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Bulletin No. 1 January 7, 2015

Paralytic Shellfish Poisoning — Alaska, 1993–2014

Background

On December 28, 2014, the Section of Epidemiology (SOE) was notified of a case of paralytic shellfish poisoning (PSP) in a middle-aged man from Southeast Alaska who consumed four butter clams that he harvested from a local beach a few days before. His symptoms consisted of paresthesias of the lips, which started about 30 minutes after shellfish consumption and resolved 3 hours later. The butter clams he consumed were positive for high concentrations of saxitoxin.

A well-known problem in Alaska,¹ PSP is a potentially fatal neuroparalytic condition caused by ingestion of saxitoxin, a toxin produced by dinoflagellate algae that accumulates in bivalve mollusks (e.g., butter clams, cockles, geoduck clams, and mussels). Because crabs consume shellfish, saxitoxin can also accumulate in crab viscera. PSP typically results in mild symptoms (e.g., short-lived paresthesias of the lips/tongue, and fingers/toes), but can also cause life-threatening paralysis. Symptoms occur within minutes to hours of consumption.² This *Bulletin* summarizes the epidemiology of reported PSP cases in Alaska during 1993–2014.

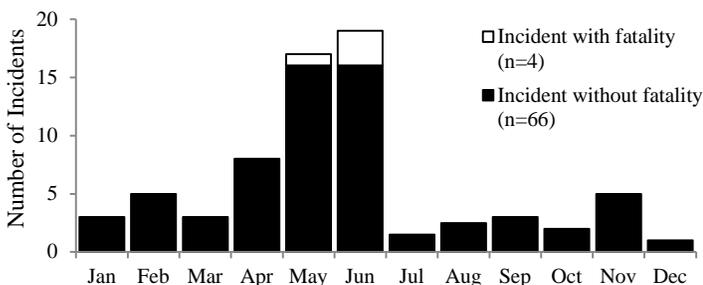
Methods

A clinical case of PSP was defined as a clinically-compatible illness in a person with a history of shellfish or crab consumption. A laboratory-confirmed case was a clinical case where saxitoxin was detected in the patient's urine or where high levels of saxitoxin were detected in shellfish from the suspected meal or shellfish collected from the same beach. The permissible level of saxitoxin per FDA is <80 µg per 100g in shellfish. Note that a negative test result (shellfish or clinical specimen) did not necessarily rule out a case if the clinical presentation and consumption history were highly compatible with PSP.

Results

From 1993–2014, SOE received reports of 117 PSP cases comprising 70 incidents (median: 1 case per incident; range: 1–7). PSP deaths occurred in 1994, 1997, and 2010 (Figure). Most surviving patients (n=96, 85%) received medical attention at a village clinic or a hospital; five patients required intubation. Implicated shellfish in 70 incidents were collected in all months with most collected in May and June (Figure).

Figure. PSP Incidents (N=70) by Month of Shellfish Collection — Alaska, 1993–2014*



*Note: For one incident, shellfish had been frozen and consumed months after collection. The family couldn't recall if the shellfish were harvested in July or August. As such, half a count was added to both the July and August columns in the Figure.

Demographic characteristics of PSP patients were as follows:

- 67 (57%) were male;
- of the 113 persons for whom an age was recorded, the median age was 42 years (range: 2–72 years);
- of the 80 persons for whom race was recorded, 43 (54%) were Alaska Native, 19 (24%) were Asian, and 18 (23%) were white.

The most frequently implicated shellfish were butter clams, mussels, and cockles (Table). Of the 49 (70%) incidents during which shellfish were tested, the saxitoxin levels ranged from non-detect to 19,418 µg per 100g. Nine of the 10 highest values (i.e., >3,500 µg per 100g) were found in mussels. Dose-response analyses were not done because quantities of shellfish consumed, patient body weights, and other key predictors of illness were not always available. Shellfish were most frequently harvested from Kodiak Island Borough (n=21, 30%), Prince of Wales-Hyder Census Area including Metlakatla (n=13, 19%), and Juneau Borough (n=11, 16%). Shellfish were also harvested from Lake/Peninsula, Kenai Peninsula, other Southeast Boroughs, and Nome Census area.

Table. Shellfish Implicated in PSP Cases — Alaska, 1993–2014

Type of Shellfish	# of Incidents (% of all 70)	# of Cases (% of all 117)
Butter clams	24 (34%)	30 (26%)
Mussels (blue or unspecified)	13 (19%)*	31 (27%)
Cockles	12 (17%)*	22 (19%)
Razor clams	4 (6%)	15 (13%)
Pink neck (surf) clams	2 (3%)	2 (2%)
Littleneck clams	1 (2%)	1 (1%)
Crab	2 (3%)*	1 (1%)
Oysters	1 (2%)	1 (1%)
Combinations of shellfish	10 (14%)*	12 (10%)

*Incidents for which there was a fatality.

Discussion

PSP cases have been caused by marine shellfish collected during *every month* of the year in Alaska. Most incidents reported during 1993–2014 involved one person, with several notable exceptions.³ Public health officials immediately investigate all reports of illness because a single case can be an indication of wider community exposure and future risk. Because PSP cases are defined by transient, somewhat non-specific clinical symptoms, many cases likely go unreported.

The Alaska Department of Environmental Conservation (DEC) routinely tests commercially-harvested shellfish to determine saxitoxin levels; therefore, commercially available shellfish are safe to consume. Because recreationally-harvested shellfish are not routinely tested, and rapid field tests are not yet widely available or practical for subsistence harvesters, there is no reliable way for subsistence harvesters to determine if the shellfish they gather are safe to eat. Efforts to model the ecological factors that cause harmful algal blooms are ongoing.⁴

Recommendations

1. Health care providers must immediately report all suspect cases of PSP to SOE; call 907-269-8000 Mon-Fri 8AM–5PM, or 800-478-0084 after-hours.
2. Providers should collect urine from suspected cases as soon as possible and store frozen. Contact SOE for instructions on routing specimens for saxitoxin testing. Collect implicated shellfish and consult with SOE for testing.
3. Ill persons should seek immediate medical attention if symptoms of PSP occur following consumption of shellfish.

References

1. Gessner BD, Middaugh JP. Paralytic shellfish poisoning in Alaska: a 20-year retrospective analysis. *Am J Epi* 1995;141(6):766-70.
2. Alaska Division of Public Health. "PSP Fact Sheet." Available at: <http://www.epi.alaska.gov/id/dod/psp/ParalyticShellfishPoisoningFactSheet.pdf>
3. SOE *Bulletin*. "Paralytic Shellfish Poisoning in Southeast Alaska, May–June, 2011." No. 17, June 23, 2011. Available at: http://www.epi.alaska.gov/bulletins/docs/b2011_17.pdf
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