Dog bites to the head, neck and face in children

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Dog bites are a poorly understood and complex public health problem. Children are most frequently the victims of dog bites and the face is often the favoured target. A review of dog bite wounds in small children presenting to the Red Cross War Memorial Children's Hospital was carried out over a period of 13.5 years (1991-2004). One thousand eight hundred and seventy-one dog bite wounds were admitted from a total of 125,677 patients treated. From 1,871 patients presenting with dog bite injuries, we identified 596 children who sustained injuries to the head, face or neck. Dog bites to the head, face or neck were responsible for 0.5% of all trauma unit presentations and 32% of all dog bite injuries. The mean age of the children was 5.1 years. Male children accounted for 68% of the patients. The peak incidence was noted in children aged 2 to 4 years old. One hundred and seventy-two (29%) bites occurred between the summer months of December and February. Two hundred and forty-nine (42%) patients presented to hospital between the hours of 12:00 and 18:00 hours and 275 (46%) children presented between 18:00 and 0:00 hours. A large proportion of all attacks occurred either inside or outside the victim's own home and at the home of friends or family. Superficial injuries were treated with wound cleaning, suturing and dressing. There were no fatalities. Dog bites are relatively common in small children, but do not represent a major cause of morbidity and mortality.

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Introduction

Dog bites are a poorly understood and complex public health problem. Children are most frequently the victims of dog bites and the face is often the favoured target.[1,2] Dog bites are a major cause of preventable traumatic injury in the paediatric population. The annual frequency of dog bite injuries in children has been estimated at 22 per 1,000 children, less than half of which present to medical facilities.[1] Dog bites are commonly associated with soft tissue laceration to the face, and there are reports of accompanying facial fractures.[2] Additional injuries include facial nerve damage, lacrimal duct damage, ptosis and blood loss. Although rarely fatal,[3] dog bite injuries sustained by children can be devastating, not only cosmetically, but also with major adverse psychological effects such as general anxiety and nightmares.[4] Because of the high prevalence of dog bites to the head, face and neck and the associated physical and psychological trauma suffered by children, a review of all paediatric patients presenting with dog bite injuries was carried out at the Red Cross Children's Hospital.

Methods

Paediatric patients who sustained dog bite injuries presenting to the trauma unit of the Red Cross War Memorial Children's Hospital (RCH) in Cape Town, South Africa, between March 1991 and November 2004 were reviewed. Data were obtained from the Child Accident Prevention Foundation of South Africa (CAPFSA) trauma registry. Ethical approval to access the data was obtained from CAPFSA. Trauma records were reviewed for demographics, environmental information, type of injury and treatment. Data are expressed as proportions. Differences in place of occurrence and anatomical location of dog bite injury between children younger than 6 years and 6 years and older were compared using chi-square tests.

Results

A total of 125,677 patient visits to the trauma unit were recorded during the study period including 1,871 patients presenting with dog bite. Five hundred and ninety-six children sustained injuries to the head, face or neck. Dog bites to the head, face and neck therefore were responsible for 0.5% of all trauma unit presentations and 32% of all dog bite injuries.

Male children accounted for 404 (68%) and female children for 192 (32%) patients. Age was not recorded for one male child. The mean age of the remaining children was 5.1 ± 2.9 years (range, 2.5 months to 13.4 years). The greatest number of children with dog bites were aged 2 to 4 years old (Figure 1). One hundred and seventy-two (29%) bites occurred between the summer months of December and February.

A large proportion of all attacks occurred either inside or outside the victim's own home and at the home of friends or family (Table 1). There were no statistically significant differences in the location of the attack and the age of the child.

The 596 children sustained a total of 633 dog bite injuries to the head, face or neck (Table 2). Injuries to the face were the most common anatomical site of trauma for children of all ages,

Figure 1: Male (n=404) and female (n=192) children by age presenting with dog bite injuries to the head, face or neck

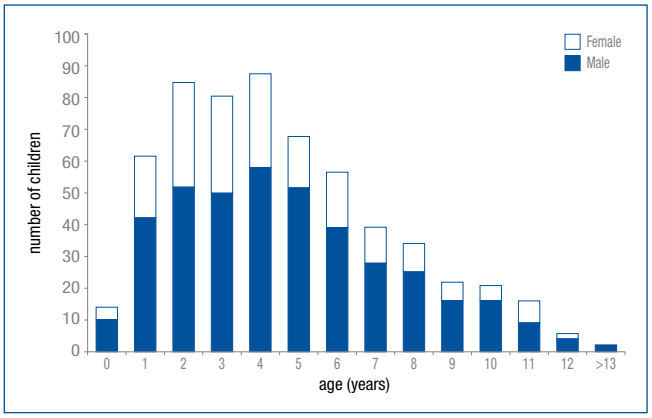

Table 1: Place of occurrence of dog bite injuries in children aged less than 6 years and 6 years or older

Place of occurrence	<6 years (%)	≥6 years (%)	Total (%)
Own home inside	66 (17)	31 (16)	97 (16)
Own home outside	166 (42)	70 (36)	236 (40)
Other home inside	25 (6)	15 (8)	40 (7)
Other home outside	66 (17)	44 (22)	110 (18)
Road or pavement	49 (12)	21 (11)	70 (12)
Public place	7 (2)	7 (4)	14 (2)
Other/Unknown	19 (5)	9 (5)	28 (5)
Total	**398**	**197**	**595**

Table 2: Anatomical locations of dog bite injuries to the head, face or neck in children aged less than 6 years and 6 years or older

Anatomical location	<6 years (%)	≥6 years (%)	Total (%)
Scalp	45 (11)	27 (13)	72 (11)
Skull	11 (3)	2 (1)	13 (2)
Brain – closed injury	1 (0)	1 (0)	2 (0)
Eye(s)	29 (7)	13 (6)	42 (7)
Nose	12 (3)	7 (3)	19 (3)
Facial bones	5 (1)	4 (2)	9 (1)
Mouth/oropharynx	32 (8)†	32 (15)	64 (10)
Mandible	3 (1)	1 (0)	4 (1)
Ear	23 (5)	16 (8)	39 (6)
Face (other)	252 (60)†	101 (48)	353 (56)
Neck	8 (2)	7 (3)	15 (2)
Total	**421**	**211**	**632***

*Some patients presented with more than one injury, †p<0.05.

particularly in those younger than 6 years of age (60% versus 48%, p=0.003). Children 6 years or older were more likely to sustain injuries to the mouth or oropharynx (15% versus 8%, p=0.004). No other statistically significant associations were found between age group and frequency of injuries to the head, face or neck.

Management

There were no dog bite-related fatalities. The majority of injuries were minor including superficial lacerations, abrasions and closed tissue injuries (Table 3). Significant injuries were complicated lacerations, including those requiring surgery and inpatient management (Figures

Table 3: Description of dog bite injuries in children aged less than 6 years and 6 years or older

Injury description	<6 years (%)	≥6 years (%)	Total (%)
Laceration – superficial	277 (66)	131 (62)	408 (64)
Laceration – compli-cated	54 (13)†	42 (20)	97 (15)
Abrasians	62 (15)	20 (9)	82 (13)
Closed tissue	18 (4)	8 (4)	26 (4)
Vascular	1 (0)	2 (1)	3 (0)
Muscle/tendon	1 (0)	0 (0)	1 (0)
Other	8 (2)	8 (4)	16 (3)
Total*	**421**	**211**	**632***

*Some patients presented with more than one injury, †p<0.05.

Figure 2: Severe lacerations of the right cheek

Figure 3: Severe lacerations beneath the nose

Table 4: Treatment of dog bite injuries in children aged less than 6 years and 6 years or older

Injury description	<6 years (%)	≥6 years (%)	Total (%)
Advice and medication	93 (22) †	32 (15)	125 (20)
Dressing	93 (22)	40 (19)	133 (21)
Clean and suture	204 (48) †	120 (57)	324 (51)
Examination under general anaesthetic	9 (2)	5 (2)	14 (2)
Open operation	10 (2)	5 (2)	15 (2)
Skin graft	1 (0)	1 (0)	2 (0)
Other	11 (3)	8 (4)	19 (3)
Total*	**421**	**211**	**632***

*Some patients presented with more than one injury, †p<0.05.

2 and 3), vascular injuries and one patient who required intubation following severe airway injury. Children 6 years or older were more likely than younger children to sustain complicated lacerations (20% versus 13%, p=0.02).

Suturing under local anaesthetic was the most common treatment administered following dog bite for both age groups (Table 4). Children younger than 6 years were more likely to be treated with simple advice and medication alone (22% versus 15%, p=0.04). Fifty-two (9%) children required a general anaesthetic. Eighty (13%) patients were admitted to the trauma ward or directly to another ward, including the intensive care unit, as a result of the attack.

Discussion

Dog bites to the head, face and neck were responsible for 0.5% of all trauma unit presentations in children. Despite increasing recognition that dog bite injuries in small children are a serious public health problem,[5] the incidence of these injuries remains high.[1] In this study, dog bites were responsible for 0.5% of all presentations to the trauma unit for children. Because of the high prevalence of dog bites in children that can result in serious physical and psychological trauma,[4] recommendations are needed that may prevent these injuries.

In this study, 68% of children bitten were male and the peak incidence of bites to the face occurred in children aged 2 to 4 years, which is lower than previous reports[6-9] and may reflect the natural behaviour of young boys including running, yelling, grabbing and maintaining eye contact, which put them at risk for dog bite injuries.[10,11] Furthermore, nearly a third of dog bites occurred during the months when children are on their summer vacation and more likely to be playing outside. These results also support previous findings that dog bites occur more often outside the family home or those of friends or relatives and involve the family pet,[12,14] highlighting the fact that a known dog cannot necessarily be regarded as a safe dog.[13]

Of the 633 injuries sustained by our patient group, most were classified as minor injuries such as superficial lacerations and abrasions. Our results suggest that bites to the head, face and neck in younger children (<6 years) is a common age-specific anatomical location for dog bite injuries. Proximity of a small child's face to the dog increases the likelihood that facial injuries will occur and scarring is a common consequence resulting in emotional distress.[14]

The public health implications of dog attacks are significant and there needs to be increased awareness of the risks to small children. Guidelines on dog bite prevention are largely unevaluated and include controls on high-risk breeds, keeping dogs on a leash, animal training and educating dog owners.[15,16] A recent randomised trial in school children has shown that education programmes can alter behaviour towards dogs in the short-term.[17] Public education is likely to be paramount to the success of any dog bite prevention programme, because the majority of all dog bites are inflicted by dogs known to the child, including the family dog.[12] The findings of this research on the location of attacks by dogs suggest that education should especially target dog owners with young children at home including close adult supervision of all child-dog interactions, and older school-aged children who encounter dogs outside of home.[18]

Prospective dog owners should also receive advice from appropriate resources including veterinarians, dog trainers and qualified animal behaviourists with regard to appropriate pet selection and responsible dog ownership.[11] Although some breeds such as Pit Bull-type dogs and male dogs of unneutered status have been identified as being more aggressive than others,[19] any dog may attack when threatened. Also, older dogs and multiple dogs should not be introduced into homes with children.[20] All dogs are social animals that have an innate pack instinct; in domestic dogs the pack is most often the human family unit.[21] A social hierarchy within the pack allows the members to assume their places and to function from those positions.[22] Any change to this hierarchy is potentially dangerous. Families should also be educated to avoid 'humanising' their dog (eg. sleeping on couches) as the dog may not be able to distinguish between animal and master and may be more likely to bite.[20]

Dog bites are relatively common in small children, and while causing significant morbidity, does not represent a major cause of mortality. Antibiotic therapy is indicated for all dog bites to the head and neck, since all dog bite wounds are potentially contaminated. Tetanus immunisation status and the risk of rabies infection should be routinely addressed in bite wound management.[23]

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