



Dog bite injuries

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Abstract

Aims To describe the extent of the dog bite problem in New Zealand for the period 1989 to 2001.

Methods Fatalities and cases requiring public-hospital treatment identified from the New Zealand Health Information Service databases.

Results There was one fatality and 3119 hospitalisations, an average of 240 per year. Those most at risk were males and children under 9 years of age. The incidence rate of dog bites has continued to increase from that reported previously. There has been an increase in recent years but it is difficult to determine whether this is real effect or an artefact of coding.

Conclusions Dog bite injuries represent a significant public health problem in New Zealand. Ongoing monitoring is required to determine if dog control policies are having the intended effect.

Results of recent studies around the World have shown increasing trends in the incidence of fatal, hospitalised, and emergency department presentations of dog bites.¹

The only previously published study in New Zealand on the incidence of dog bites was by Langley in 1992²—that study outlined the increasing incidence rate of hospitalisations for dog bites over a 10-year period (1979 to 1988). Interest in dog control heightened in February 2003 when several serious attacks were described in the media. Consequently, there were calls for a review of legislation pertaining to dog control.

In New Zealand there is a lack of recent and relevant data to determine the current extent of the problem and to make an informed decision about preventive methods to address the issue. The research described here sought to update earlier work—by determining trends in the incidence of serious dog bites in New Zealand from 1989 to 2001, inclusive.

Methods

We adopted a similar strategy to Langley² for the identification of serious cases. This involved identifying fatal and public hospital inpatient victims from New Zealand Health Information Service's (NZHIS) electronic mortality and morbidity data files using the external cause of injury and poisoning codes (E codes). Readmission for the same injury were excluded.

The NZHIS databases include a free text narrative of up to 70 characters for hospitalisations, and up to 90 characters for fatalities describing the circumstances of injury. The proportion of injury hospitalisations with useful information in this field has been low since 1995. Hospitalisations were restricted to those with a principal diagnosis of injury. Patients not staying at least one night, readmissions, and in-hospital deaths were excluded.

From 1989 to June 1999, the circumstances of injury were classified using ICD-9 E-Codes.³ For that period, cases with an E-Code of 'E906.0: Other injury caused by animals – dog bite' or a free text narrative including the words 'dog' and 'bite' were identified as dog bite injuries.

For the period 1989 to 1994, the number of struck by dog hospitalisations was estimated by identifying all cases with an E-Code of E906, or E906.9 where the free text narrative included the word 'dog' but not the word 'bite'. From July 1999 onwards, the circumstances of injury were classified using ICD-10 codes.⁴

For the period 1989 to 1994, cases with a code of 'W54: Bitten or struck by dog' were identified as dog bite injuries. The proportion of these dog bite cases were estimated as being equal to the proportion of bitten- or struck-by-dog cases from 1989 to 1994. Estimates of the total New Zealand and Maori populations, by gender and age group, were obtained from Statistics New Zealand.⁵

The inpatient data was analysed using Stata 7.0 and SPSS software. Rates and 95% confidence intervals were calculated using negative binomial regression analyses. Rate ratios, calculated from the exponential of the beta coefficients from the negative binomial regression were used to compare rates between categories. Pearson's Chi-squared analysis was used to test for differences in the distribution of categorical data.

The natural log was taken to normalise the distribution of the number of days stayed in hospital. The mean days stay and confidence limits were calculated on the logged scale and then back transformed by taking the anti log—this provides an estimate of the geometric mean and confidence limits on the original scale. Regression analysis was used to compare the mean number of days stayed by anatomical location of injury. Since the outcome variable had been log transformed, the exponential of the beta coefficients provide estimates of ratios of geometric means.

The distribution of age varies between Maori and non-Maori. Therefore direct standardisation was used to compare inpatient dog bite rates between Maori and non-Maori.

Results

From 1989 to 2001, 3119 potential dog bite hospitalisations and 1 dog bite fatality were identified. Of these 3119 incidents, 94 hospitalisations were estimated to have resulted from being struck by a dog rather than being bitten. Hence, for the period 1989 to 2001, there were an estimated 3025 hospitalisations and 1 fatality as a result of dog bites.

The incidence rates of dog bite hospitalisations by year are given in Figure 1. Rates for 1999 to 2001 have been adjusted to allow for the proportion of cases that were a result of being struck by rather than bitten by a dog. All other rates presented below were derived from the population of potential dog bites (n=3119) and, as such, are likely to be slight overestimates. Small numbers precluded reliable adjustments to these rates.

The data for ethnicity of dog bite victims was analysed for the years 1996 onwards (due to a different definition of ethnicity prior to this date). There were 1588 victims during this time, and New Zealand European victims represent 52% of the total bite victims, Maori 28%, and all other groups 20%. The age-adjusted incidence rates for Maori and non-Maori were 10.6 (9.4–11.7) and 5.9 (5.6–6.3) respectively.

Of those where a location was given (42%), 30% of the victims were bitten while at a home (not necessarily their own). For 6% of the victims, the bite occurred on the street or highway, and 1% were bitten while on a farm.

The upper limb, head, and lower limb were the most common regions to be injured, with the most common site of injury being the face. The results show evidence of a difference in the distribution of injury location by age group (Figure 2). Injuries to the head were significantly more common for the younger age groups; injuries to the

upper limb most commonly occurred in those aged over 15 years, and lower limb injuries were more consistently spread through the age groups.

Males, and children less than 9 years of age (Table 1) had the highest rates of injury.

Table 1. Demographic characteristics of dog bite victims in New Zealand (1989–2001)

Characteristic	Frequency	%	Rate per 100,000 population (95% CI)
Gender:			
Male	1886	60.5%	8.1 (7.7–8.5)
Female	1233	39.5%	5.1 (4.9–5.4)
Age (years):			
0–4	741	23.8%	19.8 (18.5–21.3)
5–9	469	15.0%	12.9 (11.7–14.1)
10–14	204	6.5%	5.8 (5.1–6.7)
15–19	192	6.2%	5.3 (4.6–6.1)
20–24	227	7.3%	6.3 (5.6–7.2)
25–29	219	7.0%	6.1 (5.3–7)
30–34	171	5.5%	4.6 (3.9–5.3)
35–39	147	4.7%	4 (3.4–4.7)
40–44	130	4.2%	3.9 (3.3–4.6)
45–49	131	4.2%	4.4 (3.7–5.2)
50–54	109	3.5%	4.3 (3.6–5.2)
55–59	83	2.7%	4 (3.2–4.9)
60–64	67	2.1%	3.6 (2.8–4.6)
65–69	65	2.1%	3.8 (3–4.9)
70–74	59	1.9%	4.1 (3.2–5.3)
75–79	56	1.8%	5.2 (4–6.7)
80+	49	1.6%	4.1 (3.1–5.4)
Ethnicity (from 1996):			
Maori	445	28.0%	10.6 (9.4–11.7)
Non-Maori	1143	72.0%	5.9 (5.6–6.3)

The total number of hospital inpatient days incurred as a result of dog bites for the 13-year period was 9,450, with 3 days being the mean number of days in hospital. The longest time spent in hospital for a dog bite injury was 56 days. For a 1 year increase in age, there was an estimated 1% (1.0–1.3) increase in the number of days stayed ($p=0.001$). Victims with injuries to the lower limb were more likely to stay in hospital the longest, with a mean number of 5.6 days.

Figure 1. Incidence rates of dog bites in New Zealand (1989–2001)

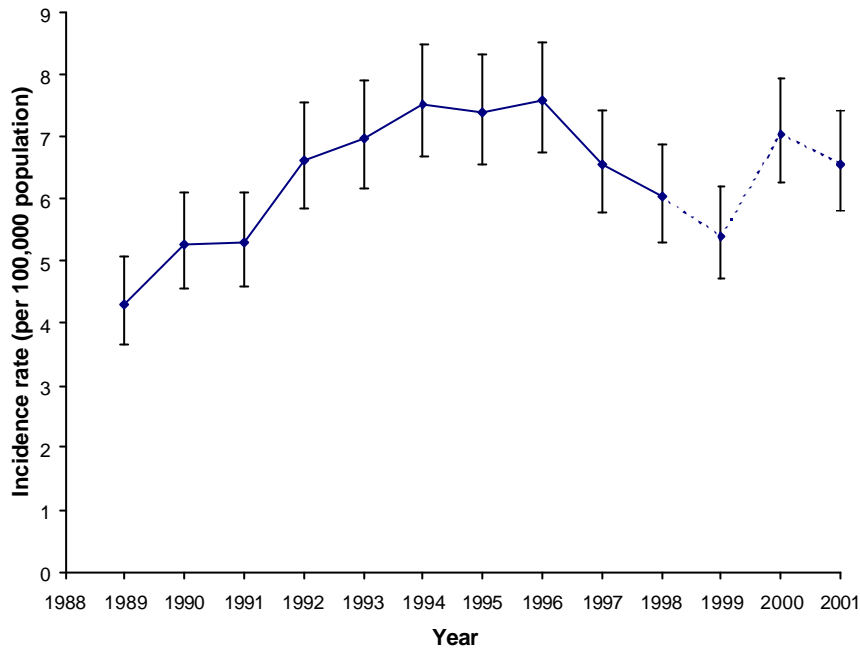
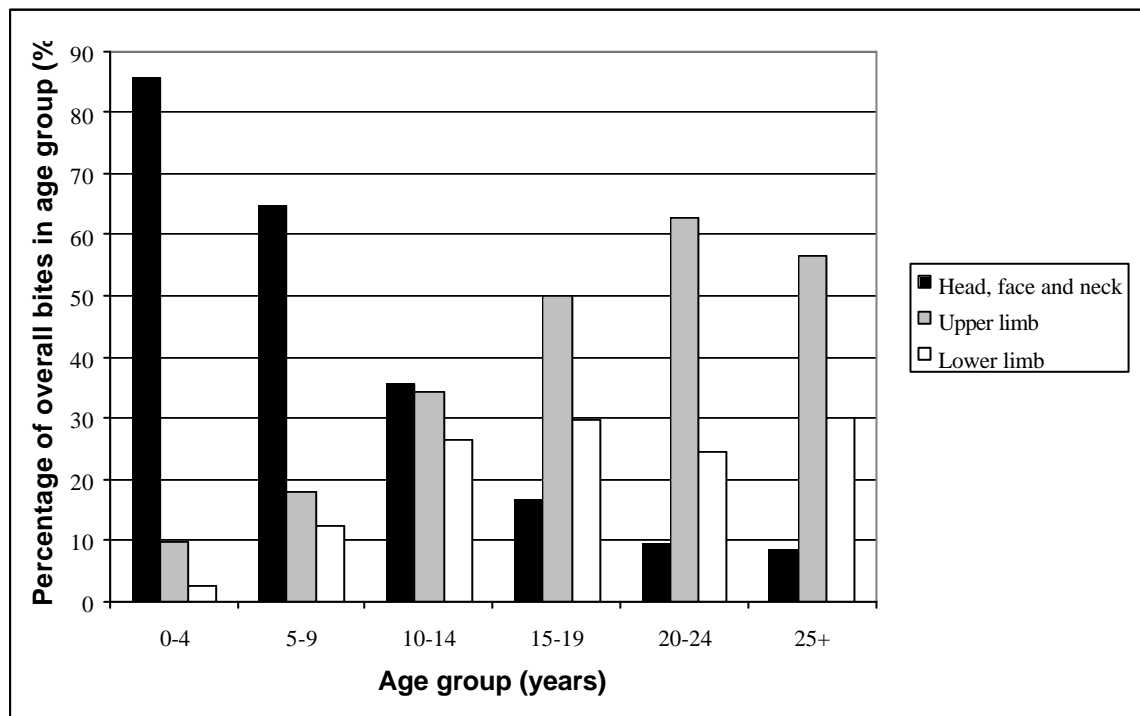


Figure 2. Age of victim and the main body region injured (1989–2001)



Discussion

One death occurred during the study period (1988–2001). This represents the only fatality identified in New Zealand since 1979. This result is consistent with other developed countries where death due to a dog bite has been very rare. The rates of serious dog bite injuries resulting in hospitalisations continued to increase following those reported by Langley² for the period 1979 to 1988. Subsequent to the introduction of the Dog Control Act 1996, the rate dropped for the following 3 years but then increased to nearly pre-1996 levels.

The decrease in incidence rates from 1996 could be attributed to the public responding to publicity around dog control around this time coupled with the introduction and enforcement of strict dog control law in 1996. The elevated risk for 2000 and 2001 could represent a real change in risk or be an artefact of coding changes or a combination of both.

The overall incidence rate was similar to that observed in Australia of 7.7 for 1995 to 1996,¹ but is much higher than the Canadian inpatient rate of 2.3 for 1993.⁶ Direct comparison with overseas studies may be limited, however, by the use of different research methods and different treatment/service delivery practices (which influence what is counted as a case).

The epidemiological characteristics of dog bite injuries over the period studied were similar to those found in other studies⁷—with males and young children, particularly those under 10 years of age, disproportionately represented. High rates among children can probably be explained by their lack of physical strength or motor skills to ward off an attacking dog.⁸ Immaturity and lack of judgement may also sometimes lead children to act in ways that animals perceive as threatening or aggressive.⁶ Furthermore, it has been suggested that (prior to their injury) children under 5 years of age are significantly more likely to provoke animals than older children.⁹

While younger victims did not stay in hospital as long as older victims, their injuries were often sustained to the head region, with very few being to the limbs. Data from elsewhere shows similar patterns.¹ It may be that parents of injured children are more likely to seek medical attention, and young children and victims sustaining head injuries may be more likely to be admitted to hospital than other groups.

Victims aged 20 to 24 had the highest number of injuries to their upper limbs in this study. Other studies found this to be a common injury site, and the leg was also particularly likely to be injured for those in the 20 to 25 age group.¹⁰

This study showed the Maori inpatient rate was 1.8 times the non-Maori rate. Previous research in New Zealand found the Maori rate to be 2.6 times that of non-Maori for the period 1979 to 1988.² The rates ratios may be a real change or be a function differences in ethnicity classification over time.

Dog bites continue to be a significant problem—so ongoing monitoring is required to demonstrate whether dog control procedures are reducing injury.

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