



**Centers for Disease Control and Prevention
Case Studies in Applied Epidemiology
No. 061-806**

An Outbreak of Gastroenteritis at a Hotel Banquet

Student's Guide

Learning Objectives

After completing this case study, the participant should be able to:

- Define cluster, outbreak, and epidemic
- List the reasons to conduct an outbreak investigation
- List the steps for an outbreak investigation
- Develop an appropriate case definition for a field investigation
- Construct and interpret an epidemic curve, and
- Describe a cohort study design and the appropriate measures of association

This case study was created in 2006 by Fatima Coronado and Julie Magri. This case study is based on an investigation conducted by Field EIS Officer Asim Jani and staff from the Virginia Department of Health. Minor modifications from actual events have been made for teaching purposes.



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service



Part I

On Friday December 19, 2003, the on-call epidemiologist at the Henrico County Health Department in Virginia was contacted by an infection control practitioner (ICP) from a local hospital regarding a 30-year old woman hospitalized with sepsis. Initial laboratory testing conducted at the hospital identified *Salmonella* as the cause of infection.

The patient’s symptoms started on December 14, two days after attending a holiday dinner party sponsored by Company A and held at a hotel located in Richmond City, Virginia. The ICP also indicated that based on information provided by the patient, at least 20 other party attendees developed symptoms of gastrointestinal illness over the same 3-4 day time period.

Question 1: Is this an outbreak?

Question 2: Is this worth investigating? Why or why not? What are the common reasons or justifications for conducting a field investigation?

Because the hotel was located in Richmond City, the county health department epidemiologist contacted the Richmond City Health Department (RCHD) and Virginia Department of Health’s Division of Surveillance

and Investigation (VDH) to report the incident. Given the limited information and concern about the report, an investigation was then initiated collaboratively by all agencies to determine the extent of the problem.

Question 3: What are the steps of an outbreak investigation?**Question 4: List the broad categories of diseases that should be considered in the differential diagnosis of an outbreak of gastrointestinal illness**

Salmonella are a group of bacteria that have been known for over 100 years to cause illness, chiefly acute enterocolitis. *Salmonella* are usually transmitted to humans by eating foods contaminated with animal feces. Outbreaks have been attributed to contamination of the following: raw and undercooked eggs and egg products; poultry and poultry products; raw milk and milk products; water; meat and meat products; and raw produce. In addition, pet turtles, iguanas and chicks, and unsterilized pharmaceuticals of animal origin are potential sources of infection.

Most persons infected with *Salmonella* develop diarrhea, fever, and abdominal cramps 6–72 hours (usually 12-36 hours) after infection. The illness usually lasts 4–7 days, and most persons recover without treatment. However, in some persons the diarrhea may be so severe that the patient needs to be hospitalized, and can even cause death unless promptly treated. The elderly, infants, and those with impaired immune systems are more likely to have a severe illness. Diarrheal illness due to *Salmonella* is reportable in Virginia, as it is in most states.

The investigative team learned from Company A that approximately 135 employees and guests had attended the holiday party at Hotel A on the evening of Friday December 12.

Company A representatives told the investigators that several employees had traveled out of state the day after attending the party and that one of these attendees was hospitalized in another state for *Salmonella* infection. In addition, VDH was getting preliminary reports of illness among other attendees, characterized by acute diarrhea, chills, and abdominal cramps. The only common event shared by both Company A employees and their guests appeared to be the Holiday party.

The investigators decided to conduct active case finding among party attendees. Company A provided them with a list of all of the attendees. In preparation for case finding, the investigators created a case definition.

Question 5: What is a case definition?

Question 6: Based on the information thus far, develop a case definition for case finding.

Part II

Investigators decided to define a case as:
1) laboratory-confirmed *Salmonella* infection or
2) diarrhea (i.e., ≥ 3 loose stools within 24 hours)
with chills or abdominal cramps or both,
occurring in any person subsequent to his/her
attendance at the Company A Holiday party.

Stool specimens were requested from symptomatic persons who attended the banquet party and any ill employees including food handlers and cooks that worked in the hotel on December 12. These specimens were submitted to the Virginia Division of Consolidated Laboratory Services (DCLS) for culture, sensitivity and pulsed field gel electrophoresis (PFGE) testing. In addition, four representative

bacterial isolates from ill individuals were forwarded to CDC to undergo phage typing.

During the holiday season, the hotel was the venue for multiple parties and banquets on a daily basis. There were four other banquets on the evening of December 12. A hotel banquet coordinator was asked to follow up with the other banquet groups held that evening.

No attendees from any other events reported gastrointestinal illness. Given that the only exposure in common among the case-patients identified to date was the banquet party at the hotel, the investigators decided to visit the hotel.

Question 7: What information should the investigators gather during the site visit?

On December 20, the VDH epidemiology team and RCHD environmental health staff interviewed the hotel’s executive chef and conducted an inspection of the hotel kitchen’s receiving, storage and food preparation areas. At this site visit, in addition to detailed information on all food items served during Company A’s event, menus from a number of other events held that day were obtained. Environmental samples from potentially contaminated surfaces were also obtained and later submitted for culture to the DCLS food laboratory.

Interviews of the chef and all hotel staff associated with Company A’s event were also conducted using a standardized questionnaire.

No hotel employees who were associated with Company A’s event and were available for interviews on December 20 reported gastrointestinal illness within two weeks prior to December 12. Subsequently, two temporary workers reported gastrointestinal symptoms occurring on December 13.

The RCHD environmental health manager provided information that this hotel kitchen had been inspected on a regular basis with no violations of food safety and preparation noted. However, during the site visit, the investigators noted these observations:

- The storage of a sheet pan containing raw poultry items directly above cooked, ready-to-eat food items
- Numerous cleaned utensils directly on common use hand towels
- A hand sink that leaked
- Lack of available hot water at sinks
- Lack of appropriate hand washing signage
- Employee interviews indicating suboptimal adherence to both hand washing and glove wearing
- Lack of adequate cleaning of food thermometers between uses

On December 21, the VDH epidemiology team revisited the hotel to gain further information about Company A’s event. The banquet meal was served from 6:30 P.M. to 8:30 P.M. on December 12.

The hotel kitchen staff purchased frozen and prepared items along with raw ingredients that were used to make the various menu items. The banquet consisted of appetizers including seaweed rolls, dips and sauces, cheeses, crusted chicken fingers, and fruit. Dinner items were served at different stations and included crab cakes, pasta dishes, bread, vegetables, multiple sauces, desserts, and beverages. Unique food items served only at Company A’s event that evening included a “steamship round” of beef, steamed vegetables, egg rolls, ravioli, pesto sauce, and Cajun remoulade sauce.

Question 8: What epidemiologic approach might you use to evaluate what caused the outbreak?

Part III

Late on December 21, the VDH epidemiology team decided to initiate a retrospective cohort study. Interviews were conducted via telephone by RCHD and VDH staff. All persons were asked to provide the names of guests who

accompanied them to the party and also any household contacts who did not attend and yet reported illness after December 12. In preparation for the interviews, the epidemiology team developed a standardized questionnaire to be used for the study.

Question 9: What information would you collect in this questionnaire?

The investigators interviewed the attendees during December 21-January 5. Interviews were conducted via telephone by RCHD and VDH

staff. The investigators created a line listing based on the questionnaire responses.

Question 10: What is a line listing? What is the value of a line listing?

The following is their line listing sorted by case status, with an abbreviated list of food exposures.

Abbreviated Line Listing from Investigation of Outbreak of *Salmonella* at a Hotel Banquet

ID	Age	Sex	ILL	Date Illness Onset	Egg Roll	Cheese	Fruit	Cajun Sauce	Ravioli	Cream Pasta	Broccoli	Carrots	Potato	Mushroom	Beef	Cheesecake	Water	Liquor	Coffee	Ice
1	44	M	Y	12/14	N	N	N	N	N	N	Y	Y	Y	Y	Y	N	Y	N	N	Y
2	56	M	Y	12/15	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	N	Y
3	53	F	Y	12/13	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4	34	F	Y	12/16	N	N	N	Y	Y	Y	N	N	Y	Y	Y	N	Y	N	N	Y
5	37	M	Y	12/15	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	N	Y
6	29	M	Y	12/13	N	N	N	N	Y	Y	N	N	Y	Y	Y	N	N	Y	N	Y
7	40	M	Y	12/14	N	N	N	Y	Y	Y	N	Y	N	Y	Y	N	N	Y	N	Y
8	38	M	Y	12/15	N	N	N	N	Y	Y	N	N	Y	N	Y	Y	N	Y	N	Y
9	32	M	Y	12/14	N	N	N	Y	N	N	Y	Y	Y	Y	Y	N	Y	N	N	Y
10	31	F	Y	12/15	N	N	N	Y	Y	Y	N	Y	Y	Y	N	Y	Y	N	N	Y
11	47	F	Y	12/14	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	N	Y	N	Y
12	46	F	Y	12/16	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	N	Y
13	50	M	Y	12/15	Y	Y	N	N	Y	Y	Y	N	N	N	Y	Y	Y	N	Y	Y
14	43	F	Y	12/14	N	N	N	N	Y	Y	Y	N	Y	N	Y	Y	Y	Y	N	Y
15	44	M	Y	12/14	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
16	32	F	Y	12/14	N	Y	N	N	N	Y	N	N	Y	N	Y	Y	N	Y	N	Y
17	33	M	Y	12/14	N	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
18	46	M	Y	12/13	N	N	N	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
19	47	M	Y	12/14	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N	Y
20	41	M	Y	12/14	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
21	42	F	Y	12/16	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
22	37	M	Y	12/14	N	N	N	N	Y	N	N	N	N	N	Y	N	Y	N	N	Y
23	40	F	Y	12/14	N	N	N	N	Y	Y	N	N	N	N	Y	N	Y	N	N	Y
24	28	F	Y	12/13	N	Y	N	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y
25	29	M	Y	12/13	N	Y	N	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y
26	45	M	Y	12/14	N	N	N	N	Y	Y	N	N	N	N	Y	N	Y	N	N	Y
27	40	M	Y	12/17	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y
28		F	Y	12/18	Y	N	Y	N	Y	N	Y	Y	Y	N	Y	Y	Y	Y	N	Y
29	45	F	Y	12/13	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
30	54	F	Y	12/14	N	N	N	N	Y	Y	N	Y	Y	Y	Y	N	Y	N	Y	Y
31	39	M	Y	12/14	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
32	57	M	Y	12/13	N	N	N	N	Y	Y	N	N	Y	Y	Y	N	Y	N	N	Y
33	34	M	Y	?	N	N	N	N	Y	Y	N	N	N	N	Y	N	Y	Y	N	Y
34	42	M	Y	12/19	Y	N	N	Y	Y	N	Y	N	N	N	Y	N	Y	N	Y	N
35	44	M	Y	?	Y	N	N	N	Y	N	N	N	N	N	Y	Y	Y	N	Y	Y
36	36	F	Y	12/14	Y	N	N	Y	Y	N	N	N	N	N	Y	Y	Y	Y	N	Y
37	31	M	Y	12/16	N	N	N	N	Y	N	N	N	Y	N	Y	N	N	Y	N	Y
38	41	M	Y	12/15	N	N	N	N	Y	Y	Y	Y	Y	N	Y	N	Y	N	Y	N
39	28	F	Y	12/14	Y	N	N	N	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	N

ID	Age	Sex	ILL	Date Illness Onset	Egg Roll	Cheese	Fruit	Cajun Sauce	Ravioli	Cream Pasta	Broccoli	Carrots	Potato	Mushroom	Beef	Cheesecake	Water	Liquor	Coffee	Ice
40	31	M	Y	12/14	N	Y	N	N	Y	N	N	N	N	N	Y	Y	Y	Y	N	Y
41	48	M	Y	12/13	N	N	Y	N	N	N	N	N	Y	Y	Y	N	Y	N	N	Y
42	38	F	Y	12/21	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y
43	40	F	Y	12/17	N	N	N	N	Y	Y	N	N	N	N	Y	Y	Y	N	N	Y
44	47	F	Y	12/12	N	Y	N	N	Y	Y	N	N	N	N	Y	N	Y	Y	N	Y
45	46	M	Y	12/15	N	N	N	N	N	N	Y	Y	Y	Y	Y	N	N	N	N	N
46	29	M	Y	12/13	Y	N	N	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	N	Y
47	46	M	Y	12/14	N	N	N	N	Y	Y	Y	Y	N	N	Y	N	Y	Y	N	Y
48	37	F	Y	12/15	N	N	N	N	N	N	N	Y	N	Y	Y	N	Y	Y	N	Y
49	40	M	Y	12/15	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
50	47	M	Y	12/14	N	N	N	N	N	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y
51	41	F	Y	12/14	N	N	N	N	N	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y
52	39	F	Y	12/13	N	N	N	Y	Y	N	N	N	Y	N	N	Y	Y	N	Y	Y
53	37	M	Y	12/13	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
54	34	F	Y	12/14	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y
55	37	F	N		Y	N	N	Y	Y	Y	N	N	N	N	Y	N	Y	Y	N	N
56	39	F	N		N	N	N	N	N	N	N	N	Y	Y	Y	N	Y	Y	N	Y
57	33	M	N		N	N	N	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N	Y
58	38	F	N		N	N	N	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N	N
59	29	M	N		N	N	N	N	N	N	N	N	Y	N	Y	N	N	N	N	N
60	49	F	N		N	N	N	N	N	N	Y	Y	Y	Y	Y	N	Y	N	N	Y
61	32	F	N		N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N	Y
62	44	F	N		Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
63	39	F	N		Y	N	N	Y	Y	Y	N	N	N	N	Y	Y	Y	Y	N	Y
64	48	M	N		N	N	N	Y	N	N	N	N	Y	Y	N	N	Y	N	N	Y
65	42	F	N		Y	N	N	N	Y	Y	Y	Y	N	Y	N	N	Y	Y	N	Y
66	30	F	N		N	N	N	N	Y	Y	Y	N	Y	N	N	Y	Y	Y	N	Y
67	44	M	N		Y	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	N	Y
68	39	M	N		N	N	N	N	Y	Y	N	Y	Y	N	Y	N	Y	Y	N	Y
69	37	F	N		N	Y	N	N	Y	Y	Y	Y	N	N	Y	Y	Y	Y	N	Y
70	50	F	N		Y	N	N	N	N	N	Y	Y	N	Y	Y	Y	Y	N	N	Y
71	33	F	N		N	N	N	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N	Y
72	50	F	N		N	N	N	N	Y	N	Y	Y	Y	Y	N	N	Y	Y	Y	Y
73	50	M	N		Y	N	N	N	N	N	N	N	Y	N	Y	N	Y	Y	N	Y
74	47	F	N		N	N	N	N	N	N	N	N	N	N	Y	Y	Y	N	Y	Y
75	46	F	N		N	N	N	N	Y	Y	N	Y	Y	Y	Y	N	Y	Y	N	Y
76	40	M	N		Y	N	N	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N	Y
77	39	M	N		N	N	N	N	Y	Y	N	N	Y	N	N	Y	Y	N	N	N
78	38	F	N		N	N	N	N	N	N	Y	Y	Y	Y	N	N	Y	N	N	Y
79	44	F	N		N	N	N	N	N	N	Y	Y	Y	Y	N	Y	Y	N	Y	Y
80	27	F	N		N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N
81	52	M	N		N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N	N	Y
82	36	F	N		N	N	N	N	Y	Y	N	N	Y	N	N	Y	Y	Y	N	Y
83	58	M	N		Y	N	N	N	N	N	N	N	Y	N	Y	Y	N	N	Y	N

ID	Age	Sex	ILL	Date Illness Onset	Egg Roll	Cheese	Fruit	Cajun Sauce	Ravioli	Cream Pasta	Broccoli	Carrots	Potato	Mushroom	Beef	Cheesecake	Water	Liquor	Coffee	Ice
84	55	F	N		Y	N	N	N	N	N	Y	Y	Y	N	N	Y	Y	N	N	Y
85	40	M	N		N	N	N	N	N	N	Y	Y	Y	N	Y	Y	Y	N	Y	Y
86	37	M	N		N	N	N	Y	N	N	N	N	N	N	N	N	Y	N	N	Y
87	29	F	N		Y	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y
88	56	M	N		N	N	N	N	Y	Y	N	N	Y	Y	Y	Y	N	N	Y	N
89	36	F	N		N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y
90	41	F	N		N	N	N	N	N	N	N	Y	N	N	Y	Y	Y	N	N	Y
91	40	M	N		N	N	N	N	Y	Y	N	N	Y	N	Y	Y	Y	N	Y	Y
92	26	F	N		Y	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y
93	28	M	N		Y	Y	N	N	Y	Y	N	N	Y	N	N	N	Y	Y	N	Y
94	52	M	N		N	Y	N	Y	N	N	Y	N	N	Y	N	N	Y	Y	Y	Y
95	42	F	N		N	Y	N	N	N	N	Y	Y	N	Y	Y	N	Y	Y	N	Y
96	44	M	N		N	N	N	N	N	N	Y	N	N	N	Y	N	Y	N	Y	N
97	29	F	N		N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y
98	52	M	N		N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	N	Y
99	39	M	N		N	N	N	N	N	N	N	N	N	N	Y	N	Y	Y	N	Y
100	31	M	N		N	N	N	N	Y	N	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
101	43	F	N		N	N	N	N	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N	Y
102	43	F	N		N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	N	Y
103	35	F	N		N	N	N	N	Y	Y	Y	N	Y	Y	N	N	Y	Y	N	Y
104	36	M	N		N	N	N	N	N	N	N	N	Y	N	Y	Y	N	Y	N	Y
105	42	M	N		N	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y
106	45	M	N		N	N	N	N	Y	Y	N	N	Y	N	N	N	Y	N	N	Y
107	33	F	N		N	N	N	N	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N	Y
108	39	M	N		N	N	N	N	Y	N	N	N	N	N	Y	Y	Y	N	Y	Y
109	41	F	N		N	N	N	N	N	Y	N	Y	Y	N	N	N	Y	Y	N	Y
110	34	M	N		N	Y	N	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N	Y
111	42	F	N		Y	N	N	N	Y	Y	N	N	N	N	N	Y	Y	N	N	Y
112	35	M	N		N	N	N	N	Y	N	N	N	N	N	N	N	N	Y	N	Y
113	25	F	N		N	N	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y
114	28	F	N		N	Y	N	N	Y	N	Y	Y	Y	Y	Y	N	Y	N	N	Y
115	35	F	N		N	N	N	Y	Y	N	N	N	N	N	N	Y	Y	N	N	Y
116	34	F	N		N	Y	N	N	Y	N	Y	N	Y	Y	N	N	Y	Y	N	Y

Of the approximately 135 persons who attended the holiday banquet, 116 (86%) were available for interviews. Of these 116 persons, 54 (47%) met the case definition. Twenty-six (48%) of the case-patients had culture-confirmed *Salmonella*; all had *Salmonella enterica* serovar Typhimurium DT 104 infection, an emerging cause of multidrug-resistant salmonellosis.

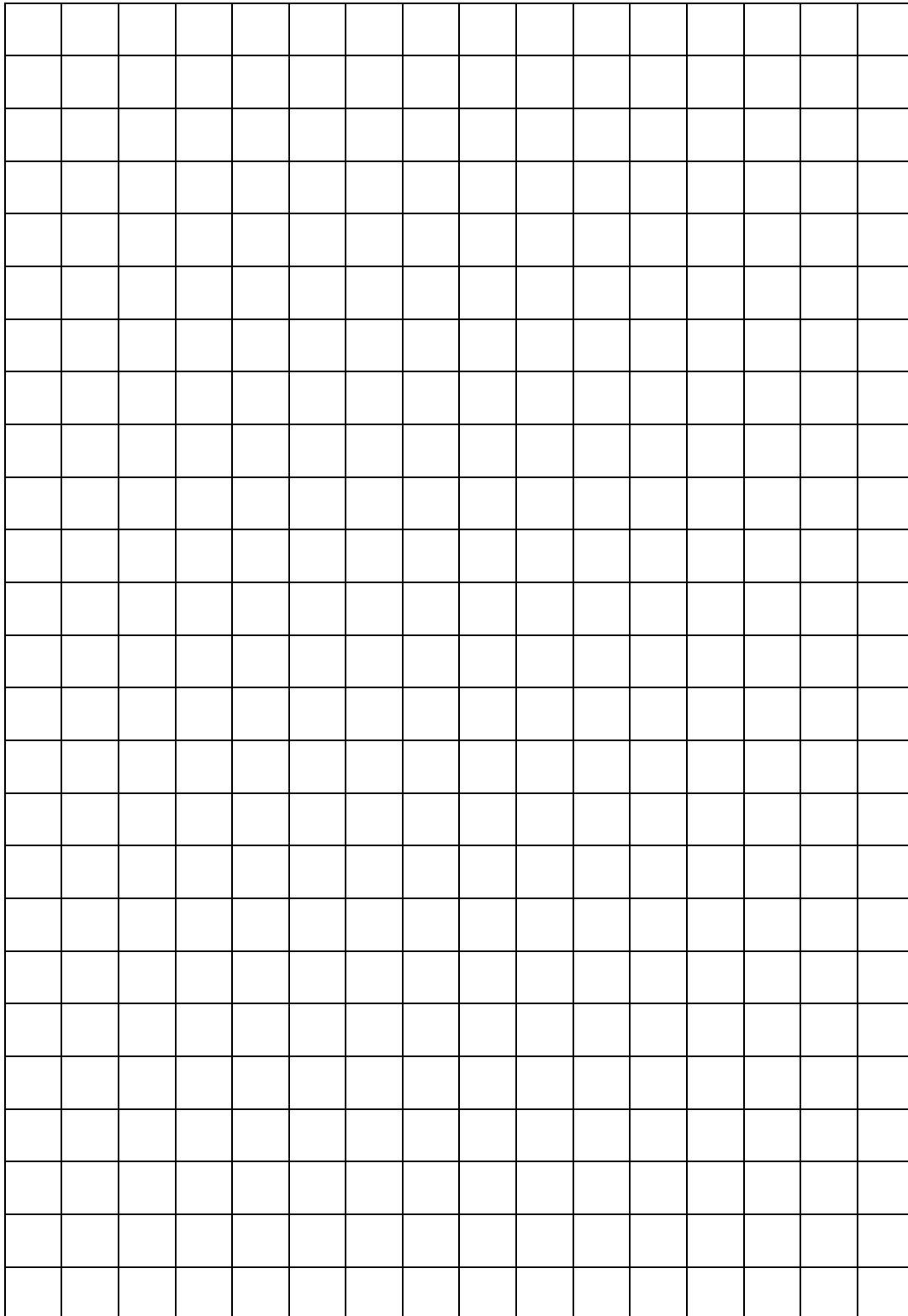
Among the 54 case-patients, illness onsets ranged from December 12 through December 21. The onset of illness in all cases was acute,

characterized by diarrhea, abdominal cramps, malaise and chills. Nausea and vomiting were less common. Symptom onset data were not available for two of the 54 cases. Patients ranged in age from 28-57 years (median=40 years). Two patients were hospitalized. No deaths were reported.

Based on the data obtained and available on the line listing, the investigators prepared an epidemic curve.

Question 11a: What is an epidemic curve?

Question 11b: Using the line listing, draw the epidemic curve.



Question 11c: Interpret the graph (i.e., what does this graph tell you)?

Question 11d: What is the value of an epidemic curve?

Question 12: What is the appropriate measure of association for a cohort study?

Part IV

Based on the results of epidemiological analyses, the roast beef was implicated as the likely source of infection.

The executive chef for the December 12 party reported that the steamship round of beef used for this event weighed about 65-70 lbs. Typically a steamship round has a width ranging from 6 inches at its narrowest point to 18 inches at its thickest point. The beef had been delivered 2 days before the event and had been kept refrigerated in its original vacuum packing. On December 11, an employee began the process of surface-marinating the beef in preparation for cooking. Before removing the plastic packaging, the employee noted that meat juices were leaking from a small hole in the packaging. The employee reported that the meat smelled fresh and that he wore gloves while performing the 5-minute marinating procedure.

The marinated beef was placed in a 220°F oven set at 9:00 pm on December 11. No written log was available to verify the cooking time or the oven temperature. To test for doneness, the kitchen staff inserted a 3-4 inch thermometer probe into several areas of the meat and also palpated the meat (with or without gloves) to assess firmness. According to the staff, the desired internal temperature of 140°F was reached between 2 pm and 4 pm on December 12, and the beef was then kept in the oven at a holding temperature of 140°F until 7:15 pm when it was taken out to be served. Before serving, the knuckle bone at the bottom of the meat was removed with a saw. At the serving station, the meat was carved into slices for banquet attendees who were waiting in line at the station.

Question 14: Based on the information known at this moment, do you think the contamination of the beef occurred at the hotel? Why or why not?

Based on the review of the food handling process at the hotel kitchen, the investigators concluded that it was unlikely that contamination of the beef occurred at the hotel. Their review suggested that internal contamination of the beef occurred at some point(s) from farm to delivery at the hotel on December 10.

Trace back information on the beef round was done through the Virginia Department of Agriculture and Consumer Services, Office of Dairy and Foods, and the Food Safety and

Inspection Service (FSIS) of the United States Department of Agriculture (USDA). The steamship round of beef consumed at the December 12 event had been shipped by a distributor company whose plant received the packaged sealed product from a cutting plant in State A. The beef animals had apparently been obtained from a total of 17 farms and slaughtered over two separate days in State B slaughterhouse. The original animal had been slaughtered on either November 28 or December 1. It was reported that one animal on

each of those days had been condemned (i.e., removed from food production) due to septicemia. No further details were available. The State B slaughterhouse passed routine Hazard Analysis Critical Control Point (HACCP) *Salmonella* proficiency testing. FSIS officers, stationed at the slaughterhouse daily to monitor

processing, reported no problems or violations. FSIS also confirmed that ongoing queries of their database of consumer complaints for similar *Salmonella* or foodborne infections traced back to that specific slaughterhouse had not yielded any reports similar to the current outbreak.

Question 15: What control measures would you suggest?

Question 16: Who needs to know this information, receive your report and recommendations?

Conclusions

This large *Salmonella* Typhimurium DT 104 outbreak was likely due to the consumption of steamship round of roast beef served at the banquet for Company A. Based on the review of the food handling process investigators concluded that it was unlikely that contamination of the beef occurred at the hotel. This suggests that internal contamination of the beef occurred at some point(s) from farm to delivery at the local hotel on December 10. Even though the epidemiologic analyses were able demonstrate associations, they could not prove cause and effect.

Salmonella Typhimurium DT 104 is more commonly associated with dairy cattle than beef cattle. There is a greater chance for dairy cows to be exposed to antibiotics prior to slaughter compared with the short life span of many beef animals. Inspection methods that rely on appearance, odor and tactile characteristics of meat have been criticized as limited when

used alone at beef processing plants. These practices may contribute to the lack of the detection of specific pathogens being implicated in food-borne outbreaks. The introduction of *Salmonella* proficiency testing by the HACCP systems has been a more effective method to detect potential contamination and facilitate the correction of any factors that may compromise food safety at slaughterhouses and processing plants.¹ Although there is no clear explanation for how the beef became contaminated, this outbreak emphasizes the need for closer inspection measures and improved adherence to temperature assessment and control in the cooking process.²

As a result of their findings, investigators provided recommendations aimed at the prevention and control of potential beef-associated food-borne illness, including recommending that food preparation should occur in accordance with the Food Code as outlined in the Commonwealth of Virginia Board of Health Food Regulations.³

References

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2. Food Safety Inspection Services (FSIS): Hazard Analysis and Pathogen Reduction. Available at: http://www.fsis.usda.gov/Science/Hazard_Analysis_&_Pathogen_Reduction/index.asp (last accessed May 2006)
3. Office of Environmental Health Division of Food and Environmental Services monograph. Commonwealth of Virginia Board of Health Food Regulations 12 VAC 5-421. March 2002.