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Outbreak of *Vibrio parahaemolyticus* Gastroenteritis Associated with Consumption of Alaskan Oysters--Part 2

BACKGROUND and METHODS

Please refer to *Bulletin* No. 18, 2004 for background information and additional detail on the methods of this investigation (1).

We performed a retrospective cohort study on Ship A passengers from four July cruises to determine the burden of gastrointestinal illness among passengers and risk factors for illness. We administered a questionnaire by telephone or in person to all contacted passengers; recorded demographic information, illness characteristics, and food consumption histories; and calculated risk factors and attack rates for illness. The case definition for this study was new onset of three or more episodes of watery diarrhea in a 24-hour period while sailing onboard Ship A during the 2004 summer.

As noted in *Bulletin* No. 18, we also performed active surveillance to identify additional *Vibrio parahaemolyticus* gastroenteritis case-patients. The revised case definition for this portion of the investigation was new onset of three or more episodes of watery diarrhea in a 24-hour period that started within two days of consumption of raw oysters collected from Alaskan waters.

RESULTS

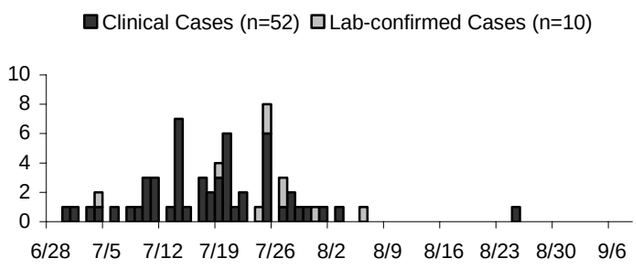
Retrospective Cohort Study

We interviewed 132 of 189 (70%) of passengers who sailed on one of four Ship A cruises during July; 22 (11.6%) passengers interviewed met our case definition for illness. Three seafood items served on Ship A, including raw oysters, lox, and seafood quesadilla were significant predictors of illness on bivariate analysis. Only raw oysters remained a significant predictor of illness after backward stepwise multiple logistic regression analysis (adjusted OR 5.2, 95% CI 1.47-18.54). Of the 48 persons interviewed who consumed raw oysters, 14 (29%) met our clinical case definition for illness. The median number of oysters consumed by ill persons was 1 (range, 1-6).

Additional Case Finding

We identified 62 people who met our case-finding case definition. Fourteen case-patients from the Ship A retrospective cohort study met this case definition and are included in these data. Figure 1 shows the number of case-patients by date of onset. Forty-six (74%) of case-patients were male. The median age was 47 (range, 7-73) years. In addition to diarrhea, symptoms included abdominal cramping (82%), chills (44%), myalgias (36%), self-reported feverishness (34%), headache (32%), vomiting (29%), mucousy diarrhea (21%), and bloody diarrhea (7%). The median duration of illness was 5 days; range, 1-13 days. Twelve (19%) case-patients were evaluated by a health care provider; none were hospitalized.

Figure 1. Cases of Vibrio parahaemolyticus Gastroenteritis by Date of Onset (N=62)



Laboratory Results

Ten stool samples were collected from persons who met the case-finding case definition; all samples were positive for *V. parahaemolyticus*. Eight samples were sent to the U.S. Centers for Disease Control and Prevention for serotype analysis; seven were serotype 06:K18, and one was serotype 01:K56. PCR analyses for thermostable direct hemolysin gene (tdh), a known *V. parahaemolyticus* virulence factor, were positive in all isolates.

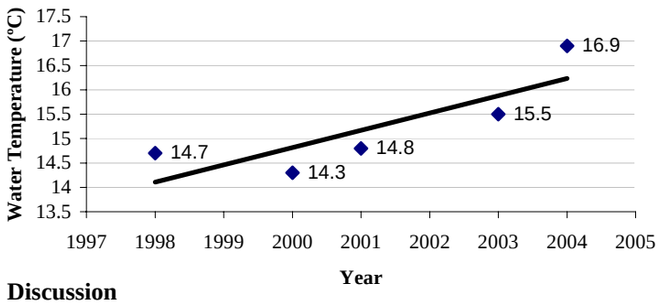
Environmental Results

Oyster samples from Farm A and seven additional Alaskan oyster farms (three in Prince William Sound [PWS] and four in southeast Alaska) tested positive for *V. parahaemolyticus*. A total of 82 *V. parahaemolyticus* isolates were identified from 104 samples tested; six different *V. parahaemolyticus* strains were characterized from the 104 environmental samples: O6:K18, 01:K56, 03:K20, 04K63, 04:K12, and 05:Kunknown.

Fifty-seven of 82 (70%) oyster isolates that tested positive for *V. parahaemolyticus* also tested positive for *tdh*. The *tdh*-positive isolates came from three farms in PWS and four farms in Southeast Alaska. Four farms were closed as a result of this outbreak—two farms in PWS and two farms in Southeast Alaska.

Median summertime Farm A temperatures from 1998-2004 are presented in Figure 2 ($r^2 = 0.75$, $p = 0.06$).

Figure 2. Median (July-August) Water Temperature, by Year—Farm A, Prince William Sound, 1998-2004 (Data complements of the USDA-funded Molluscan Broodstock Program)



Discussion

This is the first documented outbreak of *V. parahaemolyticus* associated with consumption of Alaskan oysters. *Vibrio parahaemolyticus* requires a minimum water temperature of approximately 15° Celsius to thrive (2). Findings from this outbreak might provide additional valuable scientific evidence of human health implications from arctic warming.

This investigation also highlights the importance of public health surveillance, health care provider awareness, and disease reporting. The first reported case-patient from this outbreak was in a Nevada resident who became ill while onboard Ship A in early July. Had the Nevada Office of Epidemiology not reported this person's illness to the Alaska Section of Epidemiology, it is very possible that the etiology of the outbreak might not have been discovered. Because *V. parahaemolyticus* is a bacteria that requires special growth media in order to be cultured, routine stool cultures for typical enteric bacteria (i.e., salmonella, campylobacter, *E. coli*, and shigella) would not have detected *V. parahaemolyticus*.

Recommendations

1. Health care providers should educate their patients (particularly children and immune compromised persons) about the risks associated with eating raw seafood.
2. Health care providers should test specifically for *V. parahaemolyticus* in any patient who presents with acute gastroenteritis within a week after consumption of raw oysters.
3. DEC's development and implementation of a *V. parahaemolyticus* monitoring and control plan will be critical for controlling further outbreaks.

References

1. Available at: *http://www.epi.alaska.gov/bulletins/docs/b2004_18.pdf*.
2. Draft Risk Assessment on the Public Health Impact of Vibrio parahaemolyticus in Raw Molluscan Shellfish. *Available at: http://www.cfsan.fda.gov/~dms/vprisk4.html. Accessed on Oct. 22, 2004*

(Submitted by Joe McLaughlin, MD, MPH and Karen Martinek, RN, MPH Section of Epidemiology.)