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Dog And Cat Bites: Epidemiologic Analyses Suggest Different Prevention Strategies

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SYNOPSIS

Objective. To examine the characteristics of reported dog and cat bite incidents in El Paso, Texas, and their implications for local bite prevention programs.

Methods. The authors reviewed a random sample of reported dog bites and all reported cat bites in El Paso, Texas, in 1995 using existing animal control surveillance data.

Results. The majority of cat bites (89.4%) were provoked, with females (57.5%) and adults (68.3%) more likely to be victims than males or children. In contrast, just under half of dog bites (44.6%) were provoked, with males (65.6%) and children (63%) more likely to be victims than females or adults. Dogs that had not been vaccinated for rabies were involved in 65% of dog bites and cats that had not been vaccinated for rabies were involved in 92% of cat bites.

Conclusion. Effective bite prevention programs should address the finding that both restrained and unrestrained dogs may bite even when unprovoked and that unrestrained cats usually bite when provoked.

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Domestic animal bites represent a largely unrecognized preventable public health problem.[1] There are an estimated 4.49 million dog bites annually in the United States, with 756,701 of those serious enough to require medical treatment.[2] Injuries from dog bites include physical trauma and, in severe cases, death.[3–5] Data on cat bites are limited, but these injuries can also have serious medical consequences. For example, 20% to 50% of cat bites become infected, with the risk of infection based on bite location, host factors, and local wound care.[6,7] Furthermore, cats are more likely than dogs to be exposed to rabid bats yet less likely to be vaccinated against rabies, increasing the risk of rabies among cat bite victims.[8]

In El Paso, Texas, with a population of approximately 600,000, an annual average of 2354 dog and cat bites were reported during the years 1991 through 1995 (Unpublished data, El Paso Animal Regulation and Disease Control, 1997).

Although rabies has been identified in wild animals in El Paso County, no cases have been reported in dogs or cats since 1982. Unrestrained dogs and cats—defined as those found off the owner's premises without any physical restraint—have been a problem in El Paso, with 13,419 dogs and 9096 cats impounded in 1996.

The purposes of this study were: *(a)* to examine the characteristics of dog and cat bite incidents in El Paso in 1995 and *(b)* to compare dog and cat bite incidents to determine how local programs might tailor prevention efforts based on these differences.

METHODS

Data on bite victims and the biting animal were obtained from animal bite investigation reports filed with El Paso Animal Regulation and Disease Control. We randomly selected 300 dog bite cases out of 2177 reported from January 1, 1995, through December 31, 1995. We also evaluated all cat bite cases (343) occurring that year.

In 5 dog bite cases and 30 cat bite cases, there were multiple victims. Thus our analyses of animal characteristics are based on 295 dogs and 313 cats, while the analyses of victims are based on 300 dog bite cases and 343 cat bite cases.

In the case of incomplete reports, we report percentages based on the available data. Generally, the proportion of missing data was low, ranging from 8% to 14% for specific variables. There was a high percentage of missing data for animal gender (57%), however, largely because of the difficulty in safely examining impounded stray felines.

Data were abstracted from existing records by one of the authors (GRP). Information on the bite victims included sex, age, location of the bite wound, time and day of the bite, and the address where the bite occurred. Characteristics of the biting animal included sex, age, breed, rabies vaccination status, type of quarantine imposed, whether the animal was unrestrained, and whether the animal completed the required quarantine. The age of the animal was included as a variable because Texas state law required rabies vaccinations at three months for dogs and cats, and animals younger than three months would therefore not have been vaccinated.

In filling out reports, Animal Control officers assigned dogs to breed categories according to their predominant physical traits. Breeds were identified for all dogs, with mixed breeds defined by predominant characteristics, but only the breeds that accounted for 3% or more of dog bites are reported here.

We reviewed the reported circumstances surrounding each bite incident to determine if the bite was provoked, if the animal was unrestrained, and if more than one victim was bitten. Provocation was defined as the animal having been picked up, petted, hit, kicked, or struck by a person with any object or part of the person's body or any part of the animal's body having been pulled, pinched, or squeezed.

Chi-square tests were used to identify differences by species in characteristics of the bite incidents. Data were entered in Epi-Info, Version 5, and analyzed using the SPSS statistical package, Version 6.1.

RESULTS

Animal gender data was available on 43% of the animals: more bites were from male animals, with a higher proportion of males among dogs involved in bite incidents than among biting cats. (See Table 1.) Data were not available on the gender distribution of the total pet population.

Most bites were from animals that were three months of age or older. A higher percentage of cat bites than of dog bites were from animals younger than three months.

The majority of cat bites (79.2%) involved unrestrained animals, while only 44.3% of dog bites involved unrestrained animals. The majority of dog bites (55.7%) occurred either on the owner's property or while the dog was leashed, while 79.2% of cat bites occurred off the owner's property, with the difference significant at the $P < 0.001$ level.

Overall, 79.7% of the animals had not been vaccinated for rabies, with cats significantly more likely to be unvaccinated than dogs ($P < 0.001$).

More than half (61%) of the 300 dog bite victims in the sample were male, while somewhat more than half

Table 1. Characteristics of a sample of reported dog bite incidents and all reported cat bite incidents, El Paso County, Texas, 1995

Characteristics	Dog bites		Cat bites		P-value
	Number	Percent	Number	Percent	
Animal	295	100	313	100	
Sex					
Male	179	65.6	77	53.1	0.013
Female	94	34.4	68	46.9	
Age					
Three months or older	273	94.5	229	77.4	< 0.001
Younger than three months	16	5.5	67	22.6	
Current rabies vaccination					
Yes	99	34.7	19	6.4	< 0.001
No	186	65.3	276	93.6	
Owner identified					
Yes	250	86.8	69	23.4	< 0.001
No	38	13.2	226	76.6	
Unrestrained[a]					
Yes	127	44.3	232	79.2	< 0.001
No	160	55.7	61	20.8	
Victim	300	100	343	100	
Sex					
Male	177	61.0	130	42.5	< 0.001
Female	113	39.0	176	57.5	
Age (years)					
0–2	12	4.2	9	3.0	< 0.001
3–6	54	19.0	27	9.0	
7–12	88	31.0	35	11.7	
13–18	25	8.8	24	8.0	
19–55	82	28.9	147	49.2	
Older than 55	23	8.1	57	19.1	
Bite location					
Face or head	46	16.1	12	4.0	< 0.001
Hands or arms	105	36.7	236	78.9	
Trunk	23	8.0	8.0	2.7	
Feet and legs	95	33.2	31	10.4	
Multiple sites	17	5.9	12	4.0	
Provoked animal					
Yes	125	44.6	235	89.4	< 0.001
No	155	55.4	28	10.6	
Multiple victims reported					
Yes	5	1.8	30	10.4	< 0.001
No	280	98.2	258	89.6	

NOTE: In the case of incomplete reports, percentages are calculated based on the available data.
[a]Defined as animals that were off the owner's premises without any physical restraint.

(57.5%) of the cat bite victims were female. The age distribution of victims varied, with dog bite victims more likely to be children than adults and cat bite victims less likely to be children ($P < 0.001$).

Dog bites occurred all over the body: to the face/head (16.1%), to hands/arms (36.7%), to the trunk (8.0%), to the feet/legs (33.2%), and at multiple sites (5.9%). In contrast, the majority of cat bites (78.9%) were only on the hands or arms. Overall, very few animal bites involved multiple areas of the body.

About half of the 300 dog bites in the sample were unprovoked, while the vast majority of the 343 reported cat bites were provoked. More than half of dog bites occurred between 2 p.m. and 10 p.m., but there was no seasonal pattern (data not shown). Cat bites were equally distributed across daytime hours and showed no seasonal variation (data not shown).

Multiple victims were more common for cat bites than for dog bites.

A difference was found between cat and dog bites in terms of reporting source. More cat bites than dog bites were reported to Animal Control by victims (Table 2). Other reporting sources included police or sheriff's departments, which accounted for 8.6% of dog bite reports and 4.9% of cat bite reports, and hospitals or clinics, which reported 44.6% of dog bites and 33.3% of cat bites.

The majority of both cats and dogs were evaluated for rabies, but the evaluation procedures differed. Most dogs were quarantined either at the owner's home or at a veterinary/animal control facility. In contrast, 56% of cats were euthanized and tested posthumously for the rabies virus. This difference in evaluation procedures may reflect the fact that approximately 80% of the cats involved in these incidents were unrestrained while only 44% of the biting dogs were unrestrained.

Dog breeds. The highest percentages of bites were from two breeds of dogs—German shepherds (25.2%) and chow chows (18.5%) (Table 3). The next highest percentages were from terriers, cocker spaniels, and pitbull terriers. Data were not available on the distribution of dogs in the city by breed.

Overall, 46.4% of all bites were unprovoked. Unprovoked bites were more common among chows (81.0%), pit bulls (76.9%), German shepherds (75.6%), and rottweillers (75.0%) than among other breeds. In addition, only 34.7% of all dogs were vaccinated for rabies, yet rabies-vaccinated dogs were involved in higher percentages of bite incidents for chows (81.7%), German shepherds (69.0%), rottweillers (60.0%), and pitbull terriers (54.5%) than for other breeds.

Table 2. Animal control data for a sample of reported dog bite incidents and all reported cat bites, El Paso County, Texas, 1995

	Dog bites n = 300		*Cat bites n = 343*		
Procedure	*Number*	*Percent*	*Number*	*Percent*	*P-value*
Source of report					
Law enforcement	24	8.6	13	4.9	0.001
Medical	124	44.6	88	33.4	
Self[a]	130	46.8	163	61.7	
Total	278	100.0	284	100.0	
Disposition of animal					
Home quarantine	48	16.8	11	3.5	<0.001
Hospital quarantine	159	53.9	78	24.9	
Laboratory testing	52	17.6	163	52.1	
Not apprehend	26	8.8	39	12.5	
Other[b]	10	3.4	22	7.0	
Total	295	100.0	313	100.0	

NOTE: The totals for "source of report" are the total numbers of reports; more than one incident could be included in a single report. Similarly, the totals under "disposition of animals" are the total numbers of animals; an individual animal could have been responsible for the incidents involved in more than one report.

[a]Self-reporting refers only to cases in which the incident was not also reported by law enforcement or medical facilities.

[b]Includes bite cases that occurred on a military installation or in which the victim withdrew the complaint.

Table 3. Dog breeds involved in a sample of dog bite cases, El Paso County, Texas, 1995 (N = 285)

Breed	Number	Percent[a]
German shepherd	72	25.2
Chow chow	53	18.5
Terrier	17	5.9
Cocker spaniel	14	4.9
Pit bull terrier	13	4.5
Rottweiller	12	4.2
Poodle	11	3.8
Doberman	9	3.1
Husky	9	3.1
Labrador retriever	9	3.1
Other	47	16.5
Unidentified	19	6.6

NOTE: Breed categories included dogs of mixed genetic background; animals were assigned to categories according to their predominant physical traits.

[a]Percentages do not add to 100 due to rounding errors.

DISCUSSION

In El Paso County, Texas, in 1995 the ratio of dog bites to cat bites was approximately 6:1 (2177:343). We analyzed a sample of the dog bite incidents reported to Animal Control in that year and all cat bite incidents reported that year. Our data show that cat bites were more likely than dog bites to involve animals that had not been vaccinated for rabies and more likely to involve unrestrained animals.

Cat bite victims were more likely than dog bite victims to be adult, more likely to be female, and more likely to have provoked the cat by trying to pick it up or pet it. Consequently, bites to the hands and arms were more common among cat bite victims than among dog bite victims. Dog bite victims were more frequently male than cat bite victims, more frequently children than adults, and less likely than cat bite victims to be bitten by unrestrained animals.

About a third of dog bite victims were between the ages of 7 and 12, and 50% were between the ages of 3 and 12, while almost 70% of cat bite victims were adults.

Approximately 25% of dog bites were from German shepherds, while chows accounted for almost 20% of bites. It was not possible, however, to determine if this was due to the popularity of these dog breeds. These breeds along with pit bull terriers and rottweillers had the highest percentages of unprovoked bites.

Our data confirm patterns observed elsewhere.[9,10] Most studies of dog bites have found the majority of bites occurring in children,[11,12] and several studies have found that boys are more likely to be bitten by dogs than girls.[9,13,14] An evaluation of dog bites in Milwaukee[11] found that 60% of injuries to all victims occurred on the upper extremities, with most of the bites occurring in the spring and summer months. However, while 19% of bites were provoked by the victim, 49% of the animals involved were owned by either the victim's family or a neighbor. This differs from our finding that 45% of dog bites were provoked, and 87% of dogs involved in bite incidents had an identified owner. Interestingly, in one of the few studies of cat bites, Underman found that women were more likely than men to be bitten by cats.[15] The finding that 10% of cat bites involved multiple victims is surprising; these incidents may have involved several people trying to catch a cat that had already bitten someone.

Although the present study did not evaluate the severity of bites, the number of bites by medium-sized or large breeds is of concern given that these dogs are reported to be responsible for most severe dog bites in children.[16] German shepherds have often been identified as the breed responsible for the highest percentage of severe bites,[17] but other reports have described poodles, cocker spaniels, and collies.[14,18,19] It is difficult to determine if the higher proportions of certain breeds is the result of an increased risk from these breeds or a differential proportion of ownership. However, a case-control study of dog bites found a significantly higher number of dog bites by German shepherds compared to other breeds, with an odds ratio of 16.4, and chow chows, with an odds ratio of 4.0.[20]

A higher percentage of dog bites than cat bites were reported by medical facilities, and dog bites were more likely than cat bites to involve police intervention or Animal Control's immediate response, or both. This is most likely due to the fact that dog bites are more common on the face and trunk than cat bites and thus more serious than bites to the extremities.[16] Cat bites were reported by victims twice as often as by medical facilities, while the number of reports from victims and medical facilities were about equal for dog bites.

There are several limitations to this study. First, our data are based on incidents reported to Animal Control and do not necessarily reflect all bite incidents. It has been estimated that as many as 50% of animal bites are not reported.[10,15,21,22] Second, it was not possible to determine the prevalence of ownership of dog breeds and therefore it was not possible to determine the risk of bites by breed.

Implications for prevention. Bite prevention recommendations include education of the public about the

magnitude of the problem with increased enforcement of canine leash laws,[16] teaching children how to behave around dogs and cats, and encouraging owners to take more responsibility in training their pets.[23] Information obtained from animal bite records could be used in the development of more effective prevention programs. Regional factors such as type of pet ownership, compliance with regulations, rabies prevalence, and animal enforcement policies may play a role in the incidence of and response to animal bites.

Assuming that our data reflect the true incidence and pattern of cat bites in El Paso, targeting cat owners probably would have little effect on reducing cat bites. Our data suggest that cat bite prevention programs would be most effective if they targeted adults, especially women, with an emphasis on not approaching or petting unrestrained felines. Controlling the feral cat population, encouraging owners to keep their cats from roaming, and communicating the risks in touching unfamiliar cats could reduce the number of cat bites significantly

We found that dog bites, on the other hand, were about equally likely to involve restrained or unrestrained dogs, so prevention messages should both target pet owners and emphasize not approaching unrestrained dogs. El Paso educational programs have traditionally focused on teaching children how to act defensively around stray dogs, but they also need to focus on the family pet. Parents of young children could be advised that certain breeds such as chows and German shepherds were associated with high percentages of unprovoked bites.

Rabies vaccination status impacts on the medical treatment needed by bite victims as well as on the cost of animal control.[6] Bites from unvaccinated animals require postexposure treatment of victims and quarantine of the biting animal, or laboratory testing of the animal.

The importance of maintaining rabies vaccinations and obeying the leash law must be reinforced.[24] A large number of El Paso animals are vaccinated against rabies in nearby Juarez, Mexico, where vaccination certificates are often completed by veterinary students using vaccines not approved by the U.S. Department of Agriculture (USDA). Increased cooperation between U.S. and Mexican veterinarians on rabies policy and notification of dog owners about this policy could result in decreased quarantine costs. Currently, many communities devote a large percentage of animal control financial resources to quarantines and postexposure treatment for bite incidents involving unvaccinated dogs. If these resources could be used for prevention efforts, the public could be better educated about the risks of animal bites.

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