Plague in Yosemite

[Announcer] This program is presented by the Centers for Disease Control and Prevention.

[Sarah Gregory] Today, I'm talking with Dr. Vicki Kramer, Chief of Vectorborne Disease Program with the California Department of Public Health. We'll be talking about two plague cases in Yosemite National Park. Welcome, Dr. Kramer.

[Vicki Kramer] Hello.

[Sarah Gregory] When I think about plague, it evokes images of the middle ages, bodies being piled in carts, and mass graves. Is this plague in Yosemite that same plague?

[Vicki Kramer] Yes, this is the same disease, caused by the bacterium *Yersinia pestis*.

[Sarah Gregory] How did this happen? Where did this plague come from?

[Vicki Kramer] The natural hosts, or reservoirs, of plague are a variety of rodent species. Plague bacteria are typically transmitted among rodents by their fleas, and human cases of plague most often occur through the bite of an infective rodent flea. Plague was likely introduced from Asia into the United States via ships arriving in port cities, such as San Francisco and Los Angeles, in the early 1900s. Since then, plague has spread into the western U.S. and is now established or endemic in many rural areas of the west.

[Sarah Gregory] How was plague diagnosed in the patients?

[Vicki Kramer] There are three types of syndromes that can be caused by plague, including one with swollen painful lymph nodes, one that primarily causes an overwhelming blood infection, and one primarily affecting the lungs. An initial plague diagnosis is typically based on symptoms, testing samples from the blood or lymph nodes, and consideration of the person's recent activities and travel history. Plague infection for these cases was confirmed by the county health department for the California resident and by the Centers for Disease Control and Prevention for the Georgia resident. The resulting publicity from the initial case prompted the Georgia resident to mention her recent travel history to Yosemite National Park to her health care providers, which contributed to an early diagnosis.

[Sarah Gregory] Is it unusual to have two different strains of plague in one area at roughly the same time?

[Vicki Kramer] No, it probably isn't unusual. Recent research, which is cited in our article, has found that multiple variations, or clones, of the plague bacteria can exist in relatively small geographic areas. It appears that climactic conditions or other environmental factors may trigger simultaneous increases in these clones, resulting in increased plague activity over widespread areas. Our findings in Yosemite support this view.

[Sarah Gregory] What did your study involve?

[Vicki Kramer] Once the diagnoses and travel histories were confirmed, we looked at the areas where the patients visited for indications of increased plague risk. During the initial evaluations, we assessed the presence and abundance of rodent species that we know are associated with plague in California. High numbers of certain species may suggest increased risk for plague activity in an area. We also looked for dead rodents and indications of recent declines in rodent populations. These findings provide indications that plague might be active in the area. From our initial evaluations, we prioritized locations for rodent trapping so we could take blood and flea samples to test for evidence of plague infection. Our environmental sampling documented recent activity at several locations within and outside of Yosemite, including areas the patients visited in the park.

[Sarah Gregory] Were there steps taken to prevent further spread?

[Vicki Kramer] The best plague prevention method is educating people on how plague is transmitted and how to avoid exposure to potentially infected rodents and their fleas. In addition to issuing several media releases, we worked closely with Yosemite National Park to make sure that park visitors and staff were aware of areas of increased risk of plague in the park. In several campgrounds and other high-use areas where we found evidence of plague activity, we worked with the park to temporarily close the areas and applied an insecticide to rodent burrows to control the fleas and reduce plague transmission risk.

[Sarah Gregory] What became of the patients?

[Vicki Kramer] I'm happy to report that both patients survived.

[Sarah Gregory] While there's only been two recent cases in California, will this become a larger public health threat?

[Vicki Kramer] Increased plague activity occurs sporadically, so it's difficult to predict the future. However, it's been almost 100 years since we have experienced plague epidemics in urban areas of California. Today, plague is typically found only in rural areas of the state, particularly in foothill and mountainous areas, where wild rodents and their fleas harbor the bacteria and human exposure is relatively limited. Human cases have averaged less than one per year in recent decades. We don't anticipate this pattern to change significantly.

[Sarah Gregory] Thank you, Dr. Kramer, for taking the time to talk with me today. Listeners can read the entire December 2016 article, Investigation of and Response to 2 Plague Cases, Yosemite National Park, California, USA, 2015, online at cdc.gov/eid.

I'm Sarah Gregory for *Emerging Infectious Diseases*.

[Announcer] For the most accurate health information, visit cdc.gov or call 1-800-CDC-INFO.