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CASE REPORT

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Two fatal cases of rabies in humans who did not receive rabies postexposure prophylaxis in Nigeria

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Key Clinical Message

These two cases highlight some of the many challenges encountered when handling dog bite and rabies exposure. They also provide examples of the many barriers, and while highlighting only two individuals, they are likely representative of large numbers of the over 59 000 people that die every year from this preventable disease.

KEYWORDS

humans, Nigeria, postexposure prophylaxis, rabies

1 | INTRODUCTION

Domestic dogs are the source of the vast majority of human rabies infections worldwide. An estimated 59 000 human deaths from rabies occur each year in Africa and Asia. Vaccination of dogs remains the most cost-effective measure for the prevention of rabies in endemic regions. While rabies is highly preventable with postexposure prophylaxis (PEP), distance from facilities and cost of treatment are factors that lead to failure to seek or receive PEP and serve as the major cause of death in many regions of Asia and Africa. Here, we report two cases of rabies in individuals that did not receive PEP, despite seeking health care. In the first case, a 40-year-old man was bitten by a stray dog and while he received prevention measure against tetanus, rabies PEP was not administered. Instead, a traditional treatment was chosen. In case 2, a 38-year-old woman that was bitten by a puppy declined recommended PEP because of the cost.

These cases highlight deficiencies in public and healthcare provider education and awareness that can contribute to preventable deaths, as well as the impact of financial limitations on access to a highly effective treatment. There is a need for continued awareness campaigns for healthcare providers and the general public on rabies and the response to potential rabies exposure, to reduce the impact of this almost invariably fatal but almost completely preventable disease.

Rabies is a zoonotic disease that is caused by an RNA virus of the genus lyssavirus that can infect all mammals. Over 3.9 billion people are at risk worldwide[1,2] as rabies virus is present in most regions. Rabies infection in humans occurs mostly through dog bites or scratches contaminated with saliva of rabid dogs. It has been estimated that rabies results in

more than 59 000 human deaths annually, with 99% of these deaths caused by dog bites.[3] Many regions of Africa and Asia contribute 44% and 56%, respectively, of the annual human deaths due to rabies and the disease remains a major threat to public health, especially in poor and vulnerable populations[3] Although significant progress has been made in the prevention and control of rabies, rabies virus remains endemic at high levels in dogs in many regions. In areas where canine rabies is endemic, vaccination of dogs is the most cost-effective means of protecting humans and animals from contracting the disease,[4] yet there are major barriers to widespread vaccination in many endemic countries because of large free-roaming dog populations and limited veterinary infrastructure.

Rabies is almost invariably fatal, yet it is almost 100% preventable with (PEP) that is initiated promptly after exposure. The WHO recommended PEP, consists of local treatment of the wound, followed by a course of rabies vaccine (with or without rabies immunoglobulin) should be initiated immediately with bites or contact of saliva with nonintact skin or mucous membranes if the animal is known or suspected to be rabid. Treatment may be discontinued if the animal involved (dog or cat) remains healthy throughout an observation period of 10 days (indicating it could not have been shedding rabies virus at the time of the bite); or if the animal is found to be rabies negative through testing of brain tissue. However, there can be many barriers to PEP. For PEP to be effective, the bitten individual must know to seek healthcare, they must have access to healthcare, the healthcare provider must recognize the risk of rabies and recommend PEP, PEP must be available and accessible, the patient or health care system must be able to pay for it, and it must be administered properly. This pathway can be compromised at many levels, particularly in developing regions where there may be deficiencies in education, healthcare access, PEP access, and financial limitations. This case series documents some of the potential problems that can be encountered in developing countries such as Nigeria.

2 | CASE 1

On Jan 1, 2017, a 40-year-old farmer from Jaji, Kaduna state was bitten on the hand by a stray dog. The biting dog was chased and killed by members of the community and victim sought medical assistance at the community health clinic immediately after the incident. In the clinic, he was given tetanus toxoid and an antibiotic; however, rabies PEP was not initiated because it was not available. Rather than travel 95.8 km to a tertiary health facility (Ahmadu Bello University Teaching Hospital) to receive PEP, he sought a traditional treatment for dog bite and rabies, which consisted of eating cooked liver of the killed stray dog and placing hairs pulled from the neck of the dog on the bite wounds. However, on the March 1, 2017 he exhibited severe headache, paresthesia, and severe pain at the site of bite. He was treated with diclofenac and an antibiotic at the primary health center and referred to Ahmadu Bello University Veterinary Teaching Hospital, Zaria, Nigeria for rapid immunochromatographic testing (RICT) for rabies antigen. Upon admission, he had signs of fever, nausea, paresthesia of the right hand, headache, difficulty swallowing, and hydrophobia. His saliva was collected and tested at Rabies Diagnostic Laboratory of ABU Veterinary Teaching Hospital, Zaria, and was positive for rabies with RICT assay (Rabies Ag Test kit, Bionote, Cat.No: RG18-0, Lot.No: 1801DD003). He died the same day and was buried that day due to cultural and religious beliefs; no additional testing was possible.

3 | CASE 2

On the April 10, 2017, a 10-month-old puppy was presented to the Small Animal Clinic, Ahmadu Bello University Veterinary Teaching Hospital from Chikaji, Zaria with a complaint of poor appetite. The puppy had recently been adopted from neighbors, and it had bitten two neighbors and the owner a day earlier. The owner also reported a sudden change in the puppy's behavior, with alterations in affection, restlessness, and attempting to bite. The dam had never been vaccinated against rabies and the dam, and her litter was housed in a compound where they were able to roam freely. While the history and clinical signs were suggestive of rabies, the owner did not consent to euthanasia of the puppy and it was treated with analgesics and sedatives, and quarantined.

All bite victims were referred to St Louis Missionary hospital, Zaria for postexposure prophylaxis pending outcome of investigation. Two of the victims received PEP as recommended, but the owner declined because of the cost of treatment (N25 000, USD 68.5). The puppy died after 18 hours in quarantine, and brain was extracted and subjected to RIDT and Florescent Antibody Test (FAT). Both tests were positive, and the results were provided to the hospital. The hospital gave feedback to the owner of the outcome of the tests; however, she did not seek PEP.

On the May 16, 2017, 5 weeks after the bite, the owner presented with signs of fever, paresthesia of the right hand, fever, difficulty swallowing, hypersalivation, photophobia, dyspnoea, and hydrophobia. A presumptive diagnosis of rabies was made, and she died on the second day of hospitalization. Subsequent testing was not performed.

4 | DISCUSSION

Mass dog vaccination is the most effective means of controlling rabies. However, even with large-scale vaccination,

the need for PEP continues until rabies has been successfully eliminated. These two cases highlight some of the many challenges encountered when handling dog bite and rabies exposure. While both were from Nigeria, similar challenges exist in many developing countries.

In the first case, there were multiple lost opportunities for intervention. Firstly, instead of the recommended approach to euthanasia and testing of the dog, it was killed by the public and used for a traditional treatment.[5,6] Dog meat is consumed for various reasons, notably for its medicinal potency, as an aphrodisiac, its taste and as protection against attack by evil spirits and rabies.[5,7] The processing of the rabid dog serves as a potential source of infection to those involved in the act, because nervous tissues and fluid from the infected dog are potential source of infection.[5,8] This response results in an ineffective approach to rabies prevention while also posing additional risks to people who catch, kill, and butcher the dog. The potential conflict between traditional healing practices and conventional medical approaches can be another limitation if people do not seek conventional health care, opting for traditional treatments because of cultural beliefs, lack of information about rabies or cost. Further, even though the person sought health care, PEP was not administered, despite what would be expected to be widespread understanding of the risk of rabies by Nigerian healthcare personnel, considering the well known presence of the disease in the country. Risks of tetanus and infection were acknowledged and addressed through tetanus toxoid and antimicrobials, yet this almost invariably fatal disease was not. Poor awareness of the consequences and severity of the disease and inadequate postexposure antirabies treatment in rural areas likely account for a substantial rabies burden.

While health seeking behavior is a major barrier in itself, especially for bites that cause limited trauma, there is a need for improvement of the level of care rendered to dog bite victims for prevention of rabies.[9-11] Economic factors also play important roles, particularly in developing regions, as was highlighted in case two, where PEP was recommended but not undertaken because of the cost of treatment. Since developing countries shoulder the main burden from rabies, approaches to facilitating proper and timely PEP to all individuals that need it are necessary. Distance, especially in rural communities, from facilities where PEP can be provided also likely contribute to a significant human rabies burden Asia and Africa.

The commonness of use of ineffective traditional methods of treatment highlights the need for better education about rabies and dog bite response.[5,10,11] Increasing public awareness is a viable and potentially inexpensive means of rabies prevention and control. Implementation of public awareness tools such as education at sporting and outdoor events, visual arts, mass media, and vaccination campaigns can raise public awareness regarding rabies prevention,[12] something that might have changed the outcome in both of these cases. Animal health professionals also play a major role in the control of rabies in animals through a well-planned sustainable strategy toward rabies control. Veterinary professionals can also help educate animal owners about rabies and the appropriate response to bites. Unfortunately, there tends to be a lack of cooperation between healthcare professionals, both within the human medical field and between human and veterinary fields. Poor communication and feedback can lead to poor implementation of a rabies control program. Subsequently, dog owners are then left with the primary responsibility of vaccinating their dogs against rabies or preventing their dogs from coming into contact with rabid animals.[6]

Various approaches are needed to increase dog vaccine coverage and to educate the public about rabies, rabies vaccination and ways to reduce exposure (eg, reducing encounters with feral dogs). Annual, subsidized antirabies vaccination, and public enlightenment programs/campaigns can play important roles in trying to achieve the vaccination coverage target of at least 70%, the level that has been recommended to provide the minimum level of herd immunity to control endemic canine rabies. Public education on appropriate responses to bites and the need to seek health care and comply with PEP recommendations is equally important. Parallel efforts are needed to improve rabies response awareness by human medical professionals, along with effective PEP access and methods to facilitate compliance with PEP recommendations. These two cases provide examples of the many barriers, and while highlighting only two individuals, they are likely representative of large numbers of the over 50 000 people that die every year from this preventable disease.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

AUTHOR CONTRIBUTION

SWA and BMJ: received both cases at the ABU-VTH and did the FAT and RICT. SWA and PPM: prepared the first draft of the manuscript. KB: edited the draft while JSW did the final edition and approved it for submission.

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