



Mississippi Morbidity Report

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Gastrointestinal Illness Associated with the Consumption of Raw Oysters

Introduction: The Mississippi State Department of Health (MSDH) investigated a report of gastrointestinal illness in several individuals who attended a conference held March 8-12, 2010 in Public Health District IX (the Gulf Coast region). Eleven individuals were identified with an illness consistent with norovirus infection, which was confirmed by PCR testing in two persons. The investigation epidemiologically linked the illnesses to the consumption of raw oysters harvested in Louisiana, resulting in the closure of this bed.

Background: On March 16, 2010, the MSDH Office of Epidemiology received a telephone call from the Regional Food and Drug Administration (FDA) Office reporting a gastrointestinal illness among attendees at a conference held in Ocean Springs, Mississippi from March 8 through March 12, 2010. Meetings were held at both a conference center and a research reserve, and meals were served at both locations. All meals were provided by the conference center, catering restaurants, and seafood distributors. Attendees were from 19 states and one U.S. territory. The original report indicated that five or six individuals at the conference became ill with vomiting and diarrhea on the evening of March 11.

Methods: Contact information for the attendees, staff and volunteers was obtained from the event organizers, along with a list of all food items served. A questionnaire was then developed that listed all food items served at the conference (grouped by meal) and a list of possible symptoms (nausea, vomiting, diarrhea, fever, chills, abdominal cramps, and headache). An attempt was made to contact all identified participants, by either telephone or email, to conduct interviews with each using the developed questionnaire.

Stool samples were obtained from two Mississippi residents who reported illness. These samples were submitted to the MSDH Public Health Laboratory (PHL) for testing. Raw oysters were served at the conference. The tags to identify the harvest area for the oysters were obtained. One attendee was identified who took home an opened bag of leftover oysters served at the conference and placed them in his freezer for later use. These oysters were obtained and sent to the FDA Gulf Coast Seafood Laboratory (GCSL) at Dauphin Island, Alabama for evaluation.

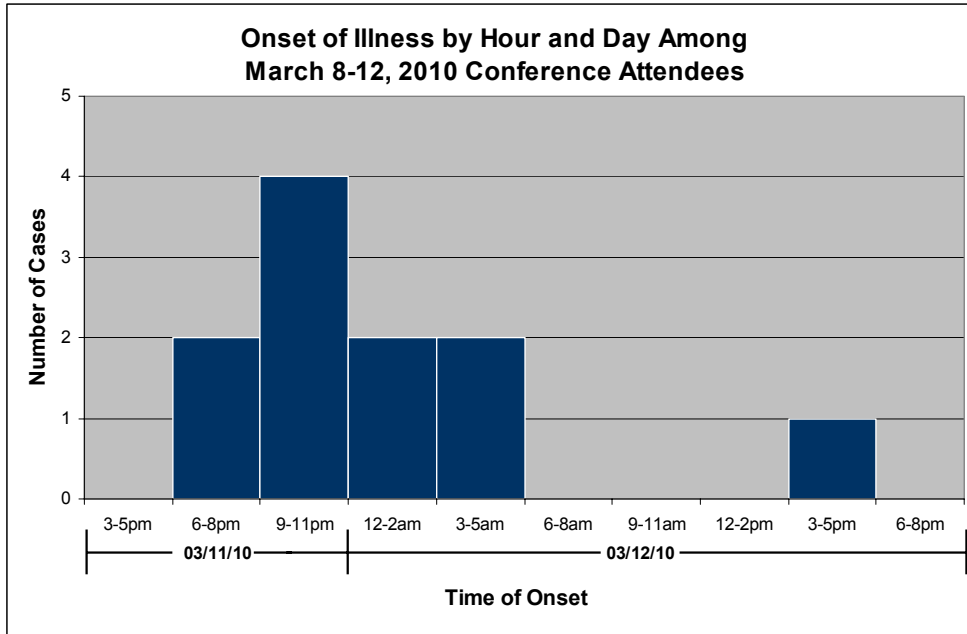
Environmental risk assessments were conducted at the conference center and Mississippi establishments that provided meals or food products for the conference. One Alabama restaurant catered a meal, and the Alabama Department of Public Health (ADPH) was contacted to inspect that establishment.

Case definition: Cases were defined as anyone who attended and ate shared meals at the conference, was interviewed using the developed questionnaire, had an onset of illness between the evening of March 11 and the evening of March 12, 2010, and had symptoms including nausea plus either vomiting or diarrhea.

Results: Sixty participants were identified who were present one or more days at the conference and who ate one or more of the provided meals. Fifty-two of the participants were located and interviewed. Eleven individuals met the case definition for illness for an attack rate of 21%. One additional individual met the case definition for symptoms, but did not become ill until three days after the conference ended (March 15).

The predominant symptoms among cases were nausea (100%), diarrhea (91%), and vomiting (91%). Onset of illness ranged from 7:45 pm, March 11 to 5:00 pm, March 12, 2010 (Figure).

Figure



An analysis of the 52 completed questionnaires was performed. The evening meal on March 10, 2010, served between 6:00pm and 8:00 pm, was the only meal in which a food item was identified as a potential source of illness. The food specific attack rate was highest among those who ate oysters at 44% ($p < 0.0001$) and all persons who met the case definition ate oysters (Table). Incubation periods from the consumption of raw oysters to the onset of illness ranged from 25 to 33.5 hours (unknown in two ill individuals), with a mean of approximately 28 hours.

The two stool samples submitted to the PHL were negative for bacterial pathogens. Both samples were positive for norovirus genogroup GII by RT-PCR. The samples were sent to the Centers for Disease and Control and Prevention (CDC) for further evaluation. Gene sequencing of the viral capsid proteins indicated that the samples were of two distinct genotypes, GII.4 and GII.16. Further tests at CDC to identify the exact strains are pending.

Table Food Specific Attack Rates (%), Conference Evening Meal, March 10, 2010

Food Item	Number of persons who Ate specified food				Number of persons who did NOT eat specified food				Relative Risk	p-value
	Ill	Not Ill	Total	Percent Ill (Attack Rate)	Ill	Not Ill	Total	Percent Ill (Attack Rate)		
Raw Oysters	11	14	25	44.0%	0	27	27	0.0%	Undefined	<0.0001
Crawfish	10	31	41	24.4%	1	10	11	9.1%	2.7	0.256
Boiled Shrimp	10	33	43	23.3%	1	8	9	11.1%	2.1	0.381
Corn on the cob	8	29	37	21.6%	3	12	15	20.0%	1.1	0.608
Sweet potatoes	9	30	39	23.1%	2	11	13	15.4%	1.5	0.438
Regular potatoes	8	25	33	24.2%	3	16	19	15.8%	1.5	0.364
Cocktail sauce	8	21	29	27.6%	3	20	23	13.0%	2.1	0.176
Portobello mushrooms grilled with onion	3	11	14	21.4%	8	30	38	21.1%	1.0	0.625
Lettuce & tomato pita sandwiches	1	3	4	25.0%	10	38	48	20.8%	1.2	0.626

Tags from the Louisiana oysters served at the implicated meal indicated they were harvested from the area # 7 oyster bed on March 6, 2010. The samples of leftover oysters sent to GCSL were positive for norovirus GII; genotypic evaluation is pending.

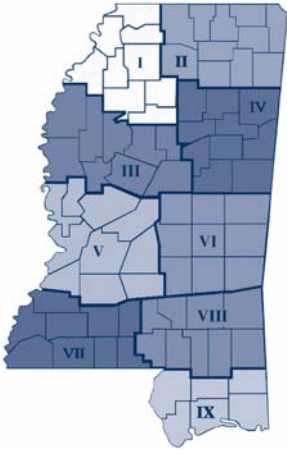
Environmental risk assessments of the conference center, caterers and food distributors revealed no violations or food safety issues. The ADPH reported no violations at the Alabama restaurant that provided a catered meal.

Summary: An outbreak of gastrointestinal illness occurred among eleven persons who ate the evening meal the on March 10, 2010 served at a conference in Ocean Springs, Mississippi held March 8-12, 2010. Eating oysters was epidemiologically associated with becoming ill, with a food specific attack rate of 44.0%. All cases became ill between the evenings of March 11 and 12, giving a mean incubation period of 28 hours from the time the oysters were eaten until onset of illness. The individual who became who became ill on March 15 may represent secondary person to person transmission. **(Continued on back flap)**

Mississippi

Provisional Reportable Disease Statistics

March 2010



		Public Health District									State Totals*			
		I	II	III	IV	V	VI	VII	VIII	IX	Mar 2010	Mar 2009	YTD 2010	YTD 2009
Sexually Transmitted Diseases	Primary & Secondary Syphilis	1	0	1	1	8	1	0	1	7	20	23	41	48
	Total Early Syphilis	5	1	4	2	32	3	0	13	21	80	57	130	115
	Gonorrhea	53	46	89	40	179	52	18	50	66	593	661	1,460	1,829
	Chlamydia	248	158	298	149	548	183	133	181	206	2,104	2,308	5,230	5,950
	HIV Disease	5	1	6	2	17	2	3	1	6	43	51	129	154
Mycobacterial Diseases	Pulmonary Tuberculosis (TB)	1	1	1	0	3	0	0	1	1	8	9	15	13
	Extrapulmonary TB	0	0	1	0	1	0	0	0	0	2	2	3	2
	Mycobacteria Other Than TB	9	11	5	7	23	4	3	3	4	69	29	131	86
Vaccine Preventable Diseases	Diphtheria	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pertussis	0	0	1	0	1	1	0	0	0	3	4	14	23
	Tetanus	0	0	0	0	0	0	0	0	0	0	0	0	0
	Poliomyelitis	0	0	0	0	0	0	0	0	0	0	0	0	0
	Measles	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mumps	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hepatitis B (acute)	0	0	0	0	0	0	0	0	0	0	2	5	6
	Invasive <i>H. influenzae</i> b disease	0	0	0	0	0	0	0	0	0	0	0	0	0
	Invasive Meningococcal disease	0	0	0	0	1	0	0	0	0	1	1	2	1
Enteric Diseases	Hepatitis A (acute)	0	0	0	0	0	0	0	0	0	0	1	0	4
	Salmonellosis	0	3	1	0	3	2	1	1	0	12**	28	50	98
	Shigellosis	2	0	0	1	1	0	0	0	1	5	3	7	8
	Campylobacteriosis	0	2	0	0	1	1	0	1	0	5	9	20	27
	<i>E. coli</i> O157:H7/HUS	0	0	1	0	0	0	0	0	0	1	2	3	3
Zoonotic Diseases	Animal Rabies (bats)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lyme disease	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rocky Mountain spotted fever	0	0	0	0	0	0	0	0	1	1	0	1	0
	West Nile virus	0	0	0	0	0	0	0	0	0	0	0	2	1

* Totals include reports from Department of Corrections and those not reported from a specific District.

** Address unknown for one case.

Stool samples from two ill individuals were positive for norovirus GII, but preliminary gene sequencing indicated the organisms were two separate genotypes. Testing of the leftover oysters confirmed the presence of norovirus GII. Environmental assessments did not reveal any food handling violations.

Discussion: Norovirus has been implicated as the most common cause of outbreaks of nonbacterial gastroenteritis. Infection typically results in a self-limited, mild to moderate illness, lasting one to two days in most individuals, with clinical symptoms of nausea, vomiting, diarrhea, abdominal pain and low grade fever. Transmission is through the fecal-oral route, and outbreaks are common in closed group setting such as nursing homes, hospitals, and ships. The incubation period is usually 24-48 hours after exposure. Almost any type of food that is contaminated may serve as a vehicle for outbreaks.

Oysters are filter feeders and can efficiently concentrate viruses and bacteria from contaminated water. Oysters have previously been implicated in the transmission of norovirus gastroenteritis in Mississippi. In January 2009, and again in March 2009, norovirus outbreaks were epidemiologically linked to the consumption of raw oysters harvested near Pass Christian, Mississippi, resulting in the closure of that harvest area for the remainder of the 2009 season.

The noroviruses isolated in the stool samples in the outbreak reported here were two separate genotypes. Mixed outbreaks can occur and are usually explained by non-point source contamination, such as sewage runoff. As a result of this investigation, the Louisiana Department of Health closed the identified harvest area. So far in 2010, at least two additional oyster beds in Louisiana have been closed due the association of outbreaks of norovirus and consumption of oysters.

Submitted by: Peggy Oakes, RN, BSN, WHNP, Sheryl Hand, RN, BSN, and Paul Byers, MD, Office of Epidemiology, with thanks to the Public Health District IX staff.

References available on request.