



Norovirus Outbreak at a Miami-Dade County University, December 2004

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Background

On December 16, 2004, the Office of Epidemiology and Disease Control (OEDC) of the Miami-Dade County Health Department (MDCHD) received a report from a local university's Student Health Services that eight students had presented to area hospitals the previous evening with a gastrointestinal illness that included nausea, vomiting, and/or diarrhea. All eight students lived in campus housing, and all ate dinner on December 15 in the same campus dining hall. Ill employees were also identified. This outbreak transpired when the university was not in session and most students were leaving the campus for vacation.

Methods

Epidemiologic Investigation

University officials were advised to obtain stool specimens from ill employees and students, and OEDC advised that ill food handlers be removed from food service activities immediately.

Case finding was initiated with the posting of a questionnaire, developed by Student Health Services, on the university website. This questionnaire included information on demographics, illness history and symptoms, 72-hour food history, and location of food consumption. On December 17, the university sent an email to all residents of the university's dormitories asking those with and without the GI illness to complete the questionnaire. OEDC staff members later attempted to contact as many students as possible to obtain information that was incomplete on questionnaires. If possible, stool specimens were also collected.

Environmental Investigation

Environmental inspections were initiated in both campus dining halls, in the campus food court and in a campus recreation center with limited food preparation. No food samples were collected, as all food items had been discarded in the facilities. Water samples were collected from water dispensers and from food preparation areas.



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Preliminary Control Measures

Food service activities in the dining halls were suspended on December 16. OEDC disease control and prevention recommendations included postponing scheduled catered events or parties, following guidelines for cleaning and sanitization, and monitoring the illness among students and staff. Educational materials on personal hygiene were also provided.

On December 18, in light of several scheduled catered activities at the University during the upcoming week, the OEDC issued updated food service recommendations. The OEDC recommended that all sit-down catered meals be cancelled. University officials were advised to limit food preparations at the food court, catering only to the football team, who needed to be on campus during vacation. Further, the OEDC advised that only minimal fast food or ready-to-eat items be served at other events. OEDC and Environmental Health staff went to campus to monitor food distribution during these activities.

Laboratory Investigation

Laboratory specimens were submitted to the State Bureau of Laboratories. A total of 35 human stool samples from 15 persons were submitted and tested for bacteria, ova and parasites, and Norovirus. Water samples were tested for coliform organisms.

Case Control Study

A confirmed case was defined as a person who a) ate at least one meal on campus between December 13 and December 16 and subsequently developed either vomiting or diarrhea between December 14 and December 17 and b) had a positive laboratory result for a clinically compatible pathogen linked to the outbreak. Probable cases had meal and illness histories identical to that of confirmed cases but lacked positive laboratory results.

Controls were students without any reported illness who responded to the university's email request.

No employee controls were used in the study, for the initial focus of the investigation was on the magnitude of the student outbreak. Employees only constituted a small fraction of the total outbreak.

Data Analysis

Initially, the analysis for this study focused on food items associated with increased odds of gastrointestinal illness. Given the variety of foods available on campus, the poor food history recall of students, and the inability of OEDC staff to interview most students due to winter vacation, this analysis was not feasible. Instead, data was ascertained of all students' meal transactions on December 13 and December 14 in the two campus dining halls via electronic records of meal swipe cards. We extracted meal history data from the database and conducted a frequency analysis to appreciate any differences in location and time of meal consumption between cases and controls. Statistical analyses were performed using SAS 9.0 and SPSS 10.1.

Results

Statistics of the Outbreak

Of the 219 reportedly ill students, 121 students met the confirmed and probable case definitions; 13 employees met the definitions. *Figure 1* reflects the onset dates for confirmed and probable cases. The largest peak in the epidemic curve occurred on December 15, with 92/121 (76%) of all student confirmed and probable cases having onsets on this day.



Environmental Results

No violations were found during the environmental inspection. A rating of “Satisfactory” was given to both dining halls. The inspections did not reveal any obvious environmental condition that could have been associated with the current episodes of gastroenteritis on campus.

Laboratory Results

Eleven of 15 persons were positive for Norovirus. Three were students, 7 were food handlers, and 1 was a cleaning staff member. All water samples were negative for coliform organisms.

Case-Control Study Results

Case-control analyses were performed to reflect the known epidemiology of Norovirus. Since the largest peak in the epidemic curve occurred on December 15, meal analyses were performed on meals consumed December 13 and December 14 (both dates are within the 24-48 hour Norovirus incubation period). Sixty-nine controls and 121 cases were included in the study.

Demographic characteristics of the students are shown in *Table 1*. The most common symptoms among cases were nausea, diarrhea, and vomiting (*Table 2*). Symptoms lasted between one and three days.

Overall, cases were more likely than controls to have eaten in the campus dining halls on December 13 and 14. On December 13, 21.5% of cases ate breakfast in Dining Hall A, 76% had lunch there, and 62% ate dinner there. Of controls 7.2% ate breakfast in Dining Hall A, 43.5% had lunch there and 40.6% had dinner there (*Table 3*). This difference in meal consumption among cases and controls was also seen on December 14.



Table 1. Demographic characteristics of confirmed/probable student cases and controls included in the case-control study

Characteristics	Cases (N=121)	Control (N=69)
	<i>n</i> (%)	<i>n</i> (%)
Sex		
Female	69 (57)	49 (71)
Male	44 (36)	14 (24)
Unknown	8 (7)	16 (23)
Age		
17-20	78 (64)	52 (75)
21-25	5 (4)	10 (14)
25+	2 (2)	0 (0)
Unknown	36 (30)	7 (10)

Table 2. Symptoms reported by confirmed and probable cases (N=121) included in the case-control study

Symptoms	<i>n</i>	%
Diarrhea	109	90
Vomiting	101	83
Nausea	109	90
Abdominal Cramps/ Bloating/Pain	89	74
Fever	74	61
Blood in Stool	2	2



Figure 1. Confirmed and Probable Cases of Gastrointestinal Illness Reported at Miami-Dade County University as of December 22, 2004

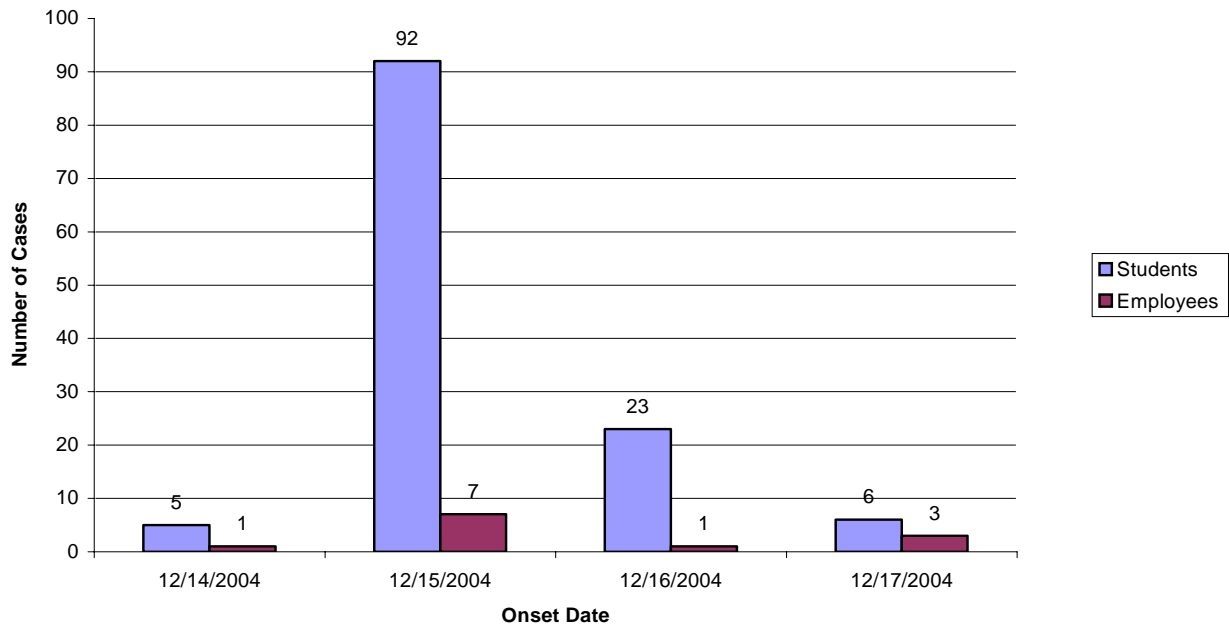


Table 3. Meals eaten and locations of meals among cases and controls included in study

	Cases (n=121)				Controls (n=69)			
	Dining Hall A		Dining Hall B		Dining Hall A		Dining Hall B	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
December 13								
Breakfast	26	21.5	0	0.0	5	7.2	1	1.4
Lunch	92	76.0	2	1.7	30	43.5	1	1.4
Dinner	75	62.0	2	1.7	28	40.6	1	1.4
December 14								
Breakfast	28	23.1	1	0.8	10	14.5	0	0.0
Lunch	82	67.8	2	1.7	21	30.4	2	2.9
Dinner	77	63.6	1	0.8	16	23.2	3	4.3

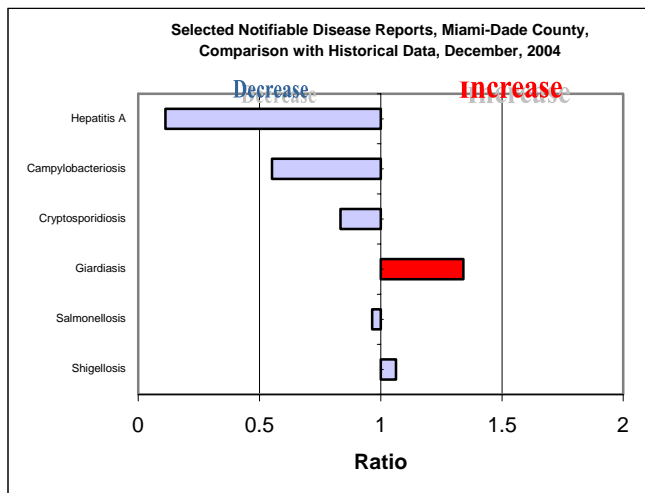


Discussion

The epidemic curve of this outbreak suggests a likely point-source exposure to Norovirus. The single large peak gives little evidence for person-to-person transmission. This study had several limitations. The timing of the outbreak strongly affected the investigative approach. Since the university was not in session, most students had already left the local area. As a result, most data had to be submitted via a self-administered questionnaire rather than an interviewer-administered questionnaire, which might have affected data quality. Also, food history recall was poor in both cases and controls, making it impossible to identify particular food items linked to the outbreak. Additionally, selection bias may have occurred in obtaining our cases and controls, as they were identified through their self-report rather than random selection. Finally, it is possible that there were cases who became ill due to exposures at other facilities on campus; our analysis of meal data was limited to the two dining halls.

Throughout this investigation, MDCHD provided recommendations to University officials and dining hall administrators to control the outbreak. After Norovirus laboratory confirmation was obtained, the following prevention measures were elicited:

- Ensure that all employees who exhibit gastroenteric or respiratory symptoms are sent home immediately after symptoms have been identified.
- Ill employees should not come back to work for a minimum of three days after symptom resolution. If employees come back after three days, strict handwashing protocols should be followed. In addition, employees should not have food handling duties for two weeks after symptom resolution.
- Any food preparation or service areas soiled with vomit should be cleaned using Norovirus decontamination methods.
- In outbreak situations, regular handwashing requirements should be increased during the food handling process.
- In outbreak situations, surfaces should be decontaminated more often with the approved disinfectant at the correct concentration.



*Ratio of current month total to mean of 15 month totals (from previous, comparable, and subsequent month periods for the past 5 years).

TO REPORT ANY DISEASE AND FOR
INFORMATION CALL:



Office of Epidemiology and Disease
Control

Childhood Lead Poisoning Prevention Program	(305) 470-6877
Hepatitis	(305) 470-5536
Other diseases and outbreaks	(305) 470-5660
HIV/AIDS Program	(305) 470-6999
STD Program	(305) 325-3242
Tuberculosis Program	(305) 324-2470
Special Immunization Program	(786) 845-0550
Nights, weekends, and holidays	(305) 377-6751



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Monthly Report

Selected Reportable Diseases/Conditions in Miami-Dade County, December 2004

Diseases/Conditions	2004 this Month	2004 Year to Date	2003 Year to Date	2002 Year to Date	2001 Year to Date	2000 Year to Date
AIDS ^{Provisional}	78	1390	1054	1115	1162	1236
Animal Rabies	0	0	0	0	1	0
Campylobacteriosis	8	135	153	129	127	162
<i>Chlamydia trachomatis</i>	N/A	N/A	3956	4643	3778	3010
Ciguatera Poisoning	0	0	0	2	0	2
Cryptosporidiosis	2	19	18	15	12	33
Cyclosporiasis	0	2	2	2	0	0
Diphtheria	0	0	0	0	0	0
<i>E. coli</i> , O157:H7	0	5	2	5	2	6
<i>E. coli</i> , Non-O157	0	1	3	2	1	1
<i>E. coli</i> , Other	0	1	1	0	0	0
Encephalitis (except WNV)	0	0	0	1	0	0
Encephalitis, West Nile Virus	0	15	6	1	0	0
West Nile Fever	0	5	0	1	0	0
Giardiasis, Acute	24	278	227	238	272	241
Gonorrhea	N/A	N/A	1664	1977	1932	1995
Hepatitis A	1	41	59	142	192	125
Hepatitis B	4	39	51	57	78	132
HIV ^{Provisional}	76	1691	1685	1966	1691	1693
Lead Poisoning	28	305	272	323	281	394
Legionnaire's Disease	2	13	9	1	3	0
Leptospirosis	0	0	0	0	0	0
Lyme disease	0	3	4	2	7	8
Malaria	3	31	16	16	21	25
Measles	0	0	0	0	0	0
Meningitis (except aseptic)	0	11	8	12	11	19
Meningococcal Disease	0	20	5	15	16	31
Mumps	0	0	0	0	0	2
Pertussis	0	9	11	6	3	7
Polio	0	0	0	0	0	0
Rubella	0	0	0	0	0	0
Rubella, Congenital	0	0	0	0	0	1
Salmonellosis	30	431	540	376	321	283
Shigellosis	17	160	295	264	153	234
<i>Streptococcus pneumoniae</i> , Drug Resistant	3	60	115	113	171	213
Syphilis, Infectious	N/A	N/A	197	232	185	131
Syphilis, Other	N/A	N/A	1007	1085	867	728
Tetanus	0	0	0	0	1	1
Toxoplasmosis	4	9	13	24	19	1
Tuberculosis ^{Provisional}	41	271	209	239	291	274
Typhoid Fever	0	3	5	4	5	2
<i>Vibrio cholera</i> Type O1	0	0	0	0	0	0
<i>Vibrio cholera</i> Non-O1	0	0	0	1	0	0
<i>Vibrio</i> , Other	0	0	2	0	0	0

* Data on AIDS are provisional at the county level and are subject to edit checks by state and federal agencies.

** Data on tuberculosis are provisional at the county level.