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Travel and non-travel associated rabies post exposure treatment in New South Wales residents, Australia, 2007–2011: A cross-sectional analysis

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Summary *Background:* Australian Bat Lyssavirus is endemic in Australian bats. More Australians are travelling to rabies (Lyssavirus 1) endemic countries. The nature and frequency of lyssavirus exposures and characteristics of New South Wales (NSW) residents exposed have not previously been described.
Method: Access to free rabies post-exposure treatment (PET) can only be arranged through Public Health Units in NSW. Details of people receiving PET after potential exposures to rabies or ABLV from 1 January 2007 to 31 December 2011 were extracted from an NSW Ministry of Health web-based database and analysed to better understand lyssavirus exposure epidemiology.
Results: Of 1195 people receiving PET, 415 exposures were in Australia and 780 abroad; 78.3% occurring in Southeast Asia, mainly Indonesia (47.6%) where most were on the island of Bali (95.2%). PET use increased substantially for domestic and international exposures. In Australia, most bat exposures were to members of the public (76.0%), rather than to people who work with bats professionally or as volunteers, with 54.1% due to bat rescue attempts. Injuries abroad were mainly from monkeys (49.4%) and from dogs (35.8%). Only 4.0% of international travellers were vaccinated prior to their exposure.

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Conclusions: Increasing rates of PET in travelling and non-travelling Australians emphasise the need for more effective communication about appropriate animal avoidance and the measures required if exposed. Opportunities for increasing pre-exposure treatment amongst individuals likely to be exposed should be promoted.

Introduction

Rabies is a form of encephalitis, usually transmitted to humans through bites or scratches from infected animals, introducing virus-laden saliva [1,2]. The incubation period is usually 1—3 months but it can range from days to years. In humans, rabies is almost invariably fatal once clinical symptoms develop [2]. Rabies virus is a member of the family Rhabdoviridae genus Lyssavirus. Australian Bat Lyssavirus (ABLV) (genotype 7) is closely related to rabies virus (genotype 1) [3]. Hosts for the rabies virus are usually *Canidae* including dogs, foxes, coyotes, wolves and jackals, but bats and other mammals can also play this role [1]. Australia is free of the rabies virus (Lyssavirus genotype 1) but many Australians travel to countries where rabies is endemic. Several of these travellers present to health authorities in Australia for post-exposure prophylaxis after an incident that potentially exposed them to the risk of rabies [4—7]. Thus far, two rabies cases (one in 1987 and one in 1990) have been described in Australians, who acquired the infection overseas [8,9].

ABLV is endemic in Australia [10]. It was discovered in Australia in 1996 in a black flying fox [11,12]. Evidence of virus infection has been identified in Australian fruit bats (*Megachiroptera*, or flying foxes) and insectivorous bats (*Microchiroptera*, or microbats) and it should be assumed that all Australian bats have the potential to be infected with ABLV [13,14]. To date, three cases of fatal rabies-like illness in humans caused by ABLV have been reported. One case occurred in 1996 [15,16], and the other in 1998 [17]. A third case of ABLV was confirmed in a child in February 2013 [18,19]. All three patients had been injured by bats. Based on these three recognized human cases of ABLV infection and the close relatedness of ABLV with the rabies virus, it is presumed that ABLV has the same clinical features as rabies [14]. Based on the genotypical and clinical features, pre- and post-exposure prophylaxis for rabies and ABLV are essentially the same.

New South Wales (NSW) is located in Australia's east, and at June 2011 had a population of 7.2 million people [20]. Sydney is the capital of NSW and a popular international tourist destination. From January 1995 to December 2005, 317 flying foxes and microbats from NSW were submitted to laboratories for lyssavirus testing. Of these mostly injured or ill bats, 22 (6.9%) were positive [21]. Post-exposure treatment (PET) is administered, according to national guidelines, to travellers with bites or scratches sustained from a mammal in a geographic location where rabies is known to be endemic and to people bitten or scratched by bats or flying foxes in Australia [22,14]. Medical practitioners can only access free PET through Public Health Units (PHUs) in NSW. Rabies vaccinations, but not human rabies immunoglobulin, can be bought on the market, but there is no evidence that PET is accessed privately. Public health units conduct surveillance of human exposure to rabies and ABLV by recording information received from medical practitioners about people who require PET following exposure to a potentially rabid animal or bat, whether in Australia or in other countries. In this paper, we describe characteristics of people receiving PET in NSW, and describe their exposures.

Materials and methods

Staff from the 17 NSW PHUs collect standardised demographic and exposure data about the case from the treating doctor and enter the data in a web-based electronic database [23]. Data include: demographic information, date and place of exposure, type and location of the wound, type of animal responsible for the injury, the circumstances of the exposure, the animal's behaviour, whether the animal had been examined for rabies or ABLV and if so, the test result, the case's vaccination history, wound management, and treatment details. We present data for people receiving PET in NSW following an exposure to an animal potentially infected with rabies or ABLV in Australia or overseas, in the five years from 1 January 2007 to 31 December 2011.

We conducted a descriptive analysis using Microsoft® Excel. For the calculation of population rates, we used the estimated quarterly NSW resident population as recorded by the Australian Bureau of Statistics [24]. Data was collected for the purpose of surveillance under the provisions of the NSW Public Health Act 2010 [25].

Results

In the five years from 1 January 2007 to 31 December 2011, 1195 people received treatment after exposure to an animal potentially infected with rabies or lyssavirus. Fifty-two people (4.4%) were residents from another state or territory in Australia (18) or overseas visitors to NSW (34).

Just over a third of exposures (34.7%, 415/1195) occurred in Australia, all but two due to an injury caused by a microbat or flying fox. One of these latter injuries was sustained by an intensive care unit doctor, who was exposed to respiratory secretion during intubation of a patient with suspected rabies after a dog exposure in Viet Nam, while the animal responsible for the other exposure was likely a flying fox as the person was standing under a tree housing flying foxes when the injury occurred. This could however not be confirmed because the person did not actually see the animal. These two cases were excluded from further analysis.