

Neurotoxic Shellfish Poisoning

PROTOCOL CHECKLIST

- Enter available information into Merlin upon receipt of initial report
- Review information on the disease and its epidemiology (see page 2) case definition (see page 3), and laboratory testing (see page 4)
- Contact provider unless case is self-reported (see page 4)
- Interview patient(s)
 - Review disease facts (see page 2)
 - Mode of transmission
 - Incubation period
 - Symptoms
 - Ask about exposure to relevant risk factors (see page 5)
 - Recreational shellfish harvesting
 - Shellfish consumption
 - Restaurant meals
 - Travel history
 - Address patient's questions or concerns
 - Identify the location the shellfish was harvested
 - Identify other ill persons who consumed the shellfish
 - Ask patient(s) to save any leftover shellfish they have from the epidemiologically implicated meal.
- Contact your Regional Environmental Epidemiologist to report the type of shellfish consumed and the location the shellfish was harvested.
- Enter additional data obtained from the interview into Merlin (see page 5)

1. DISEASE REPORTING

A. Purpose of reporting and surveillance

To determine if there is a source of shellfish of public health concern (e.g., a commercially distributed shellfish product or a shellfish harvesting bed); to stop further neurotoxic shellfish poisoning (NSP) transmission from such a source.

B. Legal reporting requirements

Laboratories and physicians are required to report NSP cases to the local county health department (CHD) immediately upon diagnosis or receipt of laboratory identification.

C. County health department investigation responsibilities

1. Report immediately, upon receipt of diagnosis or test result, 24/7.
2. Report information about the shellfish consumed to your Regional Environmental Epidemiologist for further investigation.
3. Report all confirmed cases in Merlin.

2. THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic agent

NSP is caused by a marine toxin present in contaminated shellfish. Brevetoxins produced by a marine algae, *Karenia brevis* (*K. brevis*), may accumulate when filter-feeding shellfish are exposed to algal blooms or red tide events. The metabolites produced by the brevetoxins are able to cause human and wildlife illnesses. Brevetoxins are not destroyed by heating or freezing methods, so even well-cooked shellfish (not raw) may transmit the toxin. The toxin is odorless and tasteless and cannot be detected by taste or smell.

NSP outbreaks have occurred previously in 1995, 1996, 2001, 2005, and 2006 in Florida's southwest coast, with the majority of cases occurring in Lee County. Each of these outbreaks was associated with recreationally harvested shellfish.

B. Description of illness

NSP case-patients may present with gastrointestinal and neurological symptoms including nausea, vomiting, diarrhea, abdominal pain, vertigo, numbness and tingling in the extremities, mouth, and lips, dizziness, ataxia, myalgia, and, in some cases, hot-cold temperature reversal, pupil dilation, slurred speech, partial paralysis, and respiratory distress. While the illness is self-limiting and generally milder than paralytic shellfish poisoning (PSP), some patients have required ICU support for respiratory distress. Chronic effects have not been attributed to NSP.

C. Reservoirs

NSP cases have been associated with consumption of clams, mussels, scallops, oysters, whelks, and certain gastropods.

D. Modes of transmission

Transmission is foodborne. Infections may result from ingesting contaminated shellfish that has been harvested from an area with *K. brevis* cells and brevetoxins present in the water. NSP is not transmitted person-to-person.

E. Incubation period

The typical incubation period for NSP is one to three hours, although symptoms can begin within a few minutes after shellfish consumption. Patients typically experience illness duration of two to three days.

F. Period of communicability

NSP is spread through the consumption of toxic shellfish. Shellfish may be toxic whenever brevetoxins or a red tide algae bloom is present in nearby waters.

G. Treatment

Treatment for NSP is supportive.

H. Prophylaxis

None indicated.

I. NSP in Florida

In Florida, 21 cases of NSP were reported in Merlin from 1997 to 2010. In total 90.5% were outbreak-associated cases and 9.5% were sporadic. The majority of NSP cases were associated with consuming recreationally harvested clams (20 of the 21 cases; One was unknown) during the summer months.

Past NSP cases in Florida were associated with illegal recreational shellfish harvesting. Tourists and out-of-town visitors are at an increased risk of acquiring NSP due to a lack of knowledge of local shellfish bed regulations including the approved and unapproved shellfish harvesting sites. To reduce the risk of contracting NSP, persons should avoid consuming shellfish that was harvested from beds impacted by a red-tide or any shellfish harvested in unapproved or closed shellfish beds.

3. CASE DEFINITION**A. Clinical description**

NSP symptoms may include: nausea, vomiting, diarrhea, abdominal pain, vertigo, numbness and tingling in the extremities, mouth, and lips, dizziness, ataxia, myalgia, and, in some cases, hot-cold temperature reversal, pupil dilation, slurred speech, partial paralysis, and respiratory distress.

B. Laboratory criteria for diagnosis

Detection of brevetoxin in epidemiologically implicated shellfish or human blood or urine specimens.

C. Case classification

Confirmed: a clinically compatible illness that is associated with consumption of shellfish with a positive laboratory finding of brevetoxin or with consumption of

shellfish from areas where other toxic shellfish have been found or where a red tide is documented (DOACS shellfish beds closed in region).

D. Comment

For more information on DOACS shellfish bed closures, visit:
http://shellfish.floridaaquaculture.com/seas/seas_statusmap.htm.

4. LABORATORY TESTING

A. Criteria for diagnosis

A diagnosis of NSP is made by detecting brevetoxin in shellfish or human blood or urine samples. Ask case-patients to save any leftover shellfish from the epidemiologically implicated meal.

B. Services available at BOL

Testing for brevetoxin to confirm NSP is not routinely performed at the DOH Bureau of Laboratories (BOL).

C. Testing requests

1. While testing for brevetoxin to confirm NSP is not routinely performed at the DOH Bureau of Laboratories, brevetoxin detection may be provided through outside agencies including the Florida Fish and Wildlife Research Institute (FWRI) and the U.S. Food and Drug Administration (FDA).
2. Specimen collection
 - a. Brevetoxin can be detected in shellfish or human urine and blood samples. Collect any remnant shellfish from the epidemiologically implicated meal for testing. A brevetoxin-specific ELISA assay is available at FWRI and a cytotoxicity assay and liquid, chromatography-mass spectrometry (LC-MS) test is provided through FDA for detecting brevetoxin. Contact the DOH Aquatic Toxins Program and your Regional Environmental Epidemiologist to make arrangements for confirmatory testing.

5. CASE INVESTIGATION

A. Contact the physician or hospital

1. Confirm that a NSP infection has been diagnosed in the reported case.
2. Obtain the following:
 - a. Date of onset
 - b. Signs and symptoms
 - c. Predisposing conditions (e.g., immunosuppression)
 - d. Tests performed
 - e. Treatment
3. Ask what information has been given to the patient, including whether the patient knows about the diagnosis.
4. Obtain as much demographic information as possible, including contact information (home, cellular, pager and/or work numbers). Ask how and where the patient can be contacted (i.e., at hospital or home).
5. Notify the physician that you will be contacting the case as DOH follows up on all cases of NSP to identify potential means for preventing further illness.

It may also be appropriate at this point to determine if the physician has any concerns about the health department contacting the case.

B. Interview the case

1. Contact the case to complete an interview as soon as possible after being reported to optimize recall.
 - a. Make at least three phone call attempts to reach the case.
 - b. Calls should be made at different times of the day, with at least one attempt in the evening.
2. Items to cover during interview include:
 - a. Provide brief background on NSP, including mode of transmission, incubation period, symptoms, etc.
 - b. Collect information on the shellfish consumed during exposure period (minutes to several hours before onset):
 - c. Recent restaurant meals. Record the name of the restaurant(s), date(s), and location(s) of the meal(s) and food items consumed.
 - d. Determine if others (e.g., family, friends, coworkers, customers, patients, etc.) who also consumed the shellfish are known or thought to be ill with similar symptoms. Obtain the name, phone number or address and clinical information of all affected persons.

C. Environmental evaluation

During routine case investigations of NSP the CHD investigator should complete the Tri-Agency Foodborne Illness Survey/Complaint Form if a restaurant is involved (http://www.foodandwaterdisease.com/forms/Tri-Agency_Foodborne_Illness_Form_Electronic_2-16-2011.pdf) and the CDC's National Outbreak Reporting System (NORS) 52.13 case report form (http://www.doh.state.fl.us/Environment/medicine/foodsurveillance/forms/NORS_CDC_5213_Fillable.pdf).

For each sporadic or outbreak-associated case, the Regional Environmental Epidemiologist should be notified (http://www.foodandwaterdisease.com/contact_docs/RegionalEpidemiologist_ContactsList.pdf). The Regional Environmental Epidemiologist can assist with notifying the appropriate shellfish regulatory authority (DOACS or DEP).

D. Merlin data entry

Create a case in Merlin under disease code **NSP- 98800**. Enter the data collected into Merlin, being sure to include all required fields on the Basic Data screen, complete the Case Symptoms screen, and attach all relevant labs.

6. CONTROLLING FURTHER SPREAD

A. Shellfish bed closures

The Florida Department of Agriculture (DOACS) regulates the opening and closure of shellfish harvesting beds in Florida. Detection of marine toxins and cases of human illness such as NSP may prompt a shellfish bed closure to protect the public from exposure to contaminated shellfish. Closing a shellfish bed during a red tide is one of the most effective ways to prevent NSP, although it should be noted that collecting shellfish outside the permitted harvesting sites

may occur. Report any NSP illnesses to your Regional Environmental Epidemiologist so any information about contaminated shellfish can be investigated and reported to DOACS.

B. Isolation of cases

N/A

C. Management of contacts

Symptomatic contacts: symptomatic contacts should be investigated and managed in the same manner as a confirmed case.

D. Laboratory testing during outbreaks

Laboratory testing should be initiated whenever leftover shellfish are available.

E. Comment

Contact your Regional Environmental Epidemiologist for investigation assistance:

http://www.foodandwaterdisease.com/contact_docs/RegionalEpidemiologist_ContactsList.pdf).

7. MANAGING SENSITIVE SITUATIONS

N/A

8. IMPORTANT LINKS**A. CDC 52.13 Case Report Form:**

http://www.doh.state.fl.us/Environment/medicine/foodsurveillance/forms/NORS_CDC_5213_Fillable.pdf.

D. Tri-Agency Foodborne Illness Survey/Complaint Form (for restaurant investigations) (http://www.foodandwaterdisease.com/forms/Tri-Agency_Foodborne_Illness_Form_Electronic_2-16-2011.pdf).**E. Food and Waterborne Disease Program – Investigation Tools**

http://www.foodandwaterdisease.com/investigation_information.htm.

F. Food and Waterborne Disease Program – Contact List

http://www.foodandwaterdisease.com/contact_docs/RegionalEpidemiologist_ContactsList.pdf.

G. For more information on shellfish bed closures, visit:

http://shellfish.floridaaquaculture.com/seas/seas_statusmap.htm.

I. Lee County NSP Outbreak Summary:

http://www.doh.state.fl.us/environment/medicine/foodsurveillance/pdfs/NSP_3_Panel_Statewide_Epi06.pdf.

9. REFERENCES

- A. Heymann, D.L. (Ed.). (2008). *Control of communicable diseases manual* (19th ed.). Washington: American Public Health Association.
- B. CDC: http://www.cdc.gov/ncidod/dbmd/diseaseinfo/marinetoxins_g.htm.
- C. Fish and Wildlife Research Institute Technical Reports. Resource Guide for Public Health Response to Harmful Algal Blooms in Florida. Available at: <http://www.myfloridaeh.com/medicine/aquatic/resourceguidepublichealth.pdf>.
- D. University of Miami “Red Tide or Neurotoxic Shellfish Poisoning” available at: <http://yyy.rsmas.miami.edu/groups/ohh/science/redtide.htm>.