Paralytic Shellfish Poisoning—Southeast Alaska, May—June 2011

ON JUNE 6, 2011, THE SECTION OF EPIDEMIOLOGY (SOE) OF THE ALASKA DIVISION OF PUBLIC HEALTH WAS NOTIFIED OF A CASE OF PARALYTIC SHELLFISH POISONING (PSP) IN SOUTHEAST ALASKA. IN COLLABORATION WITH LOCAL PARTNERS, SOE INVESTIGATED AND IDENTIFIED A TOTAL OF EIGHT CONFIRMED AND 13 PROBABLE PSP CASES THAT OCCURRED DURING MAY—JUNE 2011. WARNINGS TO AVOID NONCOMMERCIALLY HARVESTED SHELLFISH WERE BROADCAST ON LOCAL RADIO AND TELEVISION AND DISPLAYED AT BEACHES AND IN POST OFFICES, GOVERNMENT OFFICES, AND BUSINESSES THROUGHOUT THE REGION. COMMERCIAL SHELLFISH, WHICH ARE TESTED FOR THE PRESENCE OF PSP-CAUSING TOXINS, WERE SAFE. BECAUSE THE RISK FOR PSP IS UNPREDICTABLE, PERSONS WHO CONSUME NONCOMMERCIAL SHELLFISH SHOULD KNOW THAT THEY ARE AT RISK FOR PSP, AND SUSPECTED CASES SHOULD BE REPORTED PROMPTLY TO SOE TO INITIATE CONTROL MEASURES IN THE AFFECTED AREA.

ON JUNE 3, 2011, A MAN AGED 52 YEARS RESIDING IN METLAKATLA, ON ANNETTE ISLAND IN SOUTHEAST ALASKA, AWOKE FROM A NAP WITH NUMBNESS AROUND HIS MOUTH, TINGLING IN HIS HANDS, AND SLIGHT DYSPEA. HE WAS TAKEN TO THE ANNETTE ISLAND SERVICE UNIT, THE COMMUNITY’S HEALTH CENTER, WHERE A CLINICIAN INQUIRED ABOUT RECENT SEAFOOD CONSUMPTION. AFTER THE MAN REPORTED EATING A MEAL OF STEAMED COCKLES SHORTLY BEFORE HIS NAP, THE CLINICIAN DIAGNOSED PSP. THE MAN WAS TRANSPORTED TO KETCHIKAN WHERE, HAVING BECOME WEAK AND UNABLE TO SIT UP IN BED WITHOUT ASSISTANCE, HE WAS ADMITTED TO THE INTENSIVE-CARE UNIT.

PSP PRIMARILY RESULTS FROM INGESTION OF SAXITOXINS, TOXINS PRODUCED BY MARINE DINOFLAGELLATE ALGAE THAT ACCUMULATE IN BIVALVE MOLLUSKS (E.G., BUTTER CLAMS, COCKLES, GEODUCKS, AND MUSSELS).1 PSP IS A POTENTIALLY FATAL NEUROPARALYTIC CONDITION. SIGNS AND SYMPTOMS OF PSP RANGE FROM MILD, SHORT-LIVED PARESTHESIAS OF THE MOUTH OR EXTREMITIES TO SEVERE, LIFE-THREATENING PARALYSIS.1 BECAUSE PSP IS SUCH A SERIOUS CONDITION AND BECAUSE A CASE INDICATES WIDESPREAD RISK TO THE SHELLFISH-CONSUMING POPULATION OF THE AFFECTED AREA, IMMEDIATE REPORTING OF PSP CASES TO SOE BY HEALTH-CARE PROVIDERS IS MANDATORY IN ALASKA.

WHEN SOE WAS NOTIFIED OF THE PROBABLE CASE OF PSP (IN PATIENT A) ON JUNE 6, THEY ALSO WERE INFORMED BY A NURSE IN METLAKATLA THAT OTHER COMMUNITY MEMBERS HAD EATEN COCKLES AND HAD EXPERIENCED PSP SYMPTOMS. THAT AFTERNOON, TWO SOE EPIDEMIOLOGISTS TRAVELED TO METLAKATLA (POPULATION: 1,460 PERSONS) TO INVESTIGATE. THE EPIDEMIOLOGISTS MET WITH A VISITING PUBLIC HEALTH NURSE ONSITE AND CONDUCTED ACTIVE CASE FINDING BY BROADCASTING MESSAGES ON LOCAL TELEVISION AND RADIO AND THROUGH WORD-OF-MOUTH AMONG COMMUNITY MEMBERS.

FOR THIS INVESTIGATION, A PROBABLE CASE OF PSP WAS DEFINED AS A COMPATIBLE ILLNESS, INCLUDING PARESTHESIAS, IN A PERSON SHORTLY AFTER CONSUMPTION OF NONCOMMERCIAL SHELLFISH FROM ALASKA WATERS DURING SPRING 2011. A CONFIRMED CASE ALSO MET THIS CASE DEFINITION AND HAD DETECTABLE SAXITOXINS IN URINE OR LEVELS ≥80 µG SAXITOXINS/100 G OF MEAT (THE LEVEL AT WHICH PRODUCT IS CONSIDERED UNSAFE) IN THE SHELLFISH THAT HAD BEEN CONSUMED BEFORE ILLNESS ONSET.

SOE IDENTIFIED AN ADDITIONAL 12 PROBABLE CASES IN METLAKATLA AND USED A STRUCTURED QUESTIONNAIRE FOR PATIENT INTERVIEWS. THE TEAM COLLECTED SHELLFISH FROM TWO BEACHES WHERE SHELLFISH ASSOCIATED WITH PSP HAD BEEN HARVESTED. THEY ALSO COLLECTED FROZEN COCKLES FROM A COMMUNITY MEMBER WHO HARVESTED THEM WITH THE INDEX PATIENT (PATIENT A) BEFORE THAT PATIENT BECAME ILL.

WHAT IS ALREADY KNOWN ON THIS TOPIC?

Paralytic shellfish poisoning (PSP) is a potentially fatal yet preventable condition that results from ingestion of saxitoxins, a family of neurotoxins produced in certain marine algae and sometimes found in bivalve mollusks. PSP is considered a rare condition and is reportable in Alaska.

WHAT IS ADDED BY THIS REPORT?

OF THE 21 CASES OF PSP THAT WERE IDENTIFIED IN SOUTHEAST ALASKA DURING MAY—JUNE 2011, A TOTAL OF 17 WERE UNREPORTED TO THE ALASKA SECTION OF EPIDEMIOLOGY, INDICATING THAT PSP MIGHT BE UNDERREPORTED IN ALASKA.

WHAT ARE THE IMPLICATIONS FOR PUBLIC HEALTH PRACTICE?

PUBLIC HEALTH AUTHORITIES SHOULD RESPOND IMMEDIATELY TO SUSPECTED CASES OF PSP SO THAT WARNINGS CAN BE PROVIDED TO THE COMMUNITY. ENHANCED SURVEILLANCE DURING PUBLIC HEALTH RESPONSES MIGHT INCREASE THE NUMBER OF CASES IDENTIFIED, ALLOWING BETTER CHARACTERIZATION OF THE MAGNITUDE OF THE PROBLEM. EFFECTIVE PUBLIC INFORMATION CAMPAIGNS ON THE RISKS OF NONCOMMERCIAL SHELLFISH AND THE NEED TO SEEK MEDICAL CARE IF SYMPTOMS OF PSP DEVELOP ARE AN IMPORTANT PUBLIC HEALTH PRACTICE IN PSP-AFFECTED REGIONS.

While conducting the investigation in Metlakatla, SOE was notified of two men working in Ketchikan (population: 8,050 persons) who had been examined in the hospital’s emergency department on June 8 and subsequently were admitted with symptoms consistent with PSP, including paresthesias (patients F and G). Both patients were severely ill; one had required intubation and assisted ventilation and was admitted to the intensive-care unit. The men had shared a meal of boiled, noncommercially harvested mussels. The hospital shipped leftover mussels for testing.

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brought in by the men to the Alaska Department of Environmental Conservation’s Environmental Health Laboratory. Urine specimens from the two hospitalized men and two persons who had accompanied them to the hospital and had eaten the same meal of mussels, but who had no symptoms themselves, were sent to CDC for analysis. SOE requests that clinicians collect the first available urine, freeze it immediately, and ship as soon as possible.

On June 9, the two SOE epidemiologists in Metlakatla traveled to Ketchikan to interview patients F and G and conduct additional case finding. While at the hospital in Ketchikan, the epidemiologists were informed of two additional patients who had been examined in the emergency department in May 2011 and who had been diagnosed with shellfish allergies but who had symptoms consistent with PSP hours after consuming a clam and cockle chowder. Active case finding in Ketchikan identified three additional probable cases.

Overall, eight probable and five confirmed cases of PSP were identified in Metlakatla, and five probable and two confirmed cases of PSP were identified in Ketchikan during this outbreak. Another confirmed case of PSP (in patient H) in Ketchikan had been reported to SOE in May, for a total of eight confirmed cases. In all, 21 cases of PSP were identified in southeast Alaska during May—June 2011. All 21 patients reported experiencing paresthesia, with incubation periods for all cases ranging from 0 to 3.75 hours (median: 30 minutes). Four of the 21 (19%) patients were hospitalized (Table); none died. Of the 21 patients, 15 (71%) had consumed cockles; four (19%) had consumed blue mussels; one (5%) had consumed butter clams and cockles; and one (5%) had consumed clams that were otherwise unspecified. Four of the cases were reported to SOE, one after a delay of 3 days.

The cockles collected from the community member in Metlakatla and the mussels collected from the hospital in Ketchikan tested positive for saxitoxin (range: 4.602-5.429 µg/100 g of meat).

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CDC Editorial Note: The 21 cases of PSP identified in southeast Alaska during May—June 2011 represent a considerable increase in the numbers reported in recent years (~8 cases annually in Alaska since 1998). However, this was not the first time an increase occurred in the annual number of PSP cases in Alaska. Active case finding during this outbreak enabled epidemiologists to identify persons with PSP symptoms who had not sought care and thus would never have been reported. This demonstrates that the overall burden of PSP in Alaska likely is underestimated through standard reporting. However, saxitoxin levels were reported to have been higher in shellfish in the region during spring 2011 than in previous years (Kate Sullivan, University of Alaska Southeast, personal communication, 2011), indicating that the increase in the number of cases might not have been a surveillance artifact.

<table>
<thead>
<tr>
<th>Patient</th>
<th>Location</th>
<th>Date of onset</th>
<th>Symptoms</th>
<th>Time from consumption to symptom onset</th>
<th>Type of shellfish consumed</th>
<th>Toxic level in shellfish consumed (µg saxitoxin/100 g of meat)</th>
<th>Toxic level in urine (ng/mL)</th>
<th>Hospitalized</th>
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<tbody>
<tr>
<td>A</td>
<td>Metlakatla</td>
<td>6/3/2011</td>
<td>Ataxia, difficulty swallowing, dizziness, difficulty moving, floating sensation, numbness, paresthesia, shortness of breath, weakness</td>
<td>3.5-4 hrs</td>
<td>Cockles</td>
<td>528</td>
<td>N/A</td>
<td>Yes (ICU)</td>
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<td>B</td>
<td>Metlakatla</td>
<td>6/3/2011</td>
<td>Paresthesia</td>
<td>10-15 min</td>
<td>Cockles</td>
<td>528</td>
<td>N/A</td>
<td>No</td>
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<td>C</td>
<td>Metlakatla</td>
<td>6/3/2011</td>
<td>Paresthesia</td>
<td>2.5-3 hrs</td>
<td>Cockles</td>
<td>528</td>
<td>N/A</td>
<td>No</td>
</tr>
<tr>
<td>D</td>
<td>Metlakatla</td>
<td>6/3/2011</td>
<td>Ataxia, dysphagia, floating sensation, paresthesia, weakness</td>
<td>&lt;1 min</td>
<td>Cockles</td>
<td>528</td>
<td>N/A</td>
<td>No</td>
</tr>
<tr>
<td>E</td>
<td>Metlakatla</td>
<td>6/3/2011</td>
<td>Paresthesia</td>
<td>&lt;1 min</td>
<td>Cockles</td>
<td>528</td>
<td>N/A</td>
<td>No</td>
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<tr>
<td>F</td>
<td>Ketchikan</td>
<td>6/8/2011</td>
<td>Ataxia, dysphagia, floating sensation, paresthesia, shortness of breath, weakness</td>
<td>1 hr</td>
<td>Blue mussels</td>
<td>5,037</td>
<td>118</td>
<td>Yes (ICU)</td>
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<td>G</td>
<td>Ketchikan</td>
<td>6/8/2011</td>
<td>Dizziness, dysphagia, floating sensation, numbness, weakness</td>
<td>45 min</td>
<td>Butter/ Little neck clams</td>
<td>1,321</td>
<td>N/A</td>
<td>Yes</td>
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<td>H</td>
<td>Ketchikan</td>
<td>5/22/2011</td>
<td>Ataxia, dizziness, floating sensation, paresthesia, vomiting, weakness</td>
<td>2.5-3 hrs</td>
<td>Blue mussels</td>
<td>5,037</td>
<td>15</td>
<td>No</td>
</tr>
</tbody>
</table>

**Abbreviations: N/A = not available; ICU = Intensive-care unit.**

* The international regulatory action level set by the U.S. Food and Drug Administration for paralytic shellfish toxins in shellfish is ≥80 µg saxitoxins/100 g of meat.
PSP is a preventable condition. Avoidance of noncommercially harvested Alaskan shellfish not tested for saxitoxins is the best way to prevent PSP. Commercially harvested shellfish are tested for saxitoxin in Alaska* and considered safe for human consumption but shellfish collected by persons for their own use are not. Because shellfish harvesting is an important cultural tradition and shellfish are an important subsistence food source for many Alaska Natives and other Alaska residents, not everyone follows the public health recommendation to avoid eating shellfish from noncommercial sources. Furthermore, transient fish-processing workers in Alaska might be unaware of the potential danger of eating untested Alaskan shellfish because they are unfamiliar with PSP and might have limited English literacy.

During the investigation, SOE epidemiologists posted signs at beaches on Metlakatla and within the community to warn residents about the PSP risks associated with consuming noncommercially harvested shellfish. The warnings were printed in English, Tagalog, Russian, Spanish, and Korean. The Ketchikan Public Health Center and the Alaska Department of Fish and Game posted similar signs throughout Ketchikan and surrounding areas. Additionally, the Alaska Department of Health and Social Services issued press releases and conducted media interviews to inform the public about the outbreak and the need to avoid noncommercial harvesting of shellfish. No additional cases of PSP have been reported in Alaska since this investigation.

Because Alaskan shellfish can have high levels of PSP saxitoxins at any time of year and neither cooking nor freezing destroys the toxin, development of a widely available, inexpensive, and easy-to-use test kit to measure toxin concentrations in noncommercial shellfish would be beneficial. Symptoms of PSP occur within minutes to hours of shellfish consumption,1 and because the course of the illness is unpredictable, immediate medical assessment is strongly recommended. The roles of state and local governments, clinicians, and community leaders include (1) identifying cases so that investigations and control measures (e.g., posting warning signs) can be initiated promptly, (2) educating persons who choose to continue to consume noncommercially harvested shellfish about the signs and symptoms of PSP, and (3) recommending that medical care be sought immediately if symptoms develop. Clinicians should report suspected cases of PSP to local health authorities immediately and promptly collect and freeze samples of patient urine and any uneaten shellfish for PSP toxin testing.

Acknowledgments

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REFERENCES


*Food safety requirements for commercial harvesting of shellfish in Alaska are available at http://www.dec.alaska.gov/eh/1ss/seafood/shellfish_home.htm.