Outbreak Investigation Case Study at the South Central University of Texas

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Introduction

On March 11th, the Texas Department of Heath (TDH) reported a case of food poisoning from two college students. Both showed symptoms of food poisoning and they both believed it was linked to the pizzeria they ate at the previous night. Because of these speculations, TDH thought it was necessary to begin exploring the cause of the illness. After investigating further, they had been informed that 23 university students had also been seen at the emergency room for acute gastroenteritis in the last 24 hours and 20 students were seen at the University Student Health Center. Gastroenteritis is the inflammation of the stomach and the intestines, which can cause nausea, vomiting, and diarrhea. It is usually linked with bacterial or viral infections, food poisoning, and stress (Definition of Gastroenteritis).

By March 12th, there were 75 ill students reported to the TDH. Using questionnaires, the TDH was able to figure out the symptoms and the time of onset of the symptoms for the students. Further investigation was done, and the TDH staff reviewed the medical records of the patients. Based on the clinical findings found from the medical records, the epidemiology of early cases and from the interviews from the patients, they hypothesized that the source of the outbreak must have come from the main cafeteria, not the pizzeria. A case-control study was preformed to compare the number of sick patients with the number of healthy patients, and to look at the correlation between exposure and risk of illness. Within this case-control study, TDH found that Norwalk-like virus caused the main exposure of the outbreak, rooting from the deli bar at the main cafeteria. TDH also reported the original source of the outbreak from one employee who reported that she had been around her sick child and did not wash her hands before using her gloves to prepare the deli meat. Once the outbreak came to an end, and after meticulous inspection and cleaning practices were established, there were no further outbreaks of gastroenteritis at the university.

Methods

A case control study was conducted to identify the source of the outbreak. Before the case control study was conduction, a self reported questionnaire was administrated to the two first males who presented with the infection. They were asked where they ate, when they ate, along with their signs and symptoms. The Texas Department of Health (TDH) was doubtful about the student self reports, so they tracked down the restaurant to determine if any one else became ill after eating their food. TDH then made a call to the emergency room to see how many people had been admitted for the same signs and symptoms. Once they received information

that 23 students had been seen for gastroenteritis, the Health Center at the university reported 75 cases of the illness.

TDH staff and Student Health Center physicians and nurses and City Health Department worked together to gather more information regarding this outbreak. They reviewed medical records on March 11 for patients with vomiting and/or diarrhea since March 5. Other symptoms were recorded: vomiting, diarrhea, abdominal cramping, headache, muscle aches and bloody diarrhea, oral temperatures, and complete blood count, as seen in Table 1. They then collected stool samples from any new cases that were brought to attention. The stool samples and bacterial cultures from the patients in the emergency room were confirmed at the TDH Laboratory. After confirmation that the outbreak had to have occurred from the university's main cafeteria and not from the local pizzeria, TDH could proceed with their investigation. Once the bacterial cultures were completed, interviews were conducted from all the cafeteria food handlers. Questions such as: "What is your sanitation process? Were you sick? Do you look at temperature control?" were asked upon this process. Inspections of the university's main cafeteria, deli bar, and food prep area were conducted. TDH then requested stool samples from all cafeteria staff. Water and ice samples were obtained and examined for fecal coliforms. From March 15-23 another telephone questionnaire was administrated for the students. From the cafeteria employees who had given stool samples, interviews were conducted one last time to get the final round up for the outbreak.

Investigation

Due to a report of possible food poisoning from a student from the South Central University of Texas to the Texas Department of Health (TDH), an investigation began on March 11th. A few calls led to a hypothesis-generating meeting between TDH officials working with the University student health center and local Hospitals to identify a probable source and spread of the potential outbreak. Seven initial cases reported by both university health center and emergency rooms were analyzed and identified that most meals eaten by the subjects traced back to the universities main cafeteria. A retrospective review of records from one of the local hospitals (Identified as Hospital A) tracing back to March 5th resulted in 23 cases of probable infection. Those cases showed symptoms related to gastroenteritis, which included vomiting (91%), diarrhea (85%), cramping (68%), among others. TDH assigned staff provided reported cases that shared GI symptoms tracing back to march 5th. Stool samples from any new cases were requested from health care providers. This collection resulted in a negative result of bacterial strains from 17 ill students.

By March 12th, a summation of clinical findings, along with descriptive analysis of early cases, led to inspection of the Universities main campus cafeteria by TDH environmental sanitarians. 31 staff members were interviewed, 24 (77%) of which were food handlers. The inspection involved the main cafeteria food prep area and serving line, as well as the deli bar section, which was discovered to have its own preparation and

refrigeration area. Samples of left over foods, water, and ice were collected for further analysis as well as stool cultures from every cafeteria staff.

Testing

On March 11, a TDH employee went to Hospital A's emergency room to look through medical records of patients, who may have had similar symptoms, earlier on in the week. After reviewing the results of a complete blood count, it became apparent that there was an increase in white blood cells in at least 10 patients, in addition to an increase in body temperature. Preliminary stool sample culture results, from students affected on March 10, tested positive for fecal leukocytes and occult blood, while not identifying any bacterial strains. March 12 provided results on the cafeteria's water and ice, testing negative for any fecal related bacteria. In addition to this, all 23 cafeteria employees had stool samples and rectal swaps indicating no sign of virulent bacteria as well.

By March 13, there was little progress as another additional 125 victims of the outbreak were identified. At this point in the investigation, TDH made the executive move to bring in the CDC to aid with the crisis. The CDC went ahead and ordered a retest of stool samples from all infected students, using new samples. In addition to this, they requested to have a transcriptase-polymerase chain reaction conducted as well. This additional test (RT-PCR) would allow scientists at the CDC to further analyze samples from infected individuals and detect any changes of the RNA expression in cells or tissues, (Overbergh *et al.*, 2003, p. 33).

In the meantime, TDH and CDC officials teamed up to set up an unmatched case-control study to hone in on the outbreak origins. This study focused on students who ate at the cafeteria that experienced vomiting or diarrhea after March 5, and had the university meal plan. This study used 36 from the original 125 infected students and 144 randomly selected controls who experienced no symptoms. A phone questionnaire was administered – between the 15th and 23rd of March - to these participants regarding their meal habits between the 9th and 10th of March, allowing for a meal-specific analysis study to be conducted. This analysis will aid in determining where the greatest risk of developing this illness originated from, either the salad bar or the deli. An odds ratio was calculated from the questionnaire data, and the results indicated significantly higher odds at the deli than the salad bar (Table 2).

The individual found to be the source of the outbreak finally came forward by March 23 for an interview, revealing that though she experienced no symptoms, but her baby had been sick around the week of March 7 – when this whole ordeal started. Following this study, the RT-PCR results from fresh stool samples of infected students revealed at least 50% of them with signs of Norwalk-like virus (NLV). In addition to this, RT-PCR used on the meats in the Deli bar, after the identified source's interview, showed that the ham she had been slicing was indeed positive for NLV RNA. NLV is a seriously contagious virus that can spread easily between people, food or water, or just by touching an infected surface. The symptoms of the virus are similar to the stomach flu or food poisoning in that it inflames the GI system and causes vomiting

and or diarrhea, (Robilotti *et al.,* 2015, p. 135). The final confirmation of these findings ended with the results from a RT-PCR test done on a stool sample of the food handler's infant; testing positive for the same NLV RNA that were found in food products she handled and results from infected students.

Discussion

The outbreak was found to be a Norovirus. The source of the outbreak originated from one of the deli employees. Even though she showed no signs or symptoms of the virus, she was a carrier of it. After further testing it was found that the employee's baby had been sick a few days prior to the outbreak, and that the baby did in-fact have the virus as well. Through poor sanitation methods the employee (a carrier of the Norovirus) had passed the virus along to the deli meat she was handling, which was later passed to the students through consumption or contact with the deli meat.

Once the outbreak was over a total of 149 cases of illness had been officially reported amount the students at South Central University of Texas. With follow up, it was discovered that a secondary spread of infection was avoided with proper hand washing and sanitation between students and staff members. Campus faculty implemented new food preparation policies and provided training for all of the food workers. After further follow up, all policies had been properly administered, and no further outbreaks had been detected at the university.

Tables and Figures

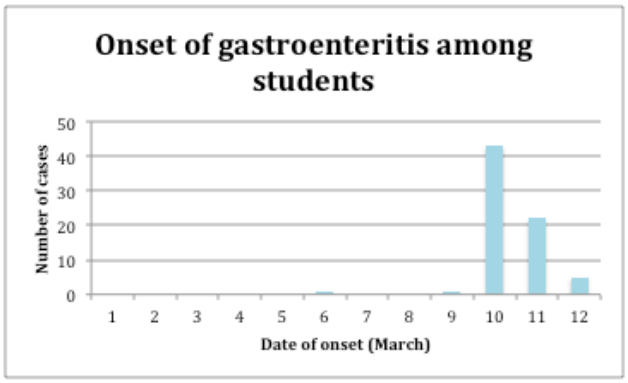

FIGURE 1. Date of onset of gastroenteritis among students at the South Central University of Texas

Symptoms	Number of Cases with symptoms	Total Cases	Proportion (%)
Vomiting	64	70	91.42%
Diarrhea	60	70	85.71
Abdominal cramping	48	70	68.57
Headaches	46	70	65.7
Muscle aches	34	70	48.6
Bloody diarrhea	4	62	6.52

TABLE 1. Proportion of patients who experience vomiting, diarrhea, abdominal cramping, headaches, muscle aches, and bloody diarrhea

Exposure		Cases	Controls	Odds Ratio
Ate at salad bar - lunch March 9	Exposed	9	36	0.76
	Unexposed	21	64	
Ate at salad bar - dinner March 9	Exposed	5	15	1.13
	Unexposed	13	44	
Ate at salad bar - lunch March 10	Exposed	6	23	0.87
	Unexposed	22	73	
Ate at salad bar - dinner March 10	Exposed	6	12	1.78
	Unexposed	9	32	
Ate at deli bar - lunch March 9	Exposed	18	12	11.13
	Unexposed	12	89	
Ate at deli bar - dinner March 9	Exposed	7	5	7.13
	Unexposed	11	56	
Ate at deli bar - lunch March 10	Exposed	13	12	5.69
	Unexposed	16	84	
Ate at deli bar - dinner March 10	Exposed	4	4	3.33
	Unexposed	12	40	

TABLE 2. Risk factors for illness among persons eating at the main cafeteria for lunch or dinner, unmatched case-control study, South Central University of Texas, March 9-10

References

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Bailey Peterson was responsible for the introduction and methods portion of this investigation. Ganesh Jialal was in charge of the testing, while Carlo Tueros helped with the investigation. Kaitlyn Grim drafted the discussion along with the tables and figures, as well as formatted the final draft. All authors have read and approved the final paper.