

Activity name: Outbreak Simulation

Goals

- to study and research emerging and re-emerging infectious diseases, particularly through vector-borne, food-borne, and water-borne educational activities
- to understand that certain exposures in the environment cause various infectious diseases

Activity	Objectives
Outbreak Simulation	<ul style="list-style-type: none"> • Simulate a food borne salmonella outbreak, and the resulting investigation

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Background Information/Instructions - Only for Teachers

Definitions: “An outbreak may be defined as the occurrence of a disease or health event in excess of the expected number cases for a given time or place. Cases may be related to an apparent common source, (eg a particular food) or sometimes to a specific setting (eg an institution).” (Source: Department of Human Services, Government of Victoria Australia):

Glossary of Epidemiological Terms:

<http://www.cdc.gov/reproductivehealth/EpiGlossary/glossary.htm>

Scenario: This activity simulates a food borne salmonella outbreak, and the resulting investigation. The exposed participants attended a school cookout. The cookout occurred at Dr. Brown’s rural home, and lasted until 9:30 p.m. Several of the attendees played volleyball, used the hot tub, and the trampoline. Beginning at dusk they had a

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campfire. Dr. Brown has a well from which his water is drawn. There are horses, dogs, and cats at Dr. Brown's. Several of the attendees played with the dogs, petted the cat, and touched and rode the horses. Many at the picnic also walked across fields, which had recently been spread with fertilizer; on their way to the wetland area behind Dr. Brown's to look for migratory waterfowl. Dr. Brown is an organic farmer, and the fertilizer he recently spread was chicken excrement.

Objective: The students will gain a greater understanding of the concepts involved in infectious diseases by participating in a contextual experience.

Activity Plan:

- 1) Provide enabling information;
 - a) Vocabulary
 - b) Disease Awareness
 - c) Outbreak investigation protocol
- 2) Introduce the scenario, and assign roles.
- 3) Conduct scenario.
- 4) Facilitate compilation of data and conclusion formation.
- 5) Final report and feedback.

Supplemental Activities:

- 1) Have students conduct supplemental research.
- 2) Involve students in scenario-related job-shadows.
- 3) Provide scenario-related field trips and/or speakers.

For activities two and three the following resources may be considered:

- a) Epidemiologist
- b) Laboratory Technician
- c) Local Health Department
- d) Sanitation Inspector
- e) Cafeteria / Restaurant Manager
- f) Water Treatment Operator
- g) Consumer Science Representative
- h) Extension Services

Additional Information: There were ten people at the picnic. Six of the attendees became true food poisoning cases, one was a false positive case*, and three were controls**. Outbreak form 1 provides pertinent information for those that became ill. Outbreak form 2 provides pertinent information for those that for the most part remained well. Outbreak form 3 provides food consumption and activity information for the instructor and ill participants. Outbreak form 4 provides a blank recording form that may be used by the investigators. Outbreak form 5 contains compiled results data for instructor use.

*A false positive case would be one who became ill, however the illness, or perceived illness was caused by something other than the discovered contaminant source.

**Controls are individuals that did not consume the contaminant.

Important Facts: Dr. Brown uses organic farming practices, and he prefers to use non-commercial fertilizers whenever possible. This scenario involves salmonella contamination of home grown strawberries. The source of the contaminant was chicken excrement. Dr. Brown raises chickens, and had just spread the accumulated waste onto his crop fields.

There is extensive use of antibiotics in the poultry industry, and as a result resistant strains of salmonella have developed and various strains are commonly present in chickens. Salmonella is also able to survive passage through the digestive system. Therefore when these chickens were purchased they were carriers of a resistant strain of salmonella.

Outbreak Protocol: A large portion of this simulation will involve the participants conducting an investigation of the outbreak. The reasons for conducting an investigation include the following (Source: Department of Human Services, Government of Victoria Australia):

- Prevent further disease transmission;
- Provide information which can be used to control the outbreak;
- Prevent similar occurrences in the future;
- Identify populations at risk for a disease;
- Evaluate the effectiveness of public health programs;
- Characterize modes of disease transmission;
- Train public health staff;
- Fulfill legal obligations and duty of care;
- Learn more about a disease including the impact of control measures; and
- Share knowledge/findings with other health professionals by documenting the outbreak investigations in reports or journal articles.

In order to begin the investigation the following information should be gathered (Source: Department of Human Services, Government of Victoria Australia):

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- Date, time and place of function or incident;
- The number of people ill and number of persons "at risk";
- Symptoms and severity, ie if any cases have been hospitalized;
- Onset dates and times for cases;
- Duration of symptoms;
- List of residents, guests, patrons;
- Names and phone numbers of any contact person or organizers or contact details for all
- exposed persons;
- Whether any staff were ill prior to the outbreak or worked while symptomatic;
- Copies of menus if a function or if persons affected are residents of premises (eg hospital), obtain menus for at least 3 days prior to the onset of symptoms for the first case;

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- Illness in any person prior to the event or whether anyone vomited in a public place;
- Circumstances, which allegedly implicate a particular source.
(Source: Department of Human Services, Government of Victoria Australia)

Mathematical requirements: When using the “Outbreak Role Play Instructor’s Form 5” it will be necessary to determine the occurrence rate of illness. The occurrence rate, which is expressed by a percent, will be determined by dividing the “number of ill” by the “total”, and then multiplying by 100.

For example, of the six that became ill and ate the white chilli, three became ill. This would result in an illness occurrence of 50%.

A higher occurrence rate should aid in identification of the potential contaminant. For example an occurrence rate of 85% would indicate a greater likely hood that you have identified the potential contaminant, as compared to one with an occurrence rate of 50%. Further confirmation could be achieved by cross checking with the “Outbreak Activity Record”, form 3.

Acknowledgement: This simulation/role-play was originally developed by Catherine Zeman Ph.D., University of Northern Iowa, Cedar Falls, Iowa.

Outbreak Role Play Form 1, Cases's Script

You have been ill with a gastrointestinal disease of acute onset. All of you attended a school cookout approximately 36 hours prior to the onset of your illness.

Your Symptom's

- *Cramping abdominal pain
- *Watery diarrhea, (sometimes tinged with blood)
- *Nausea, vomiting
- *Fever (101°F)
- *Three-day duration of most severe, acute symptoms
- *Approximately ½ of the victims continue to be plagued by a lingering fever and diarrhea

Your Activities

You attended a school cookout where we all enjoyed similar foods. The cookout occurred at Dr. Brown's house and lasted until about 9:30 p.m. Several of you played volleyball, used the hot tub, and the trampoline. Beginning at dusk we had a campfire. Dr. Brown has a well from which his water is drawn. There are horses, dogs, and cats at Dr. Brown's. Several of you played with the dogs, petted the cat, and petted and rode the horses. Many of you walked across the newly manured acreage to the wetland area behind Dr. Brown's to look for migratory waterfowl.

***Refer to your specific activities, foods list. This will allow you to respond to specific questions as they are asked. Do not deviate from your script or the role-play will not work out statistically.



Outbreak Role Play Form 2, Control's Script

You have been well for the last several days with the exception of one of your group.

Your Symptom's

*Three of you have no symptoms whatsoever.

*One of you had two days of mild diarrhea with no fever.

Your Activities

You attended a school cookout where we all enjoyed similar foods. The cookout occurred up at Dr. Brown's house and lasted until about 9:30 p.m. Several of you played volleyball, used the hot tub, and the trampoline. Beginning at dusk we had a campfire. Dr. Brown has a well from which his water is drawn. There are horses, dogs, and cats at Dr. Brown's. Several of you played with the dogs, petted the cat, and petted and rode the horses. Many of you walked across the newly manured acreage to the wetland area behind Dr. Brown's to look for migratory waterfowl.

***Refer to your specific activities, foods list. This will allow you to respond to specific questions as they are asked. Do not deviate from your scrip or the role-play will not work out statistically

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Outbreak Role Play Form 3, Outbreak Activities Script /Page 1 of 2

*You are all assigned a number. The first six darkened numbers are true cases. Number seven is a false case. The last three numbers are controls. The activities you participated in are masked with an X. Answer in the affirmative **if you are asked** about participating in these activities. Do not provide the Fellows with photocopies of this sheet or allow them to look at the sheets. An important part of epidemiology is doing the “detective” work necessary to uncover the causes of outbreaks. Please help us to make this role-play realistic and successful by knowing your scrip and your activities.

Outbreak Activity Record

Activity/ Contract	1	2	3	4	5	6	7	8	9	10
Foods:										
White Chili	X	X	X					X	X	X
Slaw	X	X	X				X	X	X	
Burgers	X		X					X	X	X
Soda Pop				X	X	X		X	X	X
Chips	X		X		X	X			X	
Potato Salad		X		X	X		X	X	X	X
Banana Cream Pie	X	X		X	X					
Strawberries	X	X	X	X	X			X		
Activities:										
Campfire	X	X	X	X	X	X		X	X	
Visit Swamp		X	X	X	X			X		X
Volley Ball	X	X							X	X
Hot Tubbing			X				X	X		X
Trampoling	X		X		X				X	X



Outbreak Role Play Form 3 / Page 2 of 2

Outbreak Activity Record

Activity/ Contract	1	2	3	4	5	6	7	8	9	10
Animals:										
Cat		X		X	X			X		
Dog			X				X	X	X	X
Horse	X		X			X	X			
Turtle	X		X				X		X	
Diseased Others:										
Flu		X			X					
Head Cold			X	X				X		
Gastric Disturbances										X
Chicken pox	X									
Other:										
Fast Food Restaurant		X			X		X	X		X
School Cafeteria	X		X	X		X		X		X
Water Skiing	X		X		X				X	X



Outbreak Role Play Form 4 / Epidemiological Case Control Record / Page 2 of 2

Outbreak Record

Activity/ Contract	ill	Not ill	Total	% ill	ill	Not ill	Total	% ill
Foods:								
White chili								
Slaw								
Burgers								
Pop								
Chips								
Potato Salad								
Banana Crème Pie								
Strawberries								
Activities:								
Campfire								
Visit Swamp								
Volleyball								
Hot Tubbing								
Tramplolng								
Animals:								
Cat								
Dog								
Horse								
Turtle								



***Outbreak Role Play Form 4 / Epidemiological Case Control
Record / Page 2 of 2***

Outbreak Record

Activity/ Contract	ill	Not ill	Total	% ill	ill	Not ill	Total	% ill
Diseased								
Others:								
Other:								



Outbreak Role Play Instructor's Form 5 / Page 1 of 2

of Persons Involved
in activity/contact

of Persons not-Involved
in activity/contact

Outbreak Record

Activity/ Contract	ill	Not ill	Total	% ill	ill	Not ill	Total	% ill
Foods:								
White chili	3	3	6	0.50	4	0	4	0.0
Slaw	4	2	6	0.67	3	1	4	0.75
Burgers	2	3	5	0.40	5	0	5	1.0
Pop	3	3	6	0.50	4	0	4	1.0
Chips	4	1	5	0.80	3	2	5	0.60
Potato Salad	4	3	7	0.57	3	0	3	1.0
Banana Crème Pie	4	0	4	1.0	3	3	6	0.50
Strawberries	5	1	6	0.83	2	2	4	0.50
Activities:								
Campfire	6	3	9	0.67	1	0	1	1.0
Visit Swamp	4	2	6	0.67	3	4	4	0.75
Volleyball	2	2	4	0.50	5	1	6	0.83
Hot Tubbing	2	3	5	0.40	5	0	5	1.0
Tramplolng	3	2	5	0.60	4	1	5	0.80
Animals:								
Cat	3	1	4	0.75	4	2	6	0.67
Dog	2	3	5	0.40	5	0	5	1.0
Horse	4	1	5	0.80	3	2	5	0.60
Turtle	3	1	4	0.75	4	2	6	0.67



Outbreak Role Play Instructor's Form 5 / Page 2 of 2

Outbreak Record

Activity/ Contract	ill	Not ill	Total	% ill	ill	Not ill	Total	% ill
Diseased Others:								
Flu	2	0	2	1.0	5	3	8	0.63
Head Cold	2	1	3	0.67	5	2	7	0.71
Gastric Disturbances	0	1	1	0.0	7	2	9	0.78
Chicken Pox	1	0	1	1.0	6	3	9	0.67
Other:								
Fast Food Restaurant	3	2	5	0.60	4	1	5	0.80
University Cafeteria	4	2	6	0.67	3	1	4	0.75
Water Skiing	3	2	5	0.60	4	1	5	0.80

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