Dog Bite Injuries among American Indian and Alaska Native Children

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Objective To examine dog bites among American Indian (AI) and Alaska Native (AN) children visiting Indian Health Service and tribal health facilities.

Study design We retrospectively analyzed hospitalizations and outpatient visits with a diagnosis of dog bite between 2001 and 2008 in AI/AN children aged <20 years. Rates of dog bite hospitalizations and outpatient visits were estimated by age group, sex, region, and number and location of open wounds using Indian Health Service data. Analyses of hospitalizations for the general US population aged <20 years used the Nationwide Inpatient Sample.

Results The average annual dog bite hospitalization rate was higher among AI/AN children in Alaska (6.1/100 000 population) and the Southwest region (5.3/100 000) compared with the general US child population (3.1/100 000; 95% CI, 2.9-3.3/100 000). The average annual outpatient visit rate in AI/AN children was highest in the Alaska (596.4/100 000), Southwest (540.0/100 000), and Northern Plains West (537.6/100 000) regions. The hospitalization rate was highest in both AI/AN and US males aged <5 years, and outpatient visit rates were highest in AI/AN males aged 5-9 years. Open wounds diagnoses were most commonly seen on the head, neck, and face in hospitalized children (45.5% of open wounds in AI/AN children, 59.3% in US children; SE, 1.0%) and on the leg in AI/AN outpatients (35.6%).

Conclusion Dog bites represent a significant public health threat in AI/AN children in the Alaska, the Southwest, and Northern Plains West regions of the US. Enhanced animal control and education efforts should reduce dog bite injuries and associated problems with pets and stray dogs, such as emerging infectious diseases. *(J Pediatr 2013;162:1270-5)*.

Dog bites are a significant, yet preventable, public health problem in the US, affecting an estimated 4.5 million people (ie, 1.5% of the population) annually.[1] More than 330 000 US emergency department visits were related to dog bites each year between 1992 and 1994, 4% of which resulted in hospitalization.[2] Studies analyzing dog bites in the general US population have found that children, especially boys, are represented disproportionately.[1-12]

Few previous studies have investigated dog bite injuries among the American Indian (AI)/Alaska Native (AN) population. A study of the Navajo population found that annual incidences of dog bites reported to the Indian Health Service (IHS) in the early 1980s were comparable to the high incidences reported in major US urban centers during this period, with the highest age group–specific rates in children and statistically equivalent rates in males and females.[13] Another study found that dog bite hospitalization rates in Alaska were highest in males, and that the AN population had a >3-fold rate than the non-AN population.[14] Studies delving further into dog bite injuries in the AI/AN population are lacking, despite known problems with dog overpopulation and associated emerging infections (eg, Rocky Mountain spotted fever) within AI/AN communities.[13,15-18]

In the present study, we analyzed dog bite injuries reported between 2001 and 2008 in children aged <20 years. We examined hospitalization rates for the AI/AN population and the general US population, and analyzed outpatient visit rates for the AI/AN population. We discuss animal control and community education efforts, as well as the relationship between dogs and emerging zoonoses.

Methods

We selected and analyzed hospital discharge data with dog bite diagnoses for the period 2001-2008 among both the AI/AN population and the general US

AI	American Indian
AN	Alaska Native
ICD-9-CM	*International Classification of Diseases, Ninth Revision, Clinical Modification*
IHS	Indian Health Service
NIS	Nationwide Inpatient Sample
NPIRS	National Patient Information Reporting System
RR	Rate ratio

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population aged <20 years, as well as outpatient visit data with dog bite diagnoses for the AI/AN population aged <20 years during this period. A dog bite hospitalization or outpatient visit was defined by an *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) code for dog bite injury (E906.0) listed anywhere on the patient record.[19] Open wound diagnoses were analyzed by body location to summarize the nature of injuries. Open wounds listed on the patient record, including traumatic amputations, (ICD-9-CM codes 870-897) were categorized as follows: head, neck, face (870-874); torso (875-879); arm (880-881, 884, 887); hand, wrist, fingers (882-883, 885-886), and leg (890-897). Patient records could include more than 1 ICD-9-CM open wound code.

We analyzed all inpatient and outpatient visit records for AI/AN children within the IHS health care system reported in the IHS Direct and Contract Health Service Database from the IHS National Patient Information Reporting System (NPIRS) for calendar years 2001-2008.[20,21] These data include records of all hospital discharges and outpatient visits from IHS- or tribal-operated hospitals and from community hospitals and facilities contracted with the IHS or tribes to provide healthcare services to eligible AI/AN individuals.[22] The IHS regions were defined based on IHS Administrative Areas as follows (**Figure**): East (Nashville), Northern Plains East (Bemidji), Northern Plains West (Aberdeen, Billings), Alaska, Southern Plains (Oklahoma), Southwest (Albuquerque, Navajo, Phoenix-Tucson), and West (California, Portland). The West region was not included in hospitalization analyses because it does not contain any IHS- or tribal-operated hospitals, and because contract health services inpatient reporting is limited.

Average annual dog bite hospitalization and outpatient visit rates were estimated as the number of visits per 100 000 persons from the corresponding population. IHS annual user populations, defined as all registered AI/AN individuals who used an IHS-funded healthcare service at least once during the previous 3 years,[22,23] were used as denominators. For some IHS regions, to protect patient privacy, hospitalization counts and rates may be too low to report. The AI/AN population used in this study does not represent all AI/AN individuals in the US.

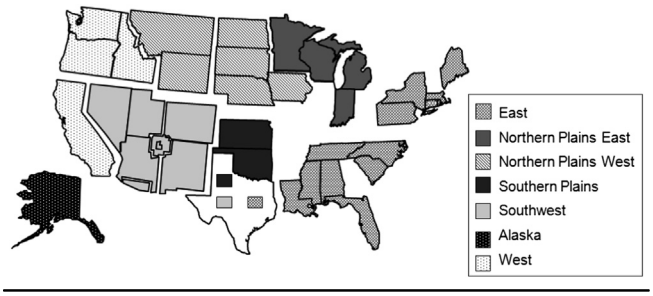

Figure. IHS regions. The West region does not keep a registry of inpatient data. Texas is administered by 3 IHS Administrative Areas (Nashville, Oklahoma City, and Albuquerque).

We used the Nationwide Inpatient Sample (NIS; http://www.hcup-us.ahrq.gov/nisoverview.jsp) from the Agency for Healthcare Research and Quality's Healthcare Cost and Utilization Project, a nationally representative sample of US hospitals that includes approximately 20% of all US hospitals, to analyze hospital discharge data for the general US population in 2001-2008. Hospitals in the sample include short-term, nonfederal general and specialty hospitals (http://www.hcup-us.ahrq.gov/nisoverview.jsp); IHS/tribal hospitals are not included. The NIS is the largest all-payer (ie, Medicare, Medicaid, private insurance, and uninsured) source of hospitalization data in the US, with approximately 8 million unweighted hospital stays each year. We determined national hospitalization rate estimates using weighting methodology developed for the NIS,[24,25] with rates (and their 95% CIs) calculated as the weighted number of visits over the corresponding population. Bridged-race census population estimates from the National Center for Health Statistics were used as population denominators in rate calculations.[26]

We calculated rate ratios (RRs) with 95% CIs to compare dog bite IHS hospitalization rates and outpatient visit rates in AI/AN children. Within the general US children population, we calculated weighted RRs with 95% CIs for hospitalization rate comparisons,[27] and used Poisson[28] and weighted least squares[29] regression methods to investigate temporal changes in rates among the AI/AN and general US populations, respectively. This study did not involve human subjects and therefore was Institutional Review Board exempt.

Results

Hospitalizations

During 2001-2008, the average annual dog bite hospitalization rate in AI/AN children aged <20 years was similar or slightly higher than that for the general US population aged <20 years (3.4/100 000 vs 3.1/100 000; 95% CI, 2.9-3.3/100 000) (**Table I**). The rate for young AI/AN males appeared higher than the rate for young males in the general US population (4.4/100 000 vs 3.5/100 000; 95% CI, 3.3-3.8/100 000). The rates in young females did not appear to differ between the 2 populations (2.4/100 000 for AI/AN vs 2.6/100 000; 95% CI, 2.4-2.8/100 000 for the general US population). In both populations, rates were significantly higher in males compared with females (RR, 1.8; 95% CI, 1.3-2.6 for AI/AN; RR, 1.3; 95% CI, 1.2-1.5 for the general US population).

The vast majority (80%) of dog bite hospitalizations in AI/AN children aged <20 years occurred in the IHS Alaska and Southwest regions. Average annual dog bite hospitalization rates were higher in Alaska (6.1/100 000) and the Southwest (5.3/100 000) AI/AN populations compared with the general US child population (**Table I**). Compared with young males in the general US population, the rate was almost 3-fold higher in young AI/AN males in Alaska (9.7/100 000) and nearly 2-fold higher in those in the Southwest region (6.3/100 000). The overall annual dog bite hospitalization rates