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A CASE-CONTROL STUDY OF DOG BITE RISK FACTORS IN A DOMESTIC SETTING TO CHILDREN AGED 9 YEARS AND UNDER

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Background

- In Victoria, Australia, an average of 565 children aged 0-14 years are treated in hospital each year for injury from dog bite
- Children aged 0-9 years account for 76% of hospital admissions and 71% of hospital emergency department (ED) presentations
- More than two thirds of hospital-treated dog bites to children occur in a domestic setting
- Surveillance data allows for monitoring of rate and some victim info
- There is limited evidence on the **risk factors** for dog bite injury

Aims of Study

- To identify risk factors for dog bite-related injury to children aged 0-9 years, occurring in a domestic setting

Methods

- Case-control study in Victoria, Australia (population of 5.25 million)
- The study region comprised the catchment of 7 EDs
- Population base children <10 yrs exposed to dog in domestic setting in study region
- Cases (n=51) children bitten by dog and presenting to hospital ED (*71% response rate*)
- Controls members of study base (n=102) recruited by contacting randomly selected telephone numbers in the study region (*23% response rate*)

Methods

- Data was collected via self-report by parent or guardian in response to an interviewer-administered telephone questionnaire
- Instrument informed by those previously used by Gersham et al (1994) and Guy et al (2001) and literature review

Methods

- Descriptive analyses were used to obtain insight into the data
- Univariate analyses tested unconditional associations of variables with the outcome (bite)
- Collinearity testing examined associations / correlations between explanatory variables
- Stepwise logistic regression used to examine association of variables with outcome, adjusting for all other variables

Results – Case characteristics

Child

- The average age of cases was 3.5 years (SD 2.5 years) and age ranged from 8 months to 9 years
- Younger children (aged 0-3) over-represented by 14% in study compared with all dog bite ED presentations over study period
- ‘Overconfident’ with dogs (65%)
- Lack of or lapse in supervision (40% unsupervised)
- Encroachment onto dog’s established territory (51%)
- Provocation of dog (57%, mostly involving male children)

Results - Case characteristics

Environment / household / location

- Bites were as likely to occur in another person's home (mostly family members) as own home
 - 33% bitten by their family pet in their own home
 - 14% bitten by a grandparent's pet when living with grandparent
 - Other cases (53%) occurred when visiting another home

Dog

- Dogs more likely to be male (65%)
- Slightly more likely to be neutered (54%)
- More likely to be small (41%) than medium (31%) or large (28%)
- 43 different pure and mixed breeds

Results

Child characteristics		Cases (n=51) n (%)	Controls (n=102), n (%)	Unadjusted odds ratio (95% CI)
Gender	Female	21 (41.2)	41 (40.2)	
	Male	30 (58.8)	61 (59.8)	1.0 (0.5,1.9)
Age group	3-9 years	24 (51.1)	74 (73.3)	
	0-2 years	23 (48.9)	27 (26.7)	2.6 (1.3,5.4)
Provoked dog	No	12 (28.6)	86 (84.3)	
	Yes	30 (71.4)	16 (15.7)	13.4 (5.7,31.6)
Unsupervised	No	31 (60.8)	96 (94.1)	
	Yes	20 (39.2)	6 (5.9)	10.3 (3.8,28.0)
Overconfident	No	17 (34.0)	69 (75.0)	
	Yes	33 (66.0)	23 (25.0)	5.8 (2.8,12.4)

Results

Dog characteristics		Cases (n=51) n (%)	Controls (n=102), n (%)	Unadjusted odds ratio (95% CI)
Gender	Female	17 (34.7)	52 (51.0)	
	Male	32 (65.3)	50 (49.0)	2.0 (1.0,4.0)
Neutered	No	17 (45.9)	17 (17.9)	
	Yes	20 (54.1)	78 (82.1)	0.2 (0.1,0.6)
Microchipped	No	12 (37.5)	10 (11.1)	
	Yes	20 (62.5)	80 (88.9)	0.2 (0.1,0.6)
Fears	Less than 3	41 (80.4)	88 (92.6)	
	3 or more	10 (19.6)	7 (7.4)	3.1 (1.1,8.6)

Results

Environment / household characteristics		Cases (n=51) n (%)	Controls (n=102), n (%)	Unadjusted odds ratio (95% CI)
Territory of dog	No	20 (43.5)	84 (83.2)	
	Yes	26 (56.5)	17 (16.8)	6.4 (2.9,14.0)
Other home (and dog)	No	17 (34.0)	79 (80.6)	
	Yes	33 (66.0)	19 (19.4)	8.1 (3.7,17.4)
Outside house	No	20 (43.5)	84 (83.2)	
	Yes	26 (56.5)	17 (16.8)	6.4 (2.9,14.0)

Results

	Odds Ratio	95.0% C.I. for Odds Ratio	
		Lower	Upper
Younger age	5.5	1.1	26.9
Other home	47.6	5.7	395.7
Provocation	15.4	3.3	73.0
Unsupervised	33.1	3.9	281.8
Over confident	19.8	3.0	133.3
Dog's territory	9.3	1.9	44.8

- H-L goodness of fit chi-square 5.25 p=0.63
- Model chi-square 85.5 6df (n=119) p<0.001
- Explained between 51.2% (Cox and Snell R square) and 73.9% (Nagelkerke R square) of variance
- Correctly classified 89.9% of cases

Results

- 43 different pure bred and mixed-breed dogs involved in 51 bite incidents and 72 different pure bred and mixed-breed dogs involved in the 102 control exposure events.

Case dogs



Control dogs



Key Findings

- A number of risk factors were identified
 - bites more likely to occur in a home other than the child's home (and own family dog)
 - Child age group (Less than 3 years, 3-9 years)
 - Lack of supervision
 - Provocation by the child (deliberate or inadvertent)
 - Over confidence by the child
 - Encroachment by the child on the dog's established territory

Key Findings

- In the model described, there was no evidence that the following were risk factors:
 - Gender of child
 - Dog gender
 - Dog neuter status
 - Dog micro chip status
 - Fear levels of dog
 - Outside location
- In this study breed did not appear to be a factor

Limitations

- Non-response bias among controls
- Possible recall bias, especially among cases
- Case dog characteristics were mostly only available for cases where the dog was owned by the parents
- Small case numbers
- Logistic regression modelling constrained by small cell sizes
- Temporal characteristic risk factors, such as season, unable to be considered because of time delay in ethics approval and resultant delay in commencement of control data collection

Conclusions

- This is the first time a case-control study of this nature, recruiting cases through hospitals, has been conducted
- A number of risk factors were identified
- Further analysis to be undertaken
- Identification of risk factors has the potential to reduce dog bite-related injury to children in a domestic setting by guiding future interventions, including education and policy
- Current prevention initiatives may be expanded to increase community awareness of contributory risk factors for dog bite

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