

## Long-Term Outcome After Treatment of Feline Inappropriate Elimination

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Urination and defecation outside the litter box is one of the most common behavior problems reported by cat caretakers and the most common behavioral reason that results in the relinquishment of cats to shelters. A physical examination, laboratory tests, and a thorough behavioral history are necessary to differentiate between the diagnoses of disease, marking, and inappropriate elimination. This study followed up on the outcome of cats who were treated for inappropriate elimination. Fifty-eight caregivers completed a telephone questionnaire 12 to 54 months after treatment was initiated. Twenty-seven (47%) of caregivers felt their cat was cured, 15 (26%) felt their cat was much better, 8 (14%) slightly better, 6 (10%) the same, and 2 (3%) worse. Forty caregivers (67%) observed a 90% to 100% reduction in frequency. There was a significant association between the caregivers' perception of treatment outcome and percentage reduction in frequency. There was a significant association between caregivers compliance and outcome. The results of this study give caregivers a valid and promising alternative to relinquishment for inappropriate elimination problems.

Urination and defecation outside of the litter box are among the most common behavioral problems reported by cat caretakers (Borchelt & Voith, 1996; Voith, 1985). It is also the most common behavioral problem that results in the relinquishment of cats to shelters (Patronek, Glickman, & Beck, 1996; Salman, Hutchison, & Ruch-Gallie, 2000).

The phrase *inappropriate elimination* as used here always refers to the diagnostic category. The differential diagnoses for urination or defecation outside the litter box are (Borchelt & Voith, 1996) disease (cystitis, diarrhea), marking, or inappropriate elimination.

Physical examination and laboratory tests (urinalysis and blood chemistries) are necessary to rule out medical causes. A thorough behavioral history (Voith & Borchelt, 1996) that includes the posture the cat assumes when urinating, the locations where the caregiver is finding excrement, the amount of urine deposited, the context in which the behavior occurs (e.g., agonistic encounters), and scratching behavior while eliminating, is necessary to differentiate between marking and inappropriate elimination.

A cat may urine mark either in a standing or squatting posture. When standing, the urine is sprayed on vertical surfaces. When squatting, the urine is deposited on horizontal surfaces. Cats who urine mark usually do so in small amounts in several locations. Common locations are doors, windows, stereo speakers, kitchen appliances, and athletic bags. Marking has a communicative function. Cats mark when in competition with other cats, to advertise their sexual availability, or when in situations of conflict (e.g., waiting to go outside or to eat). Cats may mark with either urine or feces (Leyhausen, 1979), although urine marking is much more common in homes than fecal marking. Cats who mark usually do not scratch before marking, but may scratch afterward.

Cats with the diagnosis of inappropriate elimination may urinate or defecate outside the litter box. Very often, cats deposit one form of excrement reliably in the litter box and use the inappropriate location for the other form. The urination is performed in a squatting posture, usually in large amounts, in one or a few locations and usually on a favored substrate such as carpeting or smooth floors. Cats diagnosed with inappropriate elimination use inappropriate locations for eliminating waste products, rather than as a communication signal. They often perform the normal elimination behavior of scratching before and after elimination.

## THIS STUDY

### Treating Inappropriate Elimination

This study included only cats who were diagnosed with inappropriate elimination and were free from an ongoing contributing medical problem (e.g., urinary tract or gastrointestinal disease). Cats diagnosed with territorial marking were excluded.

Treatment for inappropriate elimination has been described by several authors (Beaver, 1992; Borchelt & Voith, 1996; Cooper, 1997; Hart, 1985, 1996; Voith, 1981). Borchelt and Voith (1996) recommended correction of both the factors initiating the problem and those maintaining the problem. Some common initiating factors include discomfort associated with a medical problem, an unclean litter box, a box in a stressful location, too few litter boxes for the number of cats in the household, the box design, or the type of litter. The initiating factors cause the litter

box to become aversive, resulting in the cat's choosing an inappropriate toilet location. The habitual use of the inappropriate location is reinforcing and therefore maintains the unacceptable behavior.

After resolving any medical problems, behavioral treatment involves making the litter box situation as pleasant as possible for the individual cat, thus correcting the initiating factors. A litter box choice experiment that may vary location, type of box, and type of litter enables the identification and eventual correction of the initiating factors. Daily or twice-daily scooping and completely changing the litter in the box when indicated is usually prescribed to preclude the common initiating factor of an unclean litter box. Making the inappropriate location unpleasant (e.g., covering chosen carpeted areas with smooth plastic) or changing its significance (e.g., placing food in the area) causes most cats to stop using the inappropriate location, thereby overcoming the conditioning that maintained the problem.

Positive reinforcement with food treats whenever the cat is seen eliminating in the litter box is recommended to condition appropriate elimination behavior. Cleaning and deodorizing the inappropriate area with an enzymatic product (e.g., Nature's Miracle) also is suggested.

A successful treatment outcome for inappropriate elimination has the potential to save many animals' lives and their caregivers from distress. Yet, there have not been any studies to date of long-term treatment outcome for the specific diagnosis of inappropriate elimination. One outcome study of elimination outside the litter box (Olm & Houpt, 1988) combined both inappropriate elimination and urine marking.

### Examining the Effectiveness

The purpose of this study was to examine the effectiveness of the suggested treatment approach described by Voith (1981) and Borchelt and Voith (1996), measured by the following:

1. Caregiver perception of treatment outcome.
2. Caregiver-reported decline in frequency of elimination outside of the litter box.
3. The relation between caregiver's perception of treatment outcome and caregiver-reported decline in frequency.
4. The relation between caregiver's perception of treatment outcome and a number of demographic variables.
5. The relationship of caregiver compliance and outcome.
6. Caregivers' experiences with implementing the treatment plan and their satisfaction with the program.

## MATERIALS AND METHODS

Ninety-eight cases of feline inappropriate elimination were seen by one author (Amy R. Marder) in clients' homes between September 1993 and October 1996. All cats were referred by veterinarians, had received urinalyses, and were considered disease-free at the time the treatment program was instituted.

The diagnosis of inappropriate elimination was made based on the cats' behavioral history. To study the possible effects on treatment outcome, specific information was collected pertaining to frequency (number of times per day), duration of inappropriate elimination (months or years), form of excrement, indoor or outdoor lifestyle, sex, age, breed, declaw status, and number of cats in the household.

Although the specific treatment plans differed according to the information obtained from the individual cat's history, each generally consisted of the following:

1. A litter box choice experiment varying—when indicated—location, type of box, and type of litter, followed by offering the cat the preferred combination.
2. Daily scooping of boxes to remove both urine and feces and complete changing of the litter every 1 to 3 weeks, depending on the type of litter and the number of cats in the household.
3. Treatment of inappropriate areas with an enzymatic stain and odor removal agent (e.g., Nature's Miracle).
4. Modification of the inappropriate area to make it aversive (e.g., covering carpeted area with a sheet of smooth plastic) or to change its significance (e.g., placing food or bed in location).
5. Application of reward through praise and delicious treat after elimination in the litter box.

Confinement was recommended in only one case, and drug therapy was never recommended. Caregivers were requested to call weekly for follow-up.

For this study, a telephone questionnaire was administered by a veterinary student between September 1997 and March 1998, between 12 and 54 months ( $M = 31.72$  months) after the cases were first seen. The following questions were asked:

1. Do you consider the problem to be cured, much better, slightly better, the same, or worse? Choose one. If not cured, how often has your cat exhibited the behavior in the past week or month?
2. Did you do each part of the treatment plan? (The interviewer went over each recommended part of the program and owners answered either "yes" or "no.")

3. How long was the treatment in place? Number of weeks, months?
4. How long had you implemented the program before you noticed improvement? Number of weeks, months?
5. If your cat got better, was there a recurrence afterward? When?
6. Is your cat happier as a result of going through the program? Yes or no.
7. Did you feel it was worth it? Yes or no.
8. Did you find the program to be difficult? Yes or no.
9. Would you hire an animal behaviorist again? Yes or no.

## RESULTS AND DISCUSSION

### Demographic Information

Of the initial 98 cases, a total of 40 were excluded from analysis either because the caregiver was unreachable or because the cat had a coexisting urine marking problem or a current medical condition that was contributing to the elimination problem (e.g., urinary tract disease, diarrhea). Fifty-eight clients with cats who received a diagnosis of inappropriate urination or defecation completed the treatment plan and questionnaire.

The cats ranged in age from 16 weeks to 14 years ( $M = 5.3$  years) at initial presentation. Three (5%) were 0 to 1 year old, 12 (21%) were between 1 and 2 years old, 16 (28%) were between 2 and 5 years old, 13 (22%) were between 5 and 10 years old, and 14 (24%) were older than 10 years of age. The cats had been exhibiting the behavior for 3 weeks to 14 years ( $M = 20.83$  months). Four (7%) had been exhibiting the behavior for 0 to 1 month, 8 (14%) for 1 to 3 months, 7 (12%) for 3 to 6 months, 16 (28%) for 6 to 12 months, and 23 (39%) for 12 or more months.

Thirty-four (59%) of the cats were spayed females and 24 (41%) were castrated males. Thirty-two were domestic short hairs, 6 were domestic medium hairs, 4 were domestic long hairs, 4 were Himalayans, 9 were Persians, 1 was a Siamese, and 2 were Manxes. Twelve (21%) were declawed. Twenty-five (43%) had previous medical problems (14 had feline lower urinary tract disease, 10 had diarrhea, and 1 had anal sacculitis) that had been treated and were no longer present at the time of the initial behavioral appointment. The cats lived in one- to six-cat households. Seventeen (29%) lived in one-cat households, 31 (53%) in two-cat households, 7 (12%) in three-cat households, 2 (less than 1%) in four-cat households, and 1 (less than 1%) in a six-cat household. Forty-nine (85%) of cats lived entirely indoors, and 9 (15%) went outdoors some of the time. Twenty-two (38%) had deposited only urine outside of the litter box, 12 (20%) only feces, and 24 (42%) both forms of excrement.

### Caregiver Follow-Up

Although caregivers were asked to check in by telephone weekly, they called in at their convenience at varying intervals for a period from 1 week to 12 months ( $M = 2.32$  months).

*Caregiver-reported frequency of inappropriate elimination before treatment.* At initial presentation, 24 cats were eliminating inappropriately less than one time per day, 33 one to two times per day, and 1 more than two times a day. The range of frequency of inappropriate elimination was 0.07 to 3 times per day, with a mean frequency prior to treatment of 0.887 times per day ( $SD = 0.676$ , variance = 0.457, mode = 1).

*Caregiver-reported frequency of elimination after treatment.* The recommended treatment plans were highly successful in reducing the caregiver-reported frequency of inappropriate elimination behavior. The mean frequency of inappropriate elimination after treatment was 0.248 times per day, a mean reduction of 74.36% (see Table 1; calculated by subtracting the final frequency of inappropriate elimination from the initial frequency, both expressed as times per day, and converted to a percentage for each cat;  $SD = .447$  mode = 0). The reduction in frequency of inappropriate elimination was significant,  $t(57) = 7.040$ ,  $p = .000$ , for related samples. The pretreatment mean and posttreatment mean frequency of inappropriate elimination were significantly correlated ( $r = .296$ ,  $p = .024$ ).

*Caregivers' perception of treatment outcome.* A large number of caregivers reported that their cats were cured or much better after treatment (see Table 2).

*Validity of treatment outcome perception categories.* There was a significant relation between the reduction in the caregiver-reported number of times per day of inappropriate elimination and the caregivers' perception of treatment outcome category (cured, much better, slightly better, and combined same, worse),

TABLE 1  
Percentage Reduction in Frequency After Treatment

<i>% Reduction</i>	<i>n</i>	<i>n %</i>
90 to 100	40	67
70 to 89	3	5
50 to 69	4	7
< 50	11	18

*Note.*  $n = 58$ .

TABLE 2  
Reported Outcome by Owners

<i>Cured</i>		<i>Much Better</i>		<i>Slightly Better</i>		<i>Same</i>		<i>Worse</i>	
<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
27	47	15	26	8	14	6	10	2	3

$\rho = 0.379$ ,  $p < .002$ ,  $n = 58$ . The positive association suggests caregivers' perceptions of treatment outcome and their frequency reports were consistent, thereby supporting the validity of caregiver report data in this study.

*Caregivers' perception of treatment outcome and demographic variables.* There was no significant relation between caregivers' perception of treatment outcome category and frequency of the problem when first seen, age, sex, breed, declaw status, previous medical problems, number of cats in the household, behaviorist's length of follow-up time, or indoor or outdoor lifestyle. For the demographic variable analyses, values of  $p < .01$  were considered significant to prevent error due to multiple significance testing.

This study found that the relation between caregivers' perception of treatment outcome and frequency of the behavior at presentation was not significant. The form of excrement was not significant, although 15 of 23 cats (65%) depositing urine only were in the cured group, compared to 3 of 12 (25%) of cats depositing only feces, and 9 of 25 (36%) depositing both.

*Caregivers' perception of treatment outcome and duration of the problem.* Duration of the problem was significantly related to caregivers' perception of treatment outcome category,  $r = -.0347$ ,  $p = .007$ ,  $n = 58$  ( $M$  duration = 23.22 months, mean outcome category of much better). The obtained  $r$  shows a weak association, accounting for 12% of the variance. The negative  $r$  described the relation whereby the longer the duration, the more likely the caregivers' perception of treatment outcome was in the category of same or worse. However, because the obtained  $r$  was weak, the influence of the duration of the problem on treatment outcome was small. Of the 31 cats with a problem duration of 12 or more months, 10 cats were judged cured and 9 were judged much better.

*Location of cats following the final interview.* Fifty (86%) of the cats were still in their homes at the final interview. Of the 8 cats no longer in their homes, 3 had been cured. Of these 3, 1 cat was euthanized because of chronic renal failure, which was diagnosed after the completion of the treatment plan; 1 cat was hit by a car; and 1 cat was given away because the caregiver had no time. Two were re-

ported to be much better. Both were euthanized due to chronic renal failure, which was diagnosed after the completion of the treatment plan. Four were given away or euthanized because there was no change in their behavior.

*Caregiver percentage compliance with the treatment plan.* Caregiver compliance was calculated by dividing the number of recommendations followed by the total of number of recommendations prescribed, resulting in a percentage. For example, if a treatment plan consisted of four recommendations, and the caregivers reported they followed three of these, then caregiver compliance was 75%. Percentage compliance ranged from 0% to 100%, with  $M = 76.3\%$ . The distribution of caregiver compliance is shown in Table 3.

There was a significant relation between caregiver compliance and caregivers' perception of treatment outcome category,  $\chi^2(9) = 30.788, p < .001, C = 0.582$ . The more completely caregivers followed the treatment program, the more positive their perception of treatment outcome.

Fifty-three of 58 (91%) caregivers were able to do the litter box choice experiment. Fifty-six of 58 (97%) were able to scoop their boxes once or twice per day to remove both urine and feces. Fifty-two of 58 (90%) were able to clean the area, but further information on what they used to clean it with was not reported. Forty-two of 54 (77%) recommendations were able to modify the inappropriate area to make it aversive or change its significance. Thirty-five of 58 (60%) were able to apply reward through praise and a delicious treat after the cat eliminated in the litter box.

Additional recommendations when indicated were (a) repeating the urinalysis, 12 out of 13 (92%); (b) moving the food away from the box, 6 out of 6 (100%); (c) stopping inappropriate punishment after the fact, 5 out of 5 (100%); (d) steam cleaning the rug, 9 out of 10 (90%); and (e) increasing the number of times per day scooping the box to twice per day, 12 out of 14 (86%).

*Time to improvement and length of treatment.* The time to improvement was rapid. Twenty-three owners (38%) reported improvement within 1 week or less. The time to improvement ranged from 1 day to 3 months ( $M = 3$  weeks). The length of treatment ranged from 2 weeks to 48 months ( $M = 15.9$  months).

TABLE 3  
Percentage of Owner Compliance With Treatment Program

<i>% Compliance</i>	<i>n</i>	<i>n %</i>
100	21	36
75 to 99	14	24
51 to 74	14	24
0 to 50	9	16

*Caregivers' experiences with treatment program.* Caregivers had positive experiences with the treatment program. Fifty-two (89%) of the caregivers thought the program was worth doing. Only nine (16%) owners thought the program was difficult. Forty-nine (84%) said they would hire a behaviorist again, including two (28%) whose cat did not improve. Caregivers of the 36 (72%) of the 50 cats who were in the outcome categories of cured, much better, or slightly better thought their cats were happier.

## SUMMARY

The data obtained in this study supported the successful treatment of inappropriate elimination, thereby offering caregivers a valid alternative to relinquishment of cats who are urinating or defecating in inappropriate places. This study indicated that the treatment plan for inappropriate elimination suggested by Voith (1981) and Borchelt and Voith (1996) resulted in a significant number (72%) of cured or much better caregivers' perceptions for most cats. There was a positive association between the caregivers' perceptions of treatment outcome and reduction of inappropriate elimination determined by reported frequency counts, supporting validity of caregiver-reported data.

Caregivers often are reluctant to follow behavior modification programs because they are difficult and lengthy. It seems reasonable that caregivers would be more likely to follow a program that was not difficult, produced rapid results, and was effective in most cases. This study found that the program recommended by Voith (1981) and Borchelt and Voith (1996) fulfills these criteria. Most caregivers were able to follow this behavior modification program, found it was not difficult, and it was worthwhile. Furthermore, most caregivers experienced rapid improvement. If caregivers are able to implement a behavior modification program, it is likely to be successful. Indeed, this study found that caregiver compliance was significantly correlated with success.

There are a few possible reasons caregivers found this program to be not difficult and worthwhile. First, confinement, which has been recommended in many other programs (Beaver, 1992; Hart, 1985) was not recommended (Hart, 1996, reversed position on confinement). Caregivers are frequently reluctant to confine their cats because the caregivers suffer emotionally from separation and believe it is cruel to their cat. They also may have difficulties rearranging their homes. Although some sort of restriction sometimes is necessary for the treatment of inappropriate elimination, as when there is a coexisting problem of intercat aggression, this study showed that, in most cases, confinement is not required for a successful outcome. Second, drug therapy, which is often prescribed by veterinarians for inappropriate elimination, was not used for any of the cats in this study. Caregivers often have difficulty administering oral medication to their cats and become dis-

turbed with the side effects. Third, the program was effective in most cases in spite of variables such as longer duration of the problem and greater frequency at presentation.

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