Use of Abatement to Reduce Intensity of a Flea-Borne Typhus Outbreak in the San Gabriel Valley, Los Angeles County, California

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BACKGROUND

Flea-borne typhus is an acute febrile disease caused by Rickettsia typhi and Rickettsia felis transmitted to humans by the bite of Xenopsylla cheopis (rat fleas) or Ctenocephalides felis (cat fleas) found on many vertebrate hosts (Azad et al., 1997). More than 200 human cases of flea-borne typhus occur in the United States every year, but the disease is only endemic in California, Hawai’i, and Texas (Civen and Ngo, 2008, CDPH, 2014). In California, most cases occur in Orange and Los Angeles counties. Within Los Angeles County, approximately 40% of the human cases occur in the San Gabriel Valley, which has attracted the attention of county public health officials (Civen and Ngo, 2008, WeKesa et al., 2016a). It is therefore important that the San Gabriel Valley Mosquito and Vector Control District (District) develop strategies and nurture interagency collaboration to limit the occurrence of flea-borne typhus in the District (WeKesa et al., 2016b). An opportunity to do so occurred when a cluster of human cases was identified at an address in the eastern end of the District in 2015.

In May 2015, the Los Angeles County Department of Public Health’s (LACDPH) Acute Communicable Disease Control Program reported to the District three human cases of flea-borne typhus among residents of a 95-unit mobile home community (MHC). These cases had onsets between 9 Apr and 5 Jun 2015 and prompted an investigation to evaluate whether a public health risk existed. The initial survey of the MHC found potential risks in the form of excessive free roaming cats, overfilled trash containers, outdoor feeding stations, high flea counts, and excessive animal feces throughout the property. Traps set on the property yielded two opossums; each of which was infested with more than 600 C. felis. Two samples each containing five fleas was tested using Real Time Polymerase Chain Reaction (RT-PCR). Although R. felis was detected in both samples, R. typhi was not. These findings bring into question the species of Rickettsia responsible for this outbreak. The public health control measures required to mitigate this outbreak would apply to either species. These observations also indicated that flea-borne typhus was actively being transmitted at the MHC and required immediate action to reduce the risk to public health.

ABATEMENT ACTION

The MHC was abated by the District on 24 Jun 2015. The summary abatement order was issued to the owner of the MHC property and copied to the property manager, but not to the 90 tenants renting spaces at the MHC. The summary abatement notice required the property owner to comply within 45 days with their own MHC rules, the City ordinance, and the State of California Housing and Community Development’s regulations regarding pets in MHCs. For example, California Housing and Community Development general requirements under Title 25, Chapter 2, Section 1114 of California Code of Regulations states that “(a) all dogs and other domestic animals, and cats (domestic or feral) shall not be permitted to roam at large (free) in any park; and (b) animal feces shall not be permitted to accumulate on any lot or common area to the extent that they create a nuisance.”

The summary abatement specifically required that the property owner remove all feces present on the grounds of the MHC, ensure no outdoor pet food was available throughout the MHC, and enforce the MHC rules which limit the number of pets to one animal per unit and require that the pet be registered with property management. The abatement order also required the property owner to provide bi-weekly flea control and remove feral animals. To comply with the summary abatement, the property manager notified residents to remove outdoor pet foods and to register their pet with the MHC office.

On 24 Aug 2015 a multi-agency community event adjacent to the MHC was hosted by LACDPH and involved staff from the District, the City, the office of California State Senator Connie Leyva, and programs within LACDPH, including Community Health Services, Environmental Health Vector Management, Veterinary Public Health, and the Acute Communicable Disease Control Program. The California Department of Housing and Community Development participated in planning the event but
did not attend. Tenants were informed of the outbreak and that an excess of fleas and a large population of free-roaming cats and opossums throughout the MHC were the major contributor. Residents were advised about flea-borne typhus and informed of the community’s role in preventing new cases. They were further instructed to immediately remove outdoor feeding stations, and while the property owner managed the fleas outdoors, residents were responsible for controlling fleas inside their units. Tenants were reminded that the MHC allowed them to keep only one dog or cat per property. The LACDPH donated one Seresto® (similar to Frontline®) collar per tenant for their indoor pet. Sera were collected from individuals who were currently symptomatic or were symptomatic for flea-borne typhus in the past three months. Two additional cases of flea-borne typhus at the MHC were identified bringing the total of human cases in this outbreak to five (Croker et al., 2016).

On 3 Sep 2015, the District implemented a multi-agency plan which involved the LACDPH Environmental Health Division’s Vector Management Program, the City’s, the District, the landlord, and the tenants of the MHC. The property owner was required to provide both flea control for the outdoor space of the MHC and wildlife trapping services. The pest control operators who were hired to provide these services did so under direct instructions from the District’s disease surveillance program.

EVALUATION OF ABATEMENT

The summary abatement order issued on 24 Jun 2015 was followed with monitoring of animals and outdoor feeding stations. Feral cats, opossums, and outdoor feeding containers were counted to assess the effectiveness of this order. The bi-weekly monitoring showed declining populations of wildlife and feeding stations in the MHC (as shown in Figure 1), but indicated that additional action was required for this abatement order to be effective. The coordination of multi-agency approach culminated with a community event on 24 Aug 2015 and implementation of the multi-agency action plan thereafter. To assess the impact of the multi-agency action plan and overall effectiveness of the summary abatement order, monitoring of adult flea populations was necessary. Bi-weekly monitoring of fleas was conducted by placing six glue boards of 16 cm x 11 cm in size (PIC Corporation, Linden, NJ) throughout the MHC. In addition, outdoor feeding stations and the counts of feral cats were recorded. The percent change was then calculated by subtracting the current value from each sampling period from the initial value and then dividing that number by the initial value (Current Value – Initial Value/ Initial Value) to analyze the effect of the MHC’s actions. Also, a regression analysis was conducted to obtain the R² value and the level of significance of these actions on decreasing this public health issue. As shown in Figure 1, the number of outdoor wildlife and feeding stations had significantly declined within the five month monitoring period (n=87, r²= 0.914, P ≤ 0.05) throughout the MHC. This was further confirmed by a similar decline in the flea population monitored on glue boards between Sep and Nov 2015 (Figure 2), such that no fleas were observed for the last two consecutive sampling days. These findings indicate that the situation at the MHC continued to improve and that the outbreak was considered mediated by Nov 2015.

Figure 1. Abundance of outdoor wildlife and outdoor feeding sources from Jun to Nov 2015 at the Mobile Home Community in San Gabriel Valley, California.

Figure 2. Average number of fleas (plus standard error) collected on glue boards (n=36) from Sep to Nov 2015 at the Mobile Home Community in San Gabriel Valley, California.

SUMMARY

This approach represents the first successful attempt to use the California Health and Safety Code in an abatement process to control flea-borne typhus in southern California. We hope to employ this strategy at other mobile home communities that have excessive feral animals, animal feces and fleas. To ensure that this condition does not recur, the District will continue to monitor this MHC for fleas and the property owner will continue with monthly flea control and wildlife removal until all tenants are considered compliant to MHC rules, city ordinances, and state regulations on feral animals.
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REFERENCE CITED


