA) was used to compare the posttreatment VAS scores for the treatment and comparison condition.
3. A least squares mean analysis was also used to compare the posttreatment VAS scores for the treatment and comparison conditions.

RESULTS

Description of Subjects

Thirty-five patients were enrolled in this study of the effect of AAT on pre-ECT anxiety, fear, and depression in psychiatric patients. The average age of subjects was 54.2 years (SD = 18.6 years, range = 21–85 years). Seventy-one percent (n = 25) were female, and 29% (n = 10) were male. Seventy-seven percent were white (n = 27), 20% black (n = 7), and 2.8% Hispanic (n = 1). Forty-six percent were married (n = 16), 26% single (n = 9), 17% divorced (n = 6), and 11% widowed (n = 4). Eighty-six percent of patients lived in their family home (n = 30).

Sixty-three percent (n = 22) of the subjects were pet owners. The majority owned dogs only (55%, n = 12), followed by cats only (23%, n = 5), and both cats and dogs (18%, n = 4). One subject did not identify the type of pet.

Subjects' diagnoses reflected those typical of the ECT population, with more than half of the subjects (54%, n = 19) having a diagnosis of depression, and the remaining having bipolar disorders (20%, n = 7), psychotic disorders (17%, n = 6), and dementia with depression (9%, n = 3). The median number of previous ECT treatments was three, and half of the subjects had undergone between 1.75 and 12.25 previous treatments.

Validity and Reliability of Visual Analogue Scales

In order to assess the reliability and validity of the VASs for anxiety, fear, and depression, five ratings were examined:

1. VAS scale completed by the patient before interventions
2. VAS scale completed by the patient after interventions
3. The postintervention minus preintervention VAS rating difference
4. VAS scale completed by nurse either before or after interventions
5. Patient interview response to the question, "How helpful was [dog's name] in lessening feelings of…?"

Table 1 shows the correlations (with p values) between pairs of ratings on the VASs. A measure of reliability was obtained by analyzing the relationship between preinterven-

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TABLE 1. *Correlations between rating systems*

Rating	Anxiety		Fear		Depression	
	r	p	r	p	r	p
Post with preintervention	0.78	0.0001	0.77	0.0001	0.45	0.0001
Pre-post difference with preintervention	0.32	0.0121	0.38	0.0028	0.38	0.0003
Pre-Post difference with reported effect	0.23	n.s.	0.51	0.0042	0.16	n.s.
Pre Intervention with nurse assessment	0.34	0.0338	0.07	n.s.	0.24	n.s.
Postintervention with nurse assessment	0.68	0.0050	0.65	0.0091	0.65	0.0144

n.s., not statistically significant ($p > 0.05$).

Preintervention indicates visual analogue scale (VAS) rating by the subject before interventions. Post indicates VAS rating by the subject after interventions. Difference indicates difference between the post and pre VAS ratings. Nurse assessment indicates VAS rating completed by nurse either before or after interventions. Reported effect indicates subject interview response to "How helpful was [dog's name] in lessening feelings of [anxiety, fear, depression]?"

tion and postintervention patient VAS ratings. As can be seen in Table 1, there is a strong and significant correlation (r values $= 0.78$) between the patient preintervention and postintervention VAS ratings for fear and anxiety, and a moderate and significant correlation ($r = 0.46$) for depression.

Measures of validity were obtained by analyzing the relationship between nurse and subject VAS ratings, subject pretreatment VAS scores, and the amount of change in the VAS ratings (VAS postintervention minus preintervention), and the relationship between preintervention and postintervention VAS score differences and patients' ratings of AAT effectiveness during the postintervention interview. A strong and significant correlation (r values > 0.64) was found between the nurse and subject ratings at the postintervention for anxiety, fear, and depression. The nurse rating of anxiety at the time of pretest was also correlated with the subject's VAS score ($r = 0.34$). However, there was little, if any, relationship between nurse and patient pretest ratings in the fear and depression domains. There was also a consistent relationship between the preintervention VAS and the amount of change (VAS postintervention minus preintervention) reported by the subject, indicating that subjects were not randomly marking the VAS. There was a moderate and significant relationship ($r > 0.51$) between interview ratings of AAT effectiveness and preintervention and postintervention VAS differences in the domain of fear, with little, if any, relationship in the domains of anxiety and depression. These findings lend support to the reliability and validity of the VAS scales with this patient population.

Effectiveness of Intervention

The experimental design aimed to assess the three domains of fear, anxiety, and depression before and after the interventions. Using a crossover design, on one occasion, a subject was assigned to receive AAT, and on another occasion, magazines and not AAT. Comparison of pretreatment VAS for the two conditions revealed that the two subject conditions were comparable ($p > 0.2$).

The AAT intervention was assessed using a mixed-model, repeated-measures ANCOVA in which the preintervention VAS score was used as a covariate. In all analyses, the preintervention VAS score was a significant covariate ($p < 0.0001$). A secondary analysis was performed on each of the three rating areas (anxiety, fear, depression) to compare the AAT condition ($n = 33$) and standard condition ($n = 26$) after covarying out all of the demographic conditions (gender, race, marital status, pet ownership, age), condition order (AAT followed by magazine or magazine followed by AAT), and pre-ECT VAS rating. These analyses were performed to verify that the effect of AAT in this more complex analysis was the same as the effect of AAT in the repeated-measures ANCOVA.

In the ANCOVA results, the effect of AAT on anxiety was marginal ($p = 0.0982$), but in the secondary analysis, the effect was not significant ($p = 0.6498$). The AAT effect on fear was significant in both ANCOVA ($p = 0.0006$) and in the secondary analysis ($p = 0.0050$). The AAT effect on depression was not significant in ANCOVA ($p = 0.7665$) or in the secondary analysis ($p = 0.9394$). The ANCOVA results revealed no significant effect of pet ownership (owner versus nonowner) for anxiety ($p > 0.29$), fear ($p > 0.49$), or depression ($p > 0.26$), and no significant effect for treatment order ($p > 0.50$).

The least squares mean analysis controls for the treatment condition and preintervention VAS score. Table 2

TABLE 2. *Least squares means comparing treatment (animal-assisted therapy) and standard condition (n = 24 pairs)*

	Anxiety		Fear		Depression	
	LS mean	SE	LS mean	SE	LS mean	SE
Treatment	5.93	0.467	4.27	0.408	6.36	0.441
Comparison	7.13	0.527	6.61	0.459	6.56	0.497
Difference	1.20*	0.693	2.34†	0.58	0.20	0.665

LS mean, least squares mean. *$p = 0.09$. †$p = 0.0006$.

Mixed-models, repeated measures analysis of covariance using pretreatment rating as a covariate.

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shows the least squares means for anxiety, fear, and depression for the treatment and comparison conditions. Figure 1 shows the effect of AAT on anxiety, fear, and depression based on this analysis. For anxiety, AAT accounts for a mean difference of 1.2 units (95% CI, −0.16 to 2.56). As seen in Figure 1A, the comparison group has a higher postintervention anxiety level than the treatment group ($p = 0.0982$). At an average anxiety of 6.62 units, AAT produces an anxiety difference of 18%.

Figure 1B shows that the impact of AAT on fear is even clearer. The AAT therapy was shown to be a highly significant intervention in terms of reducing fear ($F(1,22) = 16.18$, $p = 0.0006$). The least squares means, shown in Table 2, reveal that AAT accounts for a mean difference of 2.2 units (95% CI, 1.10–3.37). At an average fear level of 6.26 units, AAT reduced fear by 2.2 units or 37%.

There is no demonstrated effect of AAT on depression ($F[2,22] < 1$, $p > 0.7$).

Interview Results

Responding to the interview question of what helped them feel better on the day assessed, those in the AAT condition most frequently identified the dog (47%, n = 16), followed by nothing (23%, n = 8). Those in the standard condition most frequently identified the nurse or nothing (both 17%, n = 6), followed by a family member (11%, n = 4). No subjects in the standard condition indicated that the magazines helped them feel better.

The majority of subjects indicated in the interview that the therapy dog lessened their anxiety (77%, n = 23), fear (55%, n = 17), and depression (55%, n = 17), in varying

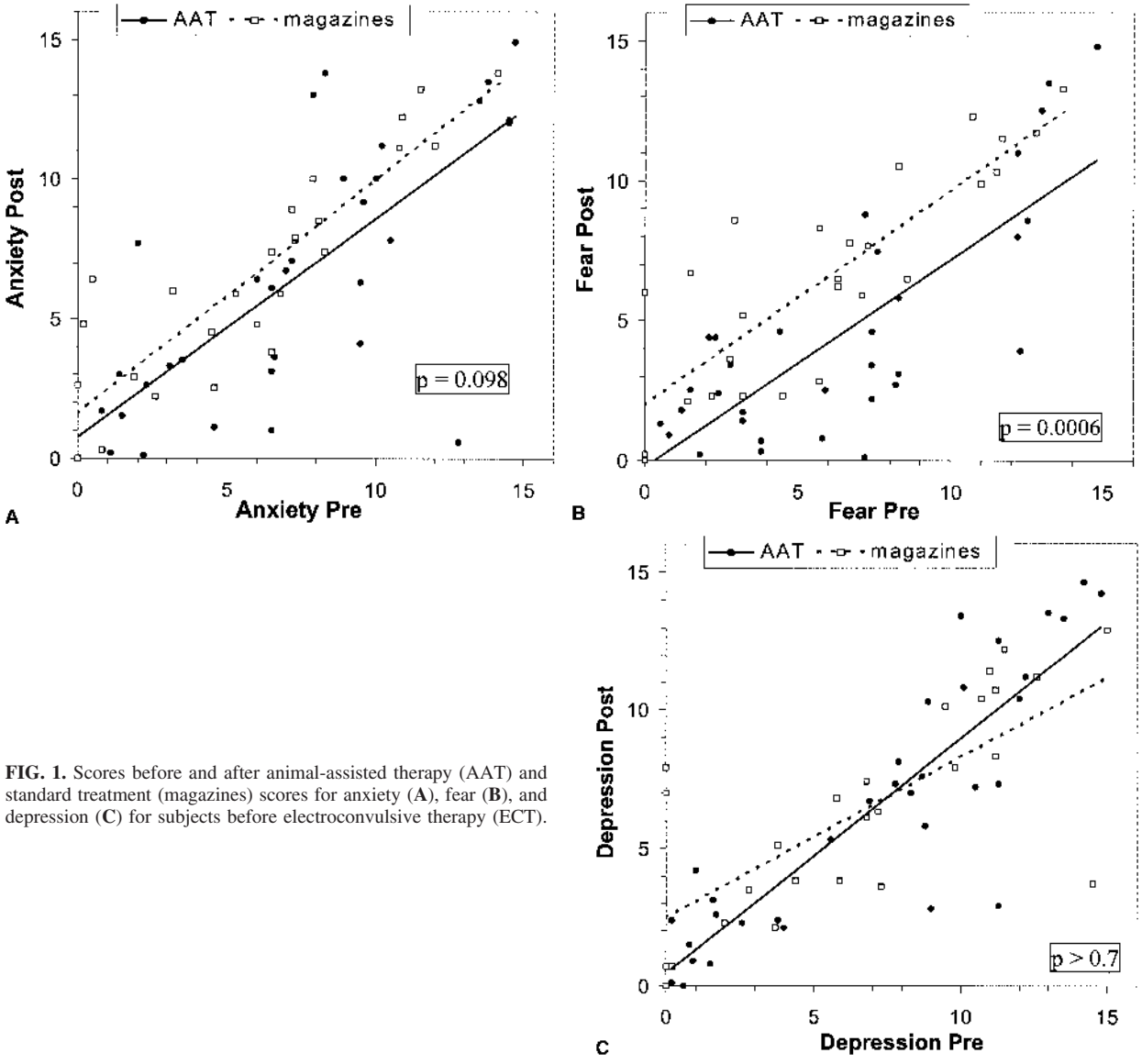

FIG. 1. Scores before and after animal-assisted therapy (AAT) and standard treatment (magazines) scores for anxiety (**A**), fear (**B**), and depression (**C**) for subjects before electroconvulsive therapy (ECT).

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degrees (from a little to very much). Almost three fourths (71%, n = 25) of the subjects indicated that they would like AAT on a subsequent treatment day. This number included all the pet owners and three out of 13 patients who did not own pets.

Typically the subjects petted the therapy dog and asked the handler questions about him, such as the dog's name and age and requirements for being a therapy dog. The handler engaged the subjects in a discussion of their own past and current pets and provided dog treats for subjects to give to the dog. Some patients wanted the dog on their beds to hug him and more actively pet him. Most subjects smiled during these interactions and also thanked the handler for bringing the dog. Often the subject continued talking about the dog after the visit with the ECT team.

DISCUSSION

In this study, patients waiting for ECT were found to have a significant reduction in fear (37% from baseline) after spending 15 minutes with a therapy dog and its owner. This finding is not only statistically significant ($p = 0.006$) but also clinically significant. Whether or not patients were pet owners, and regardless of gender, age, race, and marital status, they seemed to benefit from this relatively brief interaction. Fear reduction is important clinically because fear can contribute to noncompliance with treatment, create a negative perception of this procedure, and possibly impact the outcome.

Animal-assisted therapy did not result in a significant reduction in anxiety. Whereas a previous study of AAT in our program in 1998 (11) with inpatients in an acute psychiatric setting found significant reductions in anxiety after 30 minutes with a therapy dog, a similar reduction was not found with this group of patients undergoing ECT. Although the least squares mean analysis in the current study did show an 18% reduction in anxiety, the difference was not statistically significant. It should be noted that our 1998 study involved an intervention twice as long as that in the current study and did not target patients undergoing ECT, but rather was applied to general psychiatry patients with various psychiatric disorders. One possible explanation for the difference in study results is the difference in measurement instruments used. In the 1998 study, the acute psychiatric patients were able to complete the State-Trait Anxiety Inventory (17), whereas the patients undergoing ECT were unable to do so and were administered VASs instead. The two instruments may be measuring different aspects of anxiety. The State-Trait Anxiety Inventory consists of 28 items assessing anxiety, whereas the VAS is a single, global measure.

Another possible explanation for the difference in study results may be the different types of anxiety that were targeted. Whereas in the previous study of general psychiatric inpatients, the anxiety was more free-floating, in this study, the anxiety was more specific, focused on the ECT procedure, and was anticipatory in nature. The underlying psychologic and biologic mechanisms are putatively different for these two situations (18). It is also possible that a longer AAT session may be needed to assess the potential of this intervention for bringing about significant anxiety reduction in this more focused anxiety experienced by patients undergoing ECT.

The lack of significance for the reduction in anxiety is also interesting in light of the significant reduction in fear. Whereas anxiety and fear substantially overlap and may have been expected to respond similarly to the animal visit, a differential effect as seen in this study is quite compatible with current understanding of differences between these two emotions (19). The fear component may be associated with a specific stimulus, namely the ECT procedure, and may have responded more robustly than the anxiety component, which may be related to more diffuse stimuli and may be less responsive to the preprocedure animal visit. Further investigation in this area appears warranted.

The lack of a significant effect on depression was the null hypothesis. We hypothesized that depression resistant to various medications and severe enough to warrant ECT would not be affected by an interaction with an animal, even transiently. We believed that the brief interaction of 15 minutes would be a rather weak intervention to produce any discernible effect. Again, the lack of significant effect from this brief interaction does not rule out an effect one might find from a more sustained therapy or a longer duration of therapy.

There are several limitations to this study. Patients were not randomly selected, and therefore, generalizations to other populations should be made with caution. Also, it was not possible to blind patients to the intervention. We considered blinding the rater but found this step impractical to implement in our ECT suite area. Although it is not possible from this study to separate the effects of the dog from its handler, AAT is always conducted with the companion animal and handler.

A possible bias exists from asking patients only after the treatment condition whether the therapy dog helped diminish their fear, anxiety, and depression. However, this subset of questions was asked only after all VASs were completed so that ratings were not influenced by these questions.

The mechanism by which AAT may reduce the emotion of fear before ECT is unknown. We speculate that psychologic, behavioral, or biologic mechanisms or a combination of these may be at play. For example, previously it has been suggested that the animal provides a nonthreatening, nonjudgmental partner in facing daily stress (20,21). More simplistically, one may propose that the 15-minute period spent with the animal distracts the patient from preoccupation with the upcoming procedure. However, this cannot be the

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whole explanation, because there were differential effects for fear and anxiety. The presence of the animal may be interrupting an operant conditioning loop in which the preanesthesia procedures act as fear-inducing factors (18,22). Another possibility, not necessarily exclusive of these psychologic mechanisms, may be a reduction in cortisol secretion mediated by hypothalamic-pituitary-adrenal pathways (23–25). The last mechanism is currently being tested in our program.

The results of this study lend further support to the therapeutic benefit of AAT. In addition, patients liked having the dog visit, and 77% stated that the dog helped them feel better on the day of the visit. Approximately 71% of the subjects desired AAT on their next treatment day. Although the statistical analysis found significant reductions for only fear, more than 50% of the patients perceived that the dog lessened their fear and depression to some extent, and more than 75% perceived that the dog reduced their anxiety. Thus, patients clearly perceive benefits of interacting with the therapy dog even when such benefits are not significant by results of statistical analyses.

We conclude that AAT may have a useful role in psychiatric and medical therapies in which the therapeutic procedure is inherently fear-inducing or has a negative societal perception. Further, our preliminary study demonstrates differential effects on fear, anxiety, and depression and warrants a larger study of these effects and the underlying mechanism of action.

Acknowledgments: The authors acknowledge Elaine Platt, who served as research assistant, and Jay McLaughlin, M.S., and his certified therapy dog, Ivory, for their valuable contribution to this study.

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