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Use of Surveillance Systems in Detection of a Ciguatera Fish Poisoning Outbreak — Orange County, Florida, 2014

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Benjamin G. Klekamp, MSPH¹; Dean Bodager, MPA²; Sarah D. Matthews, MPH¹

Ciguatera fish poisoning (CFP) is a foodborne illness acquired by eating predatory reef fish that have accumulated naturally occurring ciguatoxins found in several dinoflagellate (algae) species through their diet. CFP produces neuropsychiatric, neurologic, cardiovascular, and gastrointestinal signs and symptoms, and is one of the most commonly reported fish-associated marine intoxications. Ciguatoxin retains toxicity regardless of freezing or cooking. Prompt treatment can reduce debilitating neurologic symptoms that are associated with CFP. On November 3, 2014, the Florida Department of Health in Orange County (DOH-Orange) received a report through the DOH online foodborne illness complaint system from a person (patient A) describing paresthesias and numbness that suggested CFP, which had occurred on October 31, the day after eating two fish meals. The day the report was received, DOH-Orange interviewed patient A and determined that her illness met the CFP case definition. In Florida, a single case of CFP is considered an outbreak. Multiple data sources were used to identify five additional CFP cases. DOH-Orange, the DOH Bureau of Epidemiology, the Florida Department of Business and Professional Regulation (DBPR), the Florida Department of Agriculture and Consumer Services (DACS), and the U.S. Food and Drug Administration (FDA) collaborated to conduct investigations at two restaurants, one grocery store, two fish distributors, and one fish supplier to identify the outbreak food source. The six persons with CFP had eaten black grouper either at a local restaurant or purchased from a grocery store; the fish was traced back to a common international distributor. Rapid identification and reporting of CFP cases to public health officials is imperative to facilitate supportive medical care (1,2) and source-food traceback efforts.

The initial investigation by DOH-Orange identified patient A as an adult female non-Florida resident, who reported consuming mahi-mahi at restaurant A on October 30 at 3:00 p.m., and a black grouper filet at restaurant B at 7:45 p.m. the same day. No leftover fish was available from either meal. Patient A dined alone at restaurant A, but ate with three other persons at restaurant B. No food was shared at restaurant B, and although one other group member also consumed a separate black grouper filet, only patient A became ill. On October 31 at 3:00 a.m., approximately 7 hours after eating the grouper at restaurant B, patient A experienced acute onset of paradoxical temperature perception, paresthesias, extremity numbness, a metallic taste, nausea, vomiting, abdominal pain, diarrhea, arthralgia, and myalgia. A hotel physician evaluated the patient but did not provide a diagnosis. Patient A's signs and symptoms, including paradoxical temperature perception, paresthesias, fever, dizziness, nausea, vomiting, and diarrhea continued, and she reported her illness to the DOH online foodborne illness complaint system on November 3.

To identify additional associated CFP cases, DOH-Orange queried surveillance systems, including emergency department chief complaint records, poison control center reports, and reportable disease data through the Electronic Surveillance System for the Early Notification of Community-Based Epidemics—Florida (ESSENCE-FL), and reviewed foodborne illness complaints to DOH through phone, fax, and online report submission. On November 6, DOH-Orange received an automatic e-mail alert from ESSENCE-FL stating that on November 5, within a period of 22 minutes, four persons had visited one Orange County emergency department for "food poisoning." Review of medical records faxed the following day indicated the four persons all lived at the same local address and had symptoms of nausea, diarrhea, and vomiting. A notation that the patient had become ill after eating "bad fish" was found in all four medical records. No laboratory tests were ordered, and no medication was prescribed; the patients were discharged with diagnoses of gastroenteritis.

On November 7, while DOH-Orange was interviewing the four ill patients, a fifth ill adult household member who had not sought medical attention was identified. All five household members (patients B, C, D, E, and F) shared a meal of black grouper fish heads on November 3. The fish heads were purchased from grocery store A on the same day they were consumed. The patients reported that symptoms began approximately 3 hours after the meal, and, in addition to the gastrointestinal symptoms reported in the hospital emergency department, they experienced other symptoms compatible with CFP, including paradoxical temperature perception, paresthesias, numbness, arthralgia, and myalgia. No leftover fish was available from the meal.

Among the six CFP cases identified in this outbreak, patients ranged in age from 36 to 64 years (median = 48 years), and four were male. The interval between consuming fish and symptom onset ranged from 3 to 7.25 hours (median = 3 hours). All patients experienced paradoxical temperature perception, nausea, paresthesias, numbness, abdominal pain, diarrhea, arthralgias, and myalgias ([Table](#)). At the time of interview, all patients were still symptomatic, with neurologic symptoms being most severe. Medical care was sought, and supportive care provided to five patients; however, no patients received intravenous mannitol, which has been reported to be effective in reversing the symptoms of CFP, particularly in severe cases (2,3).

Inspection of restaurant A, restaurant B, and grocery store A revealed that restaurant B and grocery store A had obtained the grouper from supplier A. Fish consumed by patient A at restaurant A was ruled out as the potential intoxicant vehicle because it is not commonly associated with ciguatoxin cases and was dissimilar to the other case exposures. An inspection of the facilities of supplier A found that the implicated lot of fish was received whole and then divided into filets that were provided to restaurant B and fish heads to grocery store A. Subsequent joint efforts by DOH-Orange, DBPR, DACS, and FDA traced the fish consumed by all persons who became ill to two distributors, through supplier A. The black grouper appears to have originated from Mexico. It was not possible to determine whether the implicated filet and any of the fish heads came from the same fish.

No leftover fish from the meals that caused the illnesses was available for laboratory analysis. Black grouper fish heads from the same lot that patients B–F consumed were collected from grocery store A. Testing by FDA did not detect ciguatoxin.

Discussion

No FDA-cleared or approved clinical tests for CFP are currently available. DOH defines a case of CFP as the occurrence of CFP-compatible symptoms (e.g., paradoxical temperature perception and paresthesia) in a person within 24 hours after ingestion of fish. Detection of ciguatoxin in the meal remnants is strongly suggestive of CFP but is not required for case confirmation.

This investigation made use of multiple surveillance systems and an online consumer complaint system to identify six persons with histories of fish consumption and signs and symptoms consistent with CFP, after eating black grouper, a species known to harbor ciguatoxin. Although CFP is a reportable disease in Florida, none of the five patients who sought medical care received a diagnosis of CFP, nor was suspected CFP reported to DOH by health care providers. The outbreak traceback investigation identified that the fish sold to the patients was purchased from two retail establishments (i.e., restaurant B and grocery store A) that received the fish from a common shipment to a single supplier through two distributors. Failure to detect ciguatoxin in FDA-tested fish heads samples taken from the same lot that intoxicated patients B–F is not inconsistent with the sporadic nature of the disease occurrence, or the observation that not all fish of a given species or from a given location are toxic (2). For these reasons, food recalls are likely to be inefficient public health tools in response to CFP outbreaks.

During 2012–2014, a total of 137 CFP cases were reported in Florida, 109 (80%) of which were initially identified by surveillance and consumer complaint systems, 19 (14%) were reported by health care providers, and nine (7%) were reported via other, nondescribed methods. A health care provider diagnosis of CFP was documented for 73 (53%) cases. Although the early gastrointestinal symptoms associated with CFP are nonspecific, health care providers need to be educated to consider the diagnosis of CFP in patients with a clinically compatible illness and a history of fish consumption, to facilitate administration of ameliorative therapy and timely reporting to public health officials (3,4). Despite the fact that five of the six patients described in this report saw a health care provider, and at least four reported that they had eaten fish before becoming ill, the cases were only detected by DOH-Orange through an online self-reporting consumer complaint system and a syndromic surveillance system. Outbreak identification and associated public health efforts allowed for the education of the patients about CFP and the gathering of distribution and harvest data on the implicated fish. Avoiding consumption of large predatory reef fish from ciguatoxic-endemic areas, particularly the organs of these fish, which concentrate the toxin, can reduce the risk for CFP.

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1Florida Department of Health in Orange County; 2Florida Department of Health.

Corresponding author: Benjamin G. Klekamp, ben.klekamp@flhealth.gov, 407-858-1400.

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Summary

What is already known on this topic?

Ciguatera fish poisoning (CFP), caused by the ingestion of predatory reef-dwelling fish harboring ciguatoxins is one of the most commonly reported fish-associated marine intoxications. Ciguatoxin retains toxicity regardless of freezing or cooking. Prompt treatment can reduce debilitating neurologic symptoms that are associated with CFP.

What is added by this report?

Syndromic surveillance systems in Florida identified six adults with CFP following consumption of black grouper. Five patients sought medical attention; health care providers did not make a diagnosis of CFP or report the cases to public health authorities, and none of the patients received treatment. Close collaboration among several investigating agencies allowed traceback efforts to link black grouper consumed by all patients to a common international distributor.

What are the implications for public health practice?

Syndromic surveillance systems capable of detecting CFP are essential public health tools to identify outbreaks and enhance investigations. Medical and public health practitioners should be educated to inquire about recent fish consumption when evaluating patients with clinically compatible signs and symptoms to allow for prompt treatment, and report suspected CFP cases to public health authorities to facilitate source-food traceback efforts. Public education on avoidance of consumption of relatively large predatory reef fish species known to be from ciguatoxic-endemic areas might reduce the risk for CFP.

TABLE. Characteristics of six patients with ciguatera fish poisoning associated with consumption of black grouper — Florida, October–November 2014

Characteristic	Patient					
	A	B	C	D	E	F
Date of fish consumption	10/30/14 (lunch) 10/30/14 (dinner)	11/05/14	11/05/14	11/05/14	11/05/14	11/05/14
Type of fish consumed	Mahi-mahi (lunch) Grouper filet (dinner)	Grouper heads	Grouper heads	Grouper heads	Grouper heads	Grouper heads
Source of fish	Restaurant A (lunch) Restaurant A B (dinner)	Grocery store	Grocery store A	Grocery store A	Grocery store A	Grocery store
Food was shared	No No	Yes	Yes	Yes	Yes	Yes
Hours from fish consumption	7.25 (after dinner)	3	3	3	3	3

to symptom onset

Signs and symptoms

Nausea	x	x	x	X	x	x
Vomiting	x	x	x	X	x	x
Abdominal pain	x	x	x	x	x	x
Diarrhea	x	x	x	x	x	x
Myalgia	x	x	x	x	x	x
Arthralgia	x	x	x	x	x	x
Paresthesias	x	x	x	x	x	x
Numbness	x	x	x	x	x	x
Metallic taste	x					
PTP	x	x	x	x	x	x
Dizziness	x					
Fever	x					

Type of medical attention sought

Hotel physician	Hospital ED	Hospital ED	Hospital ED	Hospital ED	Hospital ED	None
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Treatment

Supportive	None	None	None	None	None	—
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Initial diagnosis

None	Gastroenteritis	Gastroenteritis	Gastroenteritis	Gastroenteritis	Gastroenteritis	—
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How case was identified

DOH online foodborne illness complaint system (self-report)	ESSENCE-FL e-mail alert	ESSENCE-FL e-mail alert	ESSENCE-FL e-mail alert	ESSENCE-FL e-mail alert	ESSENCE-FL e-mail alert	During interview of patient B-I
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Date reported 11/03/14 11/06/14 11/06/14 11/06/14 11/07/14 11/06/14

Abbreviations: DOH = Florida Department of Health; ED = emergency department; ESSENCE-FL = Electronic Surveillance System for the Early Notification of Community-Based Epidemics –Florida; PTP = paradoxical temperature perception.

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Centers for Disease Control and Prevention 1600 Clifton Road Atlanta, GA
30329-4027, USA
800-CDC-INFO (800-232-4636) TTY: (888) 232-6348 - [Contact CDC-INFO](#)

