Outbreak, Surveillance and Investigation Reports
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Survey of Knowledge, Attitude and Practice Initiated by an Investigation of a Human Rabies Death in Chanthaburi Province, Thailand, 2015

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Abstract

In October 2015, one confirmed human rabies case with many human and animal contacts were reported in a subdistrict of Chanthaburi Province. A joint human and animal health team conducted an investigation, including a survey on knowledge, attitude and practice (KAP) in two villages with confirmed animal rabies cases. The human case was scratched at the wrist and bitten at the calf by a stray dog. The wounds were merely washed with rice whisky. However, 77 days later, the case developed myalgia and rash, and thus, visited the subdistrict health promoting hospital. He later died in the provincial hospital. While 22 dogs were suspected for rabies, three dogs were tested positive. Members of 149 households and 79 close contacts from the two villages were interviewed. Respondents from both villages had low scores of knowledge, attitude and practice on rabies as well as wound care. Prior to the outbreak, vaccine coverage resulted as 14.8% for owned dogs and 4.2% for cats. The phylogenetic lineage of the rabies virus found in the case was in a group commonly found in Thailand. Poor practice by the case and low KAP scores of the villagers indicated inadequate knowledge about rabies and post-exposure management. The coverage of rabies vaccine among domestic animals in the community was much lower than the requirement of 80%.

Keywords: rabies, knowledge, attitude, practice, investigation, Thailand

Introduction

Rabies is a vaccine preventable viral disease. Globally, it causes about 60,000 human deaths, 3.7 million disability-adjusted life year lost and 8.6 billion USD of economic loss every year.[1] Cooperation among animal and human health sectors, and local administrations plays a key for effective rabies prevention and control in humans. This includes public relations to promote knowledge and awareness, training for medical personnel, rabies surveillance in humans and animals, and mass immunization of animals of at least 80% coverage. In addition, the public must be educated to inform local authorities, by telephone or otherwise, about suspected rabid animals in the area.[2]

The number of human rabies cases in Thailand declined over the past few decades, from 370 deaths reported in 1980 to less than 10 deaths per year during 2011-2014. In 2015, out of six human deaths reported, all of them lacked to receive or continue post-exposure prophylaxis.[3] A low level of knowledge and awareness of rabies, lack of animal vaccination, and scarcity of vaccination campaigns are the main challenges of human rabies prevention.[4-6]

On 20 Oct 2015, the Bureau of Epidemiology was notified about a confirmed human rabies death in Klong Yai Subdistrict, Pong Nam Ron District, Chanthaburi Province. A joint investigation was conducted by Bureau of Epidemiology, district health office, district hospital, and livestock development

offices from 22 Oct 2015 to 5 Nov 2015, aiming to identify source of the outbreak and magnitude of contact exposure, and assess knowledge, attitude and practice toward rabies control and prevention among villagers in the affected communities.

Methods

This investigation was carried out in Klong Yai Subdistrict, Pong Nam Ron District, Chanthaburi Province, Thailand, where the confirmed human rabies case was reported. Areas of the investigation included three villages: Village A (where the index case lived), Village B (where the index case was bitten), and Village C (where a local dog was bitten by a stray dog) (Figure 1). Dogs suspected of rabies were also reported to be observed in these villages.

Figure 1. Geographical location of 3 villages with suspected rabid dogs in Klong Yai Subdistrict, Pong Nam Ron District, Chanthaburi Province, Thailand, 2015

Descriptive Study

The rabies situation in Thailand was reviewed from the database in the Bureau of Epidemiology[3,7] under the Ministry of Public Health and the Department of Livestock Development (Thai Rabies Net)[8]. Information on voluntary rabies post-exposure prophylaxis from the surveillance database reported from hospitals was used to determine the number of people who had received post-exposure prophylaxis.

Officers from provincial health office, provincial livestock office and district livestock office were interviewed to obtain information about rabies situation in the province, and current prevention and control measures. The possible source of infection was identified by interviewing district livestock officers whether any dogs in the district had tested positive for rabies infection between 1 Jul to 28 Oct 2015, had a history of contact with the index rabid dog on 27 July 2015, or was known to have at least one of the following symptoms: aggression, excitation, self-mutilation, excessive salivation, depression, difficulty swallowing, ataxia and paralysis.

In addition, conveniently selected villagers were interviewed in two (Villages A and B) of the three villages for the possible source of the disease. The deceased's friends and neighbors were also interviewed to ascertain wound management and subsequent behavior after he was scratched and bitten by a stray dog. The case's medical record was also reviewed for clinical signs and symptoms. The phylogenetic linkage was determined to identify the strain of rabies virus.

From 1 Jul to 28 Oct 2015, active finding of contacts was performed by looking for any persons who lived in Village A or B and, within 10 days of the exposure period, had come into contact with any dogs having rabies symptoms in the village. Reports on laboratory-confirmed rabid animals by direct fluorescent antibody test at the Center of Veterinary Research and Development and the National Institute of Animal Health, Department of Livestock Development were assessed and examined as well.

Community Survey

A door-to-door community survey was conducted to determine pet raising behaviors, accessibility to broadcasts and media, ability to identify rabies surveillance stickers, and knowledge, attitude and practice (KAP) concerning rabies prevention and control measures. Afterwards, these scores were compared between two villages: one with a human rabies case (Village B) and one without (Village A). One representative from each randomly selected household was interviewed using a questionnaire that had been reviewed by experts and had been pretested in the community. Household members who aged under 15 or over 75 were excluded.

The KAP questionnaire consisted of items with short statements and answers either yes or no. Proportions of items answered correctly were calculated for each respondent with the formula of dividing the number of correct answers by total number of items in each category. As recommended by the experts, if the proportion of items answered correctly for each category was more than 80%, then that was deemed as a pass. The proportions of respondents who passed each of three KAP categories were compared between the two villages using Pearson's chi-square test. Epi-info version 7.1.5.2[9] was used for all data management and analysis.

Results

Descriptive Study

Reviewing the rabies situation in Thailand, the animals that were tested for confirmation and resulted positive for rabies were 30.2% (240/796) in 2014, 34.7% (320/921) in 2015 and 45.9% (462/1,007) in 2016. During 2015, there were six confirmed human rabies cases reported to the Bureau of Epidemiology.[3] Out of 330 (3.8%) animal specimens tested positive for rabies from the animal sentinel sites of the Department of Livestock Development, 93.3% were dogs[3,7,8,10]. Before 2015, the most recent human rabies death was reported in Chanthaburi Province during 2006[11]. In 2015, out of 1,512 humans exposed to animals suspected to have rabies in Chanthaburi Province, 349 (23.1%) discontinued the post-exposure prophylaxis[12]. The number of people received the post-exposure prophylaxis had been decreasing over the past three years while the rate of discontinuation had been increasing (Figure 2).

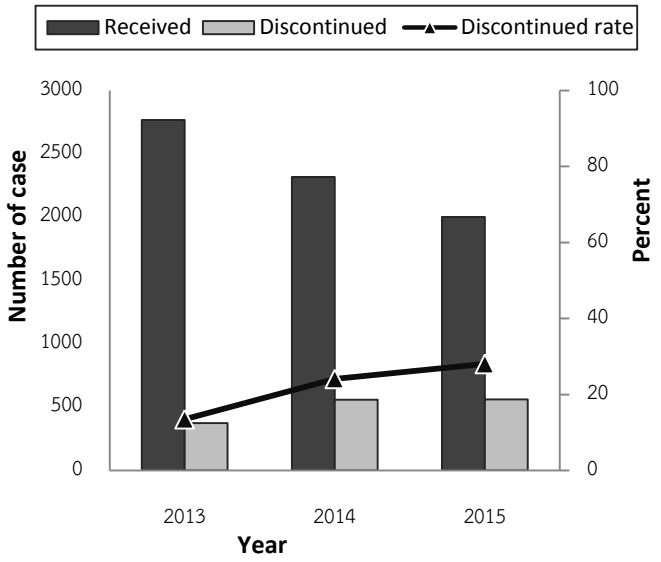

Figure 2. Number of people who received post-exposure prophylaxis (PEP) and discontinued rabies vaccination in Chanthaburi Province, Thailand, 2013-2015

The confirmed human index case was a 58-year old Thai male who drank alcohol regularly, had no underlying disease, and no history of rabies or pre- or post-exposure prophylaxis or travel outside of the area. He moved to Village A in Klong Yai Subdistrict to work as a gardener in 2000. On 27 Jul 2015, he was scratched at the wrist and bitten at the calf by a stray dog in Village B. He did not seek medical treatment and simply washed his wound with rice whisky. On 12 Oct 2015 (77 days later), he developed fever, vesicles at the site of the wound and severe itchiness. On 17 Oct 2015, further symptoms of restlessness, dysphagia, anxiousness and tightness in the chest prompted him to visit the provincial hospital where he was diagnosed with suspected rabies. He died one day later. The patient's brain biopsy was positive for rabies by immunofluorescence assay. Hair follicles and cornea were also found to have rabies virus by nested reverse transcription polymerase chain reaction. The phylogenetic lineage of the isolated rabies virus was related to a common strain of rabies virus found in Thailand (Figure 3).

During 1 Jul and 5 Nov 2015, three stray dogs were observed and attacked other dogs in Villages A, B and C. Among 22 contact dogs identified, eight (36.4%) were killed instantly or died later from injuries, and samples from three dogs tested to have rabies by immunofluorescence assay at the Veterinary Research and Development Center.

Order of Contacts

Village A: On 1 Jul 2015, a stray dog was observed by the residents. There were unknown number of contact persons, and among nine contact dogs reported, three died and all three out of five tested positive for rabies.

Village B: On 27 Jul 2015, a stray dog, possibly the same one from Village A, was observed by the residents. Out of 79 contact persons and 10 contact dogs reported, three dogs died. However, samples were not taken for rabies testing.

Village C: On 30 Oct 2015, a group of aggressive stray dogs was observed in the village. No human contact was observed or reported. Of three contact dogs, two died and both tested negative for rabies.

Community Survey

There are total seven villages in Khlong Yai Subdistrict and is part of Pong Nam Ron District in Chanthaburi Province which has a border crossing with Cambodia. As shown in the figure 1, Villages A, B and C are within four kilometers from each other. There were 345 households sheltering 1,122 residents in three villages. According to the survey, most of the villagers were longan farmers. There were no fences between houses, and some of the villagers had gardens nearby or close to their houses.

The survey was conducted in 151 (68.9%) randomly selected households from Villages A and B. Two households were excluded due to the age of interviewees. Out of total 149 respondents included in the community survey, 64 (43.0%) of the respondents were female and the median age was 45 years (range 15-75).

Majority (57.6%) of the respondents had attended primary school or pre-school only. There were 321

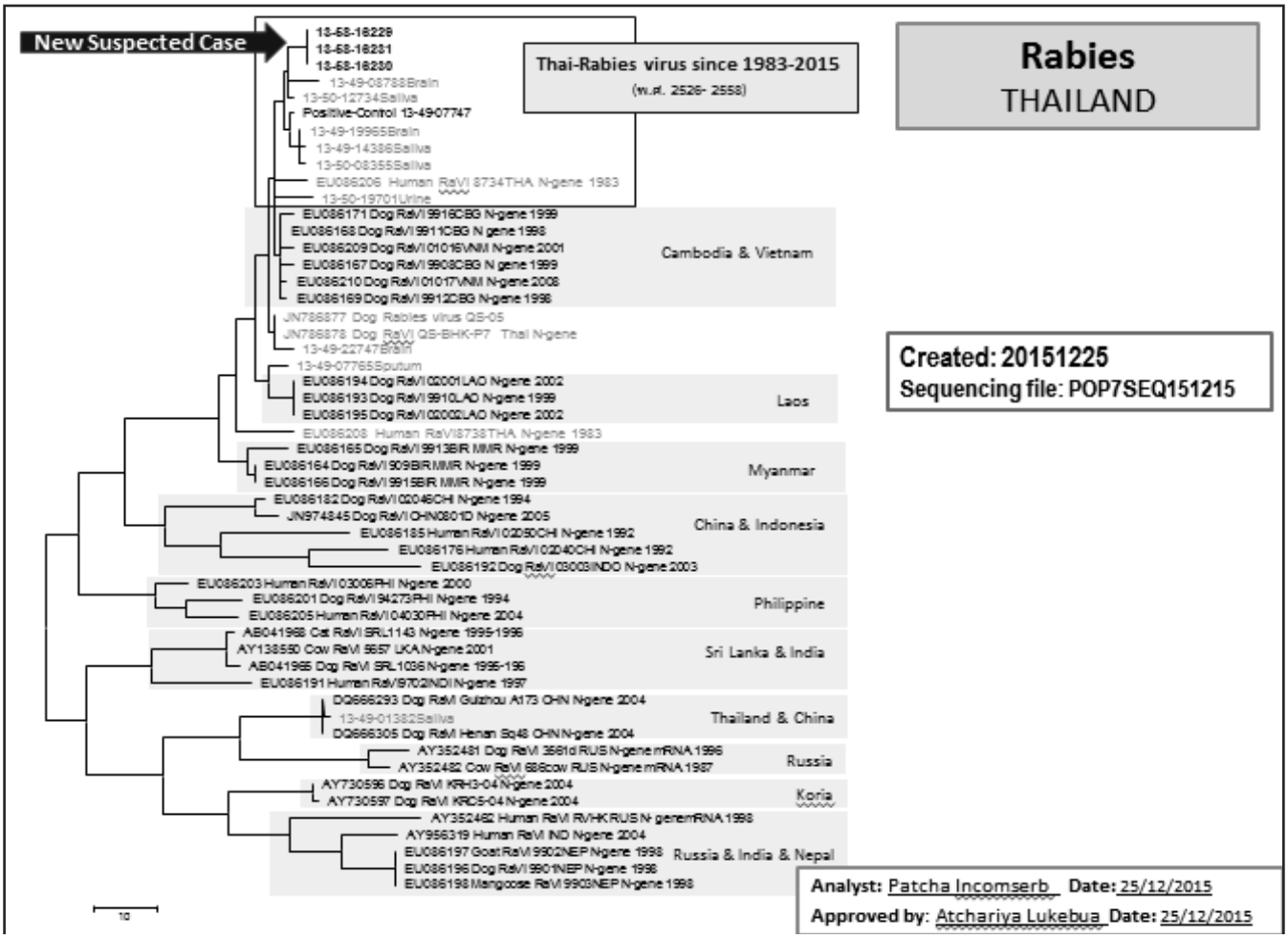

Figure 3. Phylogenetic lineages of rabies virus isolated from a human rabies case in Chanthaburi Province, Thailand, 2015

dogs in 99 (66.4%) households with dogs and/or cats. Dogs were kept as guard dogs and 82.8% of the households allowed them to roam freely.

From 63 households in Village A and 86 households in Village B, most (76.5%) of the respondents were exposed to information about rabies from local broadcasts, television, radio and posters. However, 67.8% of respondents stated that they had not seen any rabies surveillance stickers posted in the village.

Regarding to the level of knowledge about rabies transmission, disease outcome and prevention in humans and animals, the overall median percentage of items answered correctly was 62.8% (range 18.2-100%) and only 25 (16.8%) respondents answered more than 80% of the knowledge items correctly. Majority of the villagers were aware that rabies could be fatal (89.8%) and understood the route of transmission (86.4%). About 43.6% of the respondents recognized that all mammals could be infected with rabies. Nevertheless, only 47.0% realized that rabies infection in humans could be treated with curative intent. The percentage of respondents who passed the knowledge category was 27.0% for Village A and 9.3% for Village B (P-value = 0.004) (Table 1). Among the dog owners, only 14.0% passed the knowledge category. Even though only 51.0% vaccinated their pets annually, 86.1% said that they were willing to pay for the vaccination.

Overall, about 26.8% of the respondents would not receive post-exposure prophylaxis at the hospital and about 36.5% would not bring their pet(s) to the livestock office for vaccination as they assumed that it was a waste of their time and would cause a loss of income. However, 86.5% of the respondents were willing to pay for animal rabies vaccination. About 61.9% in Village A and 46.5% in Village B had passed the attitude category (P-value = 0.06) (Table 2).

In terms of rabies practices in two villages, only 24.2% would wash the affected wound with soap and water, and apply antiseptic before going to a hospital after being exposed to a suspected rabid animal. About 55.8% of dog-owners had their dogs vaccinated annually. About 22.1% of the respondents superstitiously believed that hitting the wound with a shoe would cure the infection. There were 41.3% passed the practice category in Village A as well as 83.7% in Village B (P-value <0.001) (Table 3).

Table 1. Percentage of respondents who answered the knowledge questions correctly from 2 villages related to a human rabies death in Chanthaburi Province, Thailand, 2015 (n=149)

No.	Statement	Village A	Village B	Total
1.	Rabies is fatal in humans. (n=147)	90.3	89.4	89.8
2.	All mammals can get rabies infection.	38.1	47.7	43.6
3.	Rabies can be transmitted to humans via bites or scratches of a rabid animal. (n = 147)	82.3	89.4	86.4
4.	If the bite or scratch of a rabid animal causes merely a mild wound, it is not necessary to seek medical care.	65.1	50.0	56.4
5.	Humans infected with rabies can be treated with curative intent.	49.2	45.3	47.0
6.	Pregnant women and children can receive rabies vaccine.	68.3	40.7	52.3
7.	All rabid animals behave aggressively.	52.4	48.8	50.3
8.	Puppies aged 2-3 months can receive rabies vaccine. (n = 148)	77.8	69.4	73.0
9.	Only one dose of rabies vaccine can protect animals from rabies.	74.6	80.2	77.9
	Passed >80% of all items	27.0	9.3	16.8

Table 2. Percentage of respondents who answered the attitude questions correctly from 2 villages related to a human rabies death in Chanthaburi Province, Thailand, 2015 (n=149)

No.	Statement	Village A	Village B	Total
1.	Receiving post-exposure prophylaxis at a hospital is a waste of time.	27.0	26.7	26.8
2.	I am willing to pay for post-exposure prophylaxis.	68.2	65.1	66.4
3.	Puppies cannot get rabies. (n = 147)	70.5	59.3	63.9
4.	Bringing pets to the livestock office for rabies vaccination is a waste of my time. (n = 148)	34.9	37.7	36.5
5.	I am willing to pay for animal rabies vaccine. (n = 148)	87.3	85.9	86.5
6.	Temples and schools are not appropriate places to abandon pets. (n = 148)	96.8	88.2	91.9
7.	I agree to have rabid dogs put down as long as it is done humanely.	87.3	76.7	81.2
	Passed >80% of all items	61.9	46.5	53.0

Table 3. Percentage of respondents who had good practice from 2 villages related to a human rabies death in Chanthaburi Province, Thailand, 2015 (n=149)

No.	Statement	Village A	Village B	Total
1.	Dog owners vaccinated their dogs with rabies vaccine annually (n = 104)	66.7	48.4	55.8
2.	I will manage dead dog(s) properly.	25.4	4.7	13.4
3.	I will not hit the wound with a shoe to cure rabies.	84.1	73.3	77.9
4.	I will manage the bitten wound properly.	33.3	17.4	24.2
5.	I will apply antiseptics to the wound.	58.7	53.5	55.7
6.	I do not encourage feeding of stray dogs. (n = 145)	78.7	73.8	75.9
	Passed >80% of all items	41.3	83.7	51.7

After the Department of Livestock Development announced the reported rabies outbreak in this community, all owned dogs in Village A had received full doses of the vaccine and ring vaccination was performed around the three villages. The vaccine coverage before the outbreak resulted as 14.8% for Village A and 4.2% for Village B, and increased to about 50.0% after the ring vaccination. In all three villages, all contact dogs were provided with repeated vaccination and observed for abnormal clinical signs

for at least six consecutive months. Post-exposure prophylaxis was administered completely for all contact persons and monitoring for rabies continued. Public health authorities had informed the residents in the implicated areas and health education materials were distributed to increase public awareness. The people affected communities were informed to cooperate by monitoring animals in Villages A and B for signs of rabies. Moreover, a group meeting was held for staff from the provincial health office, health promotion hospitals and livestock offices to discuss future planning, prevention and control programs for rabies.

Discussion and Conclusion

Rabies remains an important public health problem in humans and animals, especially in the central and eastern regions of Thailand.[10] In 2015, a human rabies death occurred in Chanthaburi Province, the eastern part of the country. Important predisposing factors included improper wound management and failure to seek post-exposure prophylaxis. This outbreak showed that the bite of an infected dog was the mode of transmission, and knowledge, attitude and practice about prevention and control of rabies in animals and humans was limited among the study population. About 25% of people exposed to rabies in Thailand during 2010 did not seek medical care as they assumed that transmission could not occur via a minor wound.[13] Moreover, in a study from the Nakhon Phanom Province, 35% of 51 respondents did not know about rabies.[6] From our review, the number of people who discontinued post-exposure prophylaxis and the percentage of animals that tested positive for rabies had been increasing during 2014-2016, which was the critical point for future rabies prevention and control in humans.

The phylogenetic lineage of rabies virus isolated from a case in Cambodia living near the Thai border revealed that the lineage was related to the rabies virus previously found in Thailand between 1983 and 2015. However, the origin of the first infected dog during this outbreak was uncertain since the majority of viruses from Cambodia, Thailand, Lao PDR and Vietnam were phylogenetically from the lineage SEA1.[14]

In this outbreak, about 80 persons had a contact with the rabies suspected dogs. All contact persons were monitored and administered a complete course of post-exposure prophylaxis at a hospital. Since after the outbreak, there had been no additional human rabies cases reported in the affected district. Vaccination of domestic animals against rabies and stray animal control programs greatly reduce the risk of rabies transmission to humans.[4,15-17] Implementation of these measures in the United States had led to drastic decline in the incidence of human rabies.[18] This indicates that a key factor for reducing human rabies is to focus on vaccination and control of animals as well as performing effective post-exposure prophylaxis monitoring system in humans.

The spread of this virus could be related to the number of freely wandering dogs around the three villages and low level of rabies vaccine coverage in animals, especially dogs. Although the Department of Livestock Development conducted two rounds of ring vaccination to dogs in these villages, the vaccine coverage in animals increased to only about 50%, which was still much lower than the recommended minimum of 80%. This low level of herd immunity was likely related to large number of free roaming dogs in the areas, which would be time-consuming and costly to catch and vaccinate them. Though oral vaccines for dogs were not available yet in Thailand, several countries in Europe had successfully used oral vaccination campaigns among red foxes and were declared as rabies free[19]. With the large number of free roaming dogs in Thailand, and the majority of the population being Buddhists following a religion which prohibits killing of animals, rabies control in Thailand would be a difficult task.

Immediately after the outbreak, the Department of Livestock Development and the district health office provided education about rabies to residents in the affected villages. Two weeks later, in early November 2015, a KAP survey of residents in Villages A and B indicated that knowledge, attitude and practice of residents of both villages were still very low, particularly for knowledge. Only 47% of all respondents recognized that people who developed the rabies symptoms could be treated with curative intent while merely 56% understood that minor wounds did not require any treatment at all. The overall average scores for rabies knowledge and attitude of both villages were below 80%.

Public Health Recommendations

More education about rabies in humans and animals was needed. Although post-exposure prophylaxis, consisting of rabies immunoglobulin and vaccine, is effective in preventing the disease when administered promptly after an exposure, villagers did not perceive the advantages of receiving it. Thus, health education

and public awareness of rabies should be continued until the evidence-based effects on residents' behaviors. The implementation of oral vaccines should also be considered. Moreover, a post-exposure prophylaxis monitoring system should be developed to ensure rabies vaccination in exposed people. Finally, accessibility to health care units should be increased so that prompt treatment could be provided to those exposed.

Limitations

The KAP survey was conducted in only two villages with confirmed animal rabies. While the comparison of KAP between only two villages might not be a representative method, the study aimed to identify the factors influencing the case on malpractice. Other limitation could be the recall bias since some interviews were conducted several months following the outbreak. In addition, non-response bias might have occurred from residents during the survey period as well.

Acknowledgement

The author would like to acknowledge all people in Villages A and B, and officers from the provincial health office, Pong Nam Ron district health office, Klong Yai promoting health hospital, Department of Livestock Development, Regional livestock office 2, the provincial livestock office, Pong Nam Ron district livestock office, National Institute of Health, Department of Medical Services, Bureau of Epidemiology and Field Epidemiology Training Program for providing invaluable assistance for data collection and discussion. The names of the study villages had been suppressed to protect the identity of the respondents.

Suggested Citation

Sagarasearanee O, Hinjoy S, Chuxnum T, Chantean T, Smithsuwan P, Jorhor N, et al. Survey of knowledge, attitude, and practice initiated by an investigation of a human rabies death in Chanthaburi Province, Thailand 2015. OSIR. 2017 Sep;10(3):1-8.

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