

## PEARLS OF SICKNESS: A MULTISTATE EPIDEMIC OF *VIBRIO PARAHÆMOLYTICUS* LINKED TO CONTAMINATED OYSTERS FROM WASHINGTON STATE

### BACKGROUND

In June 2006, routine disease surveillance by the Los Angeles County (LAC) Department of Public Health (DPH) Acute Communicable Disease Control (ACDC) Program uncovered a sharp increase in the number of cases of *Vibrio parahæmolyticus* infection. *Vibrio parahæmolyticus* (*V. parahæmolyticus*) is a species of comma-shaped bacteria that thrives in seawater or brackish water. People commonly become infected with *V. parahæmolyticus* through ingestion of contaminated water or undercooked shellfish. Shellfish include oysters, mussels, clams and scallops. Symptoms of vibriosis include profuse diarrhea, fever, abdominal cramps, nausea, vomiting, headache and severe fatigue. Illness duration extends from 1 to 7 days and incubation ranges between 4 to 30 hours, but usually 12 to 24 hours [1].

The endemic rate for *V. parahæmolyticus* infection is approximately 15 cases per year, with most of those cases occurring between late May and early October [2]. However, starting in mid-June ACDC began to receive more reports of infection than expected. Due to the apparent swell in incidence, ACDC investigated the rising cases of *V. parahæmolyticus* infection and found they coincided with increased incidence of vibriosis in Washington State.

### METHODS

General investigation: Cases of *V. parahæmolyticus* are reportable to ACDC and are tracked. For each report received, the physician listed on the report was contacted and interviewed about the case. Medical records such as history and physical, infectious disease consultation and discharge summary were requested from hospitals for hospitalized cases. Cases were interviewed about symptoms and risk factors, particularly consumption of certain seafood items. LAC Environmental Health Services investigated reports in which consumption of raw seafood was implicated.

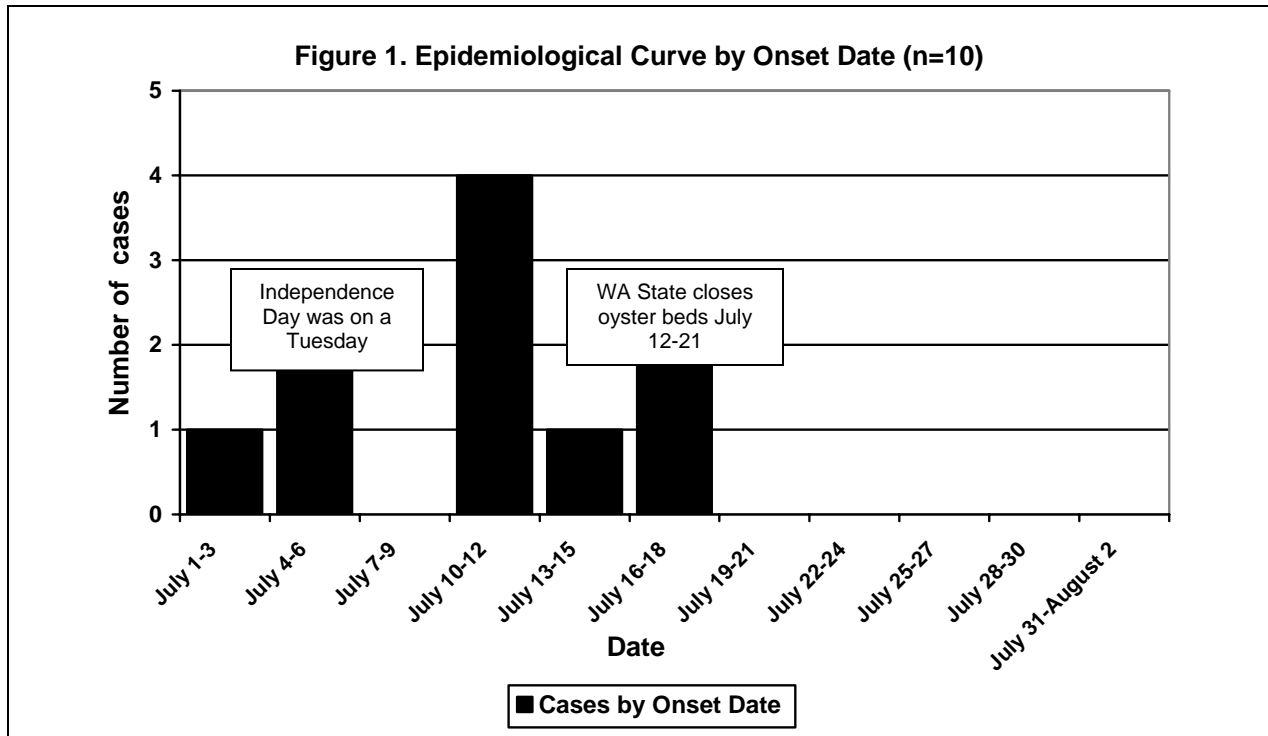
Case definition: An outbreak case was defined as any person meeting all of the following three criteria:

1. Is a Los Angeles County resident with *V. parahæmolyticus* infection confirmed by the LAC-PHL.
2. Ate raw shellfish harvested from Puget Sound, WA between July 1 and July 20, 2006.
3. Had onset of gastrointestinal symptoms within 72 hours following ingestion of the shellfish..

Environmental Health Inspection: Because many of the vibriosis cases reported eating at restaurants throughout California, multiple environmental health jurisdictions were requested to assist in the investigation. In addition to LAC Environmental Health Services, the following counties participated in the investigation: San Diego, Santa Barbara, Orange County and San Francisco. Each county inspected the restaurants or vendors; confirmed receipt and sales of raw oysters; and copied invoices and shellfish tags to determine the source of the oysters.

### RESULTS

Cases: ACDC obtained reports on 14 vibriosis cases infected with *V. parahæmolyticus* and residing in LAC between June 15 and August 15, 2006. Figure 1 shows onset dates for *V. parahæmolyticus* infections from July 1 to August 2; the time frame encompasses the vibriosis epidemic, but also includes endemic cases not related to oyster consumption. Eleven *V. parahæmolyticus* cases (79%) recalled eating raw oysters or scallops, while 3 cases denied eating raw oysters prior to onset of symptoms. Forty-seven percent of cases were male. Cases had a mean age of 48 years with a range of 25 to 86 years.



**Table 1. Profile of Selected *V. parahæmolyticus* Cases**

Age / Sex		Onset date	Implicated seafood	Purchase location
55	F	June 10, 2006	Raw scallops	Los Angeles – restaurant
47	F	July 2, 2006	Raw oysters	San Francisco – Pier 39
31	M	July 4, 2006	Raw oysters	San Diego – restaurant
25	M	July 10, 2006	Raw oysters	Century City – restaurant
48	F	July 10, 2006	Raw oysters	Santa Barbara – Stearns Wharf
43	M	July 10, 2006	Raw oysters	San Francisco – restaurant
34	F	July 14, 2006	Raw oysters	Los Angeles – supermarket
86	M	July 17, 2006	Raw oysters	Sonoma – private retreat
38	F	July 17, 2006	Raw oysters	Los Angeles – restaurant

Table 1 outlines the age, gender and onset date of selected vibriosis cases and shows the implicated seafood item and its point of purchase. The first case in Table 1 typifies LA County seasonal vibriosis case histories; a female case ate scallop ceviche at a Mexican restaurant, although she is not part of the epidemic. The first case linked to the epidemic was a woman who had visited the San Francisco Bay Area over the Independence Day weekend. She reported eating raw oysters at Fisherman’s Wharf and

subsequently became ill. The second case linked to this epidemic was a man who had traveled to San Diego with friends. He dined on raw oysters at a popular beachfront hotel as part of a large dining party. The third case linked to this epidemic was a young man who had eaten raw oysters at a restaurant in Century City in LAC. He was treated by a private physician and later diagnosed with vibriosis. One case linked to this epidemic became ill following home consumption of raw oysters. She and her partner purchased shucked oysters from a supermarket and ate them raw. Her partner experienced some gastrointestinal symptoms, but was not diagnosed with vibriosis. Three other cases were associated with raw oyster consumption outside of LAC; the remaining cases ate raw oysters at commercial food establishments in LAC.

Laboratory: The LAC PHL, bacteriology unit confirmed 12 cultures positive for *V. parahæmolyticus*. One case each was confirmed by Santa Cruz County and Orange County PHLs.

Environmental Health Investigations: LAC Environmental Health Service Food and Milk Program inspected one restaurant in Century City and one supermarket in Westwood based on case reports. Both establishments had sold raw oysters harvested from various beds in Puget Sound, Washington State.

Santa Barbara County Environmental Health inspected a restaurant on Stearns Wharf and confirmed their oyster supply had been harvested also in Puget Sound, Washington State.

San Francisco Environmental Health could not complete the inspection because the two cases reportedly ate at restaurants on Fisherman's Wharf, but neither could recall which specific restaurant.

San Diego County Environmental Health completed an outbreak investigation based on the report received from ACDC. The vibriosis case reported dining with a large group of friends at a hotel restaurant, and while he was the only person to be diagnosed with vibriosis, several members of his party became ill with similar symptoms following the meal. All of those who were ill reportedly ate raw oysters. The tags for that particular lot of oysters indicated they were harvested, again, from Puget Sound, Washington State.

Halt of Supply: Between July 12 and 21, 2006, the state of Washington issued public warnings and closed several oyster beds in Puget Sound in response to the public health threat. Following the closures of the oyster beds, the number of cases of vibriosis (including all *Vibrio* species) reported in Los Angeles County fell back to endemic levels.

## DISCUSSION

After thorough investigation, the LAC DPH determined that the epidemic of vibriosis due to infection with *V. parahæmolyticus* was caused by environmental contamination of oysters harvested from Puget Sound in Washington State. The summer of 2006 was one of the warmest recorded for the United States since 1895 [4]. As a result, water temperatures in Puget Sound were also above normal. *V. parahæmolyticus* tends to thrive in warmer conditions, which led to proliferation of the bacteria in the water. Oysters and other filter-feeding marine life concentrate the bacteria in their bodies, and if the shellfish are not cooked properly, the bacteria may cause illness.

The onset of four cases in LAC coincided with Independence Day celebrations, three of whom reported traveling outside of LAC for the holiday. This is significant because in some cultures oysters are a special occasion food item consumed during celebrations. Two peaks of disease incidence surround July 4, 2006. The holiday occurred on a Tuesday, which led to some people taking an extended weekend before or after the holiday. Several cases who became ill outside the holiday period had eaten oysters as part of other festivities including business meetings, family gatherings, parties and romantic liaisons.

## LIMITATIONS

This investigation was limited by a few factors. There was recall bias among some cases due to the retrospective nature of the data collection. Several cases were unable to positively identify the restaurant

where they had eaten oysters. The standardized questionnaire administered to the cases asked specifically about seafood and seawater exposure, which may have biased the cases' answers.

Despite the multiple health jurisdictions involved in this epidemic, no additional warnings regarding the consumption of raw oysters and other seafood were officially made in California by either state or local health departments. Epidemiological data related to this outbreak of *V. parahæmolyticus* from LAC and other parts of California were not included in a bulletin posted to the CDC Morbidity and Mortality Weekly Report [3]. Because the source of the contaminated oysters was in Puget Sound, much of the higher-level oversight of the investigation was covered by Washington state authorities.

## RECOMMENDATIONS

While it is legal to sell and serve raw oysters in LAC, the DPH recommends that people do not consume raw or undercooked oysters. Current California health codes dictate that commercial food establishments that serve raw oysters originating from the Gulf of Mexico display prominent warnings in both English and Spanish, detailing the health risks associated with raw seafood consumption and sales of oysters from this region are restricted between April 1 and October 31 each year. However, there is no such regulation for oysters taken from other locations or for other raw shellfish.

Also, LAC DPH recommends that clinicians treating patients for profuse diarrhea and other symptoms consistent with vibriosis ask their patients about seafood consumption and recreational water exposure. If patients admit to a recent history of either activity, clinicians should take a stool specimen for culture. Culture for vibriosis species is not done routinely on all stool cultures. Vibriosis (stool) culture must be requested by Doctor's order and the lab has to use TCBS agar.

## REFERENCES

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