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Dog Bites an Opportunity for Parent Education in the Pediatric Emergency Department

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Abstract

Objectives—This study focuses on parental report of exposure to dogs and highlights the potential for using a computer kiosk to increase knowledge around dog bite safety in an urban pediatric emergency department.

Methods—901 parents of young children completed a kiosk assessment and received a report which contained information aimed at increasing knowledge about either dog bite prevention (PAR-DB n=453) or other safety behaviors (PAR-S n=448). The participants who received the dog bite prevention report (PAR-DB) were asked questions about exposure to dogs as part of the baseline assessment. All participants were telephoned 2-4 weeks later for a follow-up interview to measure knowledge differences.

Results—The majority of respondents who answered the exposure questions reported seeing stray dogs (53%) and having dangerous dogs (43%) in their neighborhood. Few respondents reported that their child had been bitten by a dog (1%), but the majority (56%) reported having knowledge of another child having been bitten. Few respondents reported having a dog in their home (11%) and only one reported that her dog had bitten a child. A majority (56%) of dogs had not been spayed or neutered. Of families with dogs in the home, 20% reported leaving their child unattended with the dog. A minority (45%) of dogs left alone with children had been spayed or neutered. PAR-DB parents achieved knowledge gains as a result of the parent action report generated by the kiosk, demonstrating the potential to improve knowledge via a computer kiosk in a busy pediatric emergency department.

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Key Words and Phrases

Injury Prevention; Dog Bites; Computer Kiosk; Emergency Department; Trauma Center

Introduction

Each year, an estimated 4.5 million dog bites occur in the United States.[1, 2] These bites incur an annual medical care cost of \$102.4 million, \$58.7 million of which goes towards care for victims under 9 years of age.[3] Based on the present incidence of medically attended nonfatal dog bites, 151.4 per 100,000, the Centers for Disease Control and Prevention have set a goal of reducing this incidence to 114 per 100,000 by 2010.[4] In 2009 the Baltimore City Health Department investigated 670 dog biting incidents in a city of 630,000. Of those with age data available in the Baltimore City Health Department analysis (N=549), 38 percent of the victims were children under 18 years of age and 24% were children under the age of 11. (C. Fuller, personal communication, March 10, 2010)

Young children, especially males, are at particular risk of serious injury due to dog bites.[3] Children are more likely to receive medical attention for these bites and children 5 years of age may be at increased risk as they are more likely to unintentionally provoke a dog to attack.[1-3, 5-7] Dog bites to children occur most often within the home or involve a dog that is otherwise familiar to the child, and children who live in a home with a dog are at higher risk.[2, 5-8]

For many dog bites observed in some urban areas, supervision of the child around a dog appears to be a factor. Just over half of dogs involved in bites treated in a Philadelphia Hospital were leashed, chained, or inside a house at the time of the bite.[7] One Pittsburgh study found that over one half of dog bites occurred between 4pm and 9pm, which may indicate that children are most likely left unsupervised with dogs during dinner preparations. [5] Another recent case study of three fatal dog attacks in Baltimore found that in each instance an infant was left unsupervised in a mobile swing at the time of the attack by a family dog.[9]

Dog owners in general have shown a lack of knowledge about factors associated with dog aggression towards children, although knowledge does increase somewhat among those who are parents. [13] A survey of dog-owning parents in Tucson showed that only two thirds of parents believed that infants were at risk for a fatal bite by a dog, and another two thirds believed it was safe to leave a 4 year old child unsupervised with a dog. [11] Because many dog bites involve family pets or that dogs are known to the child, the most common recommendations for dog bite prevention include education of children about safe dog play and education of parents in effective supervisory practices, selection factors for choosing a family pet, and having pets spayed or neutered. Pediatricians are repeatedly identified as important family educators about such issues, but such education appears to be uncommon. [5, 7] One study found that only 17% of pediatricians regularly educate parents about pet-related injuries and only 68% do so occasionally.[11] Given the paucity of research on this topic and the absence of proven interventions, there is still a need to develop a better understanding of how best to educate parents to prevent dog bite injuries to children.

Pediatricians are repeatedly identified as important family educators about such issues, but such education appears to be uncommon.[5, 7] One study found that only 17% of pediatricians regularly educate parents about pet-related injuries and only 68% do so occasionally.[12] The Pediatric Emergency Department (PED) particularly may provide an excellent venue for injury prevention counseling as families often wait to be seen, and several studies have yielded promising results from injury prevention counseling.[13-17]

However, one concern is the limited time health care providers have to devote to prevention counseling. New computer technology has the ability to provide patient information without placing a burden on health care providers. [13, 18-19]

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We had an opportunity to add to this small but growing literature during the conduct of a large computer kiosk intervention trial conducted in an urban pediatric emergency department to determine the impact of computer tailored information on various home safety behaviors. [15]. The present study examines data collected from a control group that received untailored information on an unrelated safety topic, dog bite prevention. Using data from this large sample of low income urban parents, we address the following specific aims: 1) To describe children's exposure to and experience with dogs; and 2) to examine the impact of an untailored Parent Action Report on parents' knowledge about dog bites and their prevention.

Methods

Study Design

We conducted a randomized, computer kiosk-based intervention trial, originally designed to improve parents' use of car seats, smoke alarms, and safe poison storage. [15] The intervention group received a computer generated Parent Action Report focused on these safety behaviors (PAR-S); the control group received a computer generated Parent Action Report on dog bites and how to prevent them (PAR-DB). Both reports were of the same length and appearance and were created with attention to the needs of low literacy audiences. [19] A total of 901 parents of young of children between 4 and 66 months treated in an urban pediatric emergency department for an illness or injury between September 2004 and December 2005 were included in our sample.

Data Collection and Randomization

Patients were recruited during the busiest shifts in the pediatric emergency department. Study recruiters screened triage sheets to identify children who were in the study age range and approached potentially eligible parents in the waiting room. The parent of any child whose visit was noted with suspicion of child abuse or neglect or whose child was critically ill or injured was not approached. Eligibility criteria included: English-speaking parent or guardian of a child between 4 to 66 months of age being seen for an injury or medical complaint or an age-appropriate sibling of a child being seen for these reasons; living in Baltimore City; and living with the child "at least some of the time."

A study recruiter obtained written informed consent and participants were escorted to the computer kiosk. When the computer program was activated by the study recruiter, the random number generation program in FileMaker Pro® assigned the participant to the PAR-S or PAR-DG group and the appropriate assessment instrument appeared on the screen. Participants in both groups then completed a 12-minute assessment, after which the kiosk printed their reports. The kiosk intervention was pilot tested with 20 families recruited from the ED. When asked about ease of use, all respondents reported satisfaction with using the computer kiosk, and none of the parents who used the kiosk during the trial had any difficulties with the technology. Participants were paid \$10, and they were telephoned 2-4 weeks later for a follow-up interview. The follow-up interview included 3 items which assessed dog bite knowledge. The interview was pilot tested with 20 families, and modifications to question wording were made as necessary.

Sample Size

Estimates for sample size calculations were taken from our prior intervention work and were aimed at showing difference in safety outcomes for the PAR-S group.

PAR-DB Group

At the kiosk, the PAR-DB group participants completed a computerized survey. Items included sociodemographic characteristics and knowledge and experience with four unrelated topic areas including: child development, sleep, neighborhood safety, and dog bites. Their report was personalized with the child's name and contained generic information on the selected child health topics. (13-14) The Dog Bite section included information about dog bite incidence and advice about bite prevention.

PAR-S Group

At the kiosk, PAR-S group participants completed an assessment which assessed sociodemographic characteristics and child safety seat, smoke alarm, and poison storage knowledge and behaviors. We did not assess dog exposure or experience in the PAR-S group.

Measures

Sociodemographic Characteristics—At enrollment, both groups were asked their child's age and gender and their relationship to the child, ethnicity, education, income, and marital status. Per capita income was calculated as total household income divided by total number of individuals supported.

Exposure to Dogs—To survey baseline exposure to dogs, eight questions were developed to assess neighborhood experience and in-home exposure to dogs. The items were only administered to the PAR-DB group at baseline.

Dog Bite Knowledge—Three multiple choice items were developed to test knowledge acquisition acquired in the PAR-DB kiosk report. These items were administered to both study groups at follow-up.

Data Analysis

Data analysis was conducted using SPSS 15.0 (SPSS Inc, Chicago, IL). We first compared groups on sociodemographic characteristics as a check on the randomization and equivalence of the groups at follow up. Simple descriptive statistics were conducted to observe reported exposure to dogs in the home and neighborhood at baseline for the PAR-DB group. Knowledge outcomes at follow up were compared between study groups using t-tests. A total mean percent correct score was calculated for dog bite items at follow up and compared between groups.

Results

Sample

We approached 1,412 parents with children who were age-eligible according to the daily PED triage sheet; 239 (17%) were ineligible, 201 (14%) refused to participate, and 69 (5%) were missed by the recruiters (Figure 1). Child's age and reason for visit were the only data available from those who refused or were ineligible; there were no differences from enrolled subjects on these variables. A total of 901 parents were enrolled (448 PAR-S, 453 PAR-DB).

Follow up rates were 86% in the PAR-DB group (n=384) and 83% in the PAR-S group (n=375). In both groups, completion rates did not differ by: child's gender, age, reason for visit, respondent's relationship to child, ethnicity, marital status, employment, income, or education. In both groups, completion rates were lower in older mothers (>30 years) relative to younger mothers (78% vs. 85%, $p < 0.05$). At follow up, 757 (99%) of the total sample (764) remembered receiving the PAR, 696 (91%) reported having read it, and 442 (58%) reported sharing the contents with friends or family.

The majority of respondents were African-American (93%), mothers (90%), unmarried (69%), between 20-29 years of age (58%), with a high school degree (75%) and an annual per capita income of less than \$5,000 (63%). The largest proportion of children were 1-2 years old (42%) and equally divided between boys and girls. Most PED visits were for medical complaints (72%). There were no differences between the PAR-DB and PAR-S groups on sociodemographic characteristics.

Dog Exposure at Baseline for PAR-DB Group

The majority of respondents (53%) reported seeing stray dogs in the neighborhood, and (43%) reported having dangerous dogs in their neighborhood. Few respondents reported that their child had been bitten by a dog (1%), but the majority (56%) reported having knowledge of another child who had been bitten or attacked by a dog. Few respondents reported having a dog in their home (11%) and only one respondent reported that her dog had bitten a child. Of those with dogs in the home, a majority (56%) reported that their dog had not been spayed or neutered. A minority (21%) reported leaving their child alone with the dog. Less than one half (45%) of those with dogs in the home that reported having left them alone with children also reported that dogs left alone with children had been spayed or neutered.

Dog Bite Knowledge at Follow-Up: Comparison between groups

The PAR-DB group scored significantly higher on 2 of 3 dog bite knowledge questions at follow up (Table 3). This group was more likely than the PAR-S group to correctly answer the question "Dogs are less likely to bite if they are? Correct Answer: spayed or neutered?" (13% vs. 3% $p=.00$) as well as the question "According to experts, how many dog bites happen every year?" (13% vs. 8% $p=.047$).

Discussion

Parents in our urban population report high exposure to stray and dangerous dogs. Few parents reported that their child had been bitten by a dog; however they reported high awareness of other children having been bitten. They were generally unaware of the magnitude of the problem nationally. Educational approaches may effectively capitalize on these findings by creating messages that reinforce the common experience of knowing children who have been bitten and adding a public health frame that explains how widespread the problem actually is.

Few parents in our sample were aware that neutering a dog reduces the chance of the dog biting someone, and several parents with unneutered dogs reported leaving their children alone with the dog. This message could be utilized as an additional benefit of neutering that might both increase compliance with recommendations to neuter pets as well as reduce the risk of dog bites to children. Parents in our sample were generally aware of other recommendations for protecting their children from dog bites such as staying away from a dog when it is eating. Educational messages can reinforce these standard recommendations, but should go beyond them to communicate new information that our data suggest may not be as widely known.

While it is promising that the PAR-DB group demonstrated significant knowledge gains for two assessment items, it is concerning that only 13 percent correctly answered each of these questions at 2 weeks after the intervention. The PAR-DB group functioned in the larger study as a control to test the personalized and tailored intervention delivered to the PAR-S group, which did show significantly higher safety knowledge and was more likely to report correct child safety seat use. (15) We can therefore hypothesize that a similarly tailored PAR-DB report would have demonstrated greater gains for dog bite knowledge and behavior as well. Although knowledge comparisons are limited, the frequency of dog bite-related dangers reported by this sample combined with low knowledge demonstrates a need for action, perhaps educating caregivers through a personalized and tailored intervention. Our findings that parents were able to complete the computerized assessment and remembered reading the report suggest that tailored print material designed for low literacy audiences has potential to effectively communicate with families such as those served in our urban PED setting. These conclusions should be tempered by the fact that our knowledge assessment was limited to only three questions because this was the control condition for a study focused on other safety behaviors (15,19). While we are encouraged by the findings because of the strong internal validity of our study design, the generalizability of the results to other contexts and populations is limited and awaits further research.

We could find no other research that reported on the results of a dog bite prevention education intervention geared towards parents. A 2009 Cochrane review reported on interventions geared towards children and adolescents and concluded that no intervention to date has been found to be effective to reduce dog bite injuries and their consequences. [21] While we only assessed a few aspects of parental knowledge about preventing dog bites, we are encouraged that such a simple intervention yielded some significant differences. The relationship between such knowledge gains and actual preventive behaviors remains to be demonstrated. Nevertheless, the results of this study do suggest that there is potential to improve knowledge via a computer kiosk in a busy pediatric emergency department.

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References

1. Sacks JJ, Kresnow M, Houston B. Dog bites: how big a problem? *Inj Prev.* 1996; 2(1):52–4. [PubMed: 9346056]
2. Gilchrist J, Sacks JJ, White D, et al. Dog bites: still a problem? *Inj Prev.* 2008; 14(5):296–301. [PubMed: 18836045]
3. Weiss HB, Friedman DI, Coben JH. Incidence of dog bite injuries treated in emergency departments. *JAMA.* 1998; 279(1):51–3. [PubMed: 9424044]
4. Centers for Disease Control and Prevention. “15: Injury and Violence Prevention.”. *Healthy People.* 2010; II <http://www.healthypeople.gov/document/HTML/Volume2/15Injury.htm> (accessed 20 December 2008).
5. Bernardo LM, Gardner MJ, Rosenfield RL, et al. A comparison of dog bite injuries in younger and older children treated in a pediatric emergency department. *Pediatr Emerg Care.* 2002; 18(3):247–9. [PubMed: 12066018]
6. Gandhi RR, Liebman MA, Stafford BL, et al. Dog bite injuries in children: a preliminary survey. *Am Surg.* 1999; 65(9):863–4. [PubMed: 10484090]
7. Avner JR, Baker MD. Dog bites in urban children. *Pediatrics.* 1991; 88(1):55–7. [PubMed: 2057274]

8. Greenhalgh C, Cockington R, Raftos J. An epidemiological survey of dog bites presenting to the Emergency Department of a children's hospital. *J Paediatr Child Health*. 1991; 27(3):171–4. [PubMed: 1888565]
9. Chu AY, Ripple MG, Allan CH, et al. Fatal dog maulings associated with infant swings. *J Forensic Sci*. 2006; 51(2):403–6. [PubMed: 16566780]
10. Shuler CM, DeBess EE, Lapidus JA, et al. Canine and human factors related to dog bite injuries. *J Am Vet Med Assoc*. 2008; 232(4):542–6. [PubMed: 18279087]
11. Villar RG, Connick M, Barton LL, et al. Parent and pediatrician knowledge, attitudes, and practices regarding pet-associated hazards. *Arch Pediatr Adolesc Med*. 1998; 152(10):1035–7. [PubMed: 9790618]
12. Gershman KA, Sacks JJ, Wright JC. Which dogs bite? A case-control study of risk factors. *Pediatrics*. 1994; 93(6):913–7. [PubMed: 8190576]
13. D'Onofrio G, Degutis L. Preventative Care in the Emergency Department: Screening and Brief Intervention for Alcohol Problems in the Emergency Department: A Systematic Review. *Academic Emergency Medicine*. 2008; 9(6):627–638. [PubMed: 12045080]
14. Johnston, et al. Behavior Change Counseling in the Emergency Department to Reduce Injury Risk: A Randomized, Controlled Trial. *Pediatrics*. 2002; 110(2):267–274. [PubMed: 12165577]
15. Gielen AC, Trifiletti LB, McDonald EM, Shields WC, Want MC, Cheng YJ, Weaver NL, Walker A. Using a computer kiosk to promote child safety: Results of a randomized controlled trial in an urban pediatric emergency department. *Pediatrics*. 2007 Aug; 120(2):330–9. [PubMed: 17671059]
16. Claudius IA, Nager AL. The utility of safety counseling in a pediatric emergency department. *Pediatrics*. 2005; 115:423–427.
17. Maio RF, Shope JT, Blwo FC, Gregor MA, Zakrajsek JS, Weber JE, Nypaver MM. “A Randomized controlled trial of an emergency department-based interactive computer program to prevent alcohol misuse among injured adolescents”. *Ann Emerg Med*. 2005; 45(4):420–429. [PubMed: 15795723]
18. Rhodes KV, Lauderdale DS, Stocking CB, Howes DS, Roizen MF, Levinson W. Better health while you wait: a controlled trial of a computer-based intervention for screening and health promotion in the emergency department. *Ann Emerg Med*. 2001; 37(3):284–91. [PubMed: 11223765]
19. Trifiletti LB, Shields W, Gielen AC, McDonald EM, Walker A. Development of injury prevention materials for people with low literacy skills. *Patient Education and Counseling*. Dec; 2006 64(1-3): 119–27. [PubMed: 16723205]
20. Duperrex O, Blackhall K, Burri M, Jeannot E. Education of children and adolescents for the prevention of dog bite injuries. *Cochrane Database Systematic Review*. 2009 Apr 15.(2)

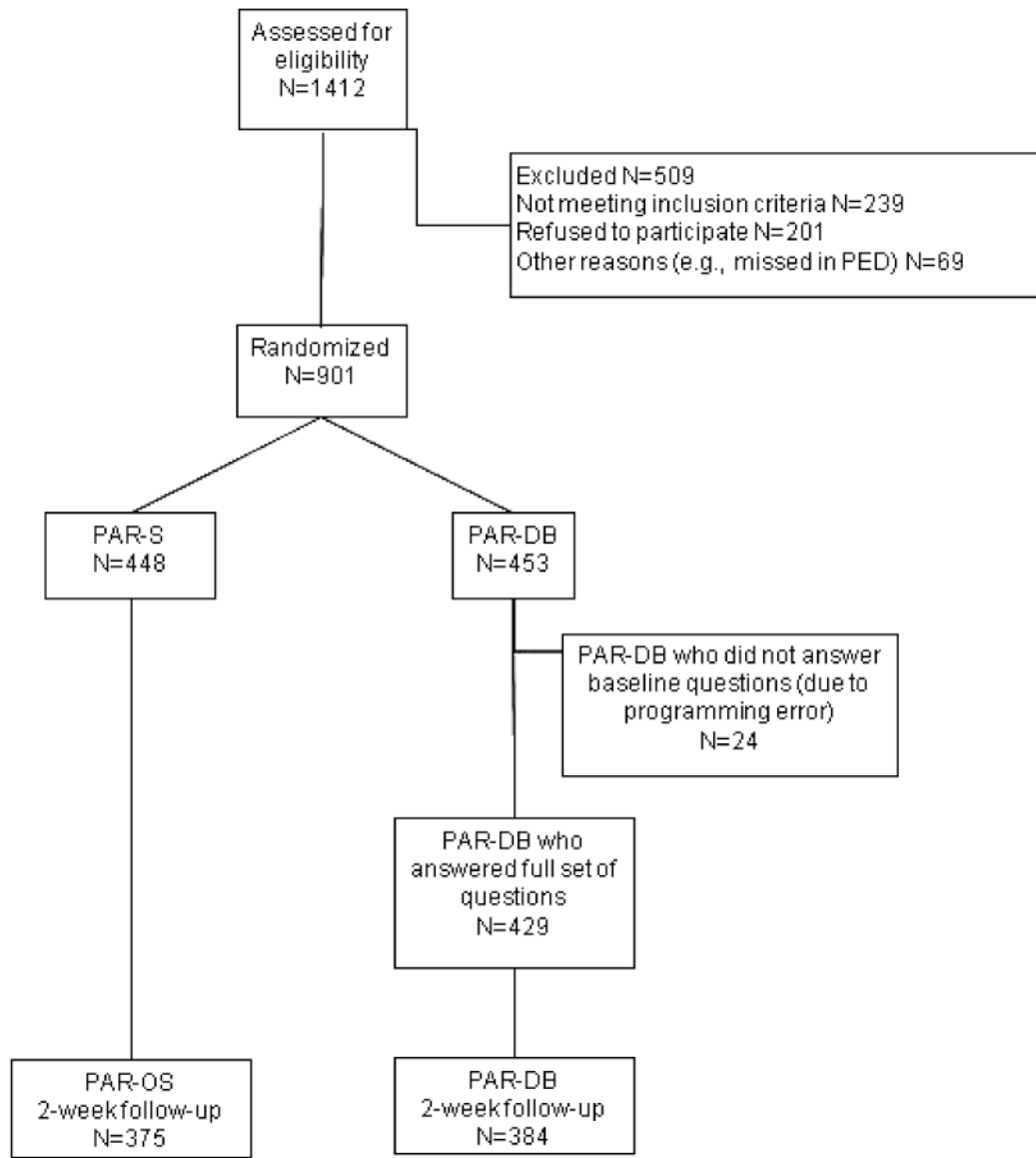


Figure 1.
Study design.

Table 1

Responses to Baseline Survey among PAR-DB Group (N=429)

Baseline questions for entire sample		N=429 (%)
1	Have you seen stray dogs in your neighborhood? a. Yes b. No	n=250 (58.3) n=179 (41.7)
2	Have you seen dangerous dogs in your neighborhood? a. Yes b. No	n=187 (43.6) n=242 (56.4)
3	Has [child's name] ever been bitten or attacked by a dog? a. Yes b. No	n=6 (1.4) n=423 (98.6)
4	Have you ever heard about other children being bitten or attacked by a dog? a. Yes b. No	n=241 (56.2) n=188 (48.3)
5	Is there a dog living in your home? a. Yes, one dog b. Yes, more than one dog c. No	n=43 (10.0) n=5 (1.2) n=381 (88.8)
Questions for only homes with dogs		N=48 (%)
6	Do you ever leave your child alone with this dog? a. Yes b. No	n=10 (20.8) n=38 (79.2)
7	Has this dog ever bitten or attacked a child? a. Yes b. No	n=1 (2.1) n=47 (97.9)
8	Has this dog been spayed or neutered? a. Yes b. No	n=21 (43.7) n=27 (56.2)

Table 2

Knowledge of Dog Bite Facts at Two Weeks by Study Group

Question	% Correct PAR-S Group	% Correct PAR-DB Group	Chi-squared value	p-value
Dogs are less likely to bite if they are a. spayed or neutered *** b. small dogs c. not raised in a home with children d. none of the above	3.3	12.5	17.937(b)	.000
According to experts, how many dog bites happen every year in the U.S.? a. 5,000 b. 100,000 c. 5 million *** d. 10 Million	7.9	12.8	3.956(b)	.047
To reduce the risk of dog bites children should be taught to a. Leave dogs alone when they are eating b. Let dogs sniff you before petting them c. Stay away from dogs you don't know d. All of the above ***	84.8	82.9	0.414	.520

T-Test of Variance in Overall Dog Bite Knowledge Scores between Intervention and Control Groups		
	Mean	Standard Deviation
PAR-S	0.9603	0.4806
PAR-DB	1.0812	0.6188

	t-score	Significance e (2-tailed)	Mean Difference	95 % Confidence Interval of Difference	
				Upper	Lower
Equal Variances Assumed	-2.792	0.005	-.12089	-0.20592	-0.03587

*** correct answer