

Final Exercise

Epi-Ready

FINAL EXERCISE

Module 11

Outbreak, Out West

Outbreak, Out West

This exercise will reinforce some concepts of the course. Working in your table groups, read the inject and answer the questions that follow. There will be short discussion following each inject.



11-2

Wednesday, August 3rd

- Would you consider this an outbreak? Why or why not?
- If you were the epidemiologist at the West County Health Department, what would be your next steps?

11-3

On Wednesday, August 3rd, the West County Health Department received notice from the West Regional Hospital's clinical laboratory that they just identified two cases of STEC with a syndromic, multi-analyte culture-independent diagnostic test, BioFire[®] FilmArray[®] System. The panel is a test that targets 22 pathogens. The two individuals stated they are traveling together and were in West County to participate in an all-day seminar on birds of prey in Peregrine State Park. The seminar was held on Saturday, July 31st but they were going to spend a few days after the seminar to see the sites in West County. As they were readying to drive home when Case A came down with a severe case of diarrhea and vomiting and decided that she needed to go to the hospital. Case B had stomach cramps and had a loose stool that morning and decided to get checked out just in case she may be coming down with a similar illness as her traveling companion. Their healthcare provider advised them it may not be a good time to travel so they extended their stay at the West Country Inn.

Question 1. Would you consider this an outbreak? Why or why not?

Question 2. If you were the epidemiologist at the West County Health Department, what would be your next steps?

Thursday Morning

- As a member of the local health department team, would you notify the state health department at this time?
- At this point, three cases have identified an event and three cases have yet to be interviewed. How would you approach these newly-identified cases?

11-4

On Thursday morning at 8:30, the local health department convened their “foodborne outbreak response team” to review the initial findings. The findings from interviewing the Case A and Case B were discussed with the team. Two additional cases have been identified by the hospital’s clinical lab by CIDT. The results came in after 5:00 P.M. and the results were retrieved off the electronic lab reporting system this morning. No follow up has been conducted on these possible cases. A complaint was received late Wednesday afternoon and the complainant was interviewed with the standard enteric disease reporting form. This case stated that they called because the diarrhea episode he was having concerned him as it is now bloody. The interviewer recalled that complainant-case also attended the all-day seminar this past Saturday. Two additional calls were received on the after-hours hot line. The messages have not been followed up upon but both individuals stated that they were ill with vomiting and diarrhea and one of the callers stated they were going to urgent care in the morning. Of the individuals interviewed, all stated that a box lunch was included as part of the experience. Case A stated that her box lunch contained a chicken sandwich and chips. Case B had a box lunch of a prepared salad. She recalled that her salad had a label that she always reads the ingredients label as she has dairy allergies. She did not recall if the label stated who made the salad. The complainant also recalled that he had a box lunch at the event but did not recall what he ate.

Question 3. As a member of the local health department team, would you notify the state health department at this time?

Question 4. At this point, three cases have identified an event and three cases have yet to be interviewed. How would you approach these newly-identified cases?

Thursday Afternoon

Thursday Afternoon

- How might participants at the event be identified?
- If the boxed lunch appears to be the focus of the investigation, what may be the next steps of the response team?

11-5

A follow up meeting Thursday afternoon of the outbreak response team revealed that the two newly-identified cases and the two callers also had also attended the event. The caller that went to the urgent care clinic had also tested positive for STEC. The lead epidemiologist called the state epidemiology department to notify of the additional cases. The epidemiologist was informed that they have been notified by the neighboring state's public health department that they have two confirmed cases of STEC in cases that have recently traveled to West County within the incubation period of STEC.

It appears apparent to the outbreak investigation team that they should focus on the birds of prey event and the box lunch.

Question 5. How might participants at the event be identified?

Question 6. If the boxed lunch appears to be the focus of the investigation, what may be the next steps of the response team?

Friday Morning

Friday Morning

- With the understanding that there are approximately 55 participants, and you possess a good description of the food consumed, what type of analytic study would you consider? Why?
- By reviewing the recipes, is there a boxed lunch that concerns you? Why?
- For this outbreak response a case definition would be:

11-6

Friday morning the team assembles to review the gathered information and establish the next steps. The environmental investigators have identified the vendor that supplied the boxed lunches as Raptor Deli. Raptor Deli is a concessionaire at the state park and is known for its homemade condiments and for the use of locally-sourced foods. The vendor supplied four different boxed lunches for the event. Sixty boxes were prepared for fifty-five participants.

Participants picked up their lunches at 11:00 AM prior to a short hike to observe some birds of prey in their native habitat. Raptor Deli supplied the following:

- 15 turkey sandwich boxes
- 15 chicken salad wrap boxes
- 20 ham sandwich boxes
- 10 mixed green salads

In addition to the main entree, the boxes contained a bag of potato chips, an apple, and a chocolate chip cookie. Participant were encouraged to provide their own beverages as state park policy did not allow to purveyance of commercially-bottled water.

The ingredients of the entrees were obtained from the vendor and are provided below.

Mixed Green Salad Ingredients:

- 1/4 cup extra-virgin olive oil
- 2 tablespoons fresh lime juice
- 1 tablespoon freshly grated gingerroot
- Salt and freshly ground black pepper
- 6 cups mixed greens
- 2 tomatoes diced
- 1 cup peeled and diced cucumber
- 1 cup sliced red onion
- 1/8 cup chopped fresh mint leaves
- 3/4 cup fresh picked cilantro leaves

Chicken Salad Wrap:

- 2/3 cup olive oil
- 1/4 cup lime juice
- 1/4 cup minced fresh cilantro
- 1/2 teaspoon ground cumin
- 1/2 teaspoon salt
- 1/4 teaspoon crushed red pepper flakes
- 4 cups torn leaf lettuce
- 2 cups cubed cooked chicken
- Flour tortilla wraps

Ham Sandwich:

- Thinly-sliced ham
- Mild cheddar cheese
- Leaf lettuce
- Tomato slices
- Dill pickle
- Homemade mustard in single service containers
- Homemade mayonnaise in single service containers

Turkey Sandwich:

- Thinly sliced turkey breast
- 4 pieces of bacon
- Provolone cheese slice
- 1/2 Thinly sliced avocado
- Tomato slices
- Leaf lettuce
- Homemade mustard in single service containers
- Homemade mayonnaise in single service containers

Question 7. With the understanding that there are approximately 55 participants, and you possess a good description of the food consumed, what type of analytic study would you consider? Why?

Question 8. By reviewing the recipes, is there a boxed lunch that concerns you? Why?

Whichever design is considered; it would be appropriate to develop a cases definition. A case definition should include information regarding person, place, time, and clinical symptoms.

Question 9. For this outbreak response a case definition would be:

Cohort Study

Cohort Study and Statistical Significance

- Based on the attack rate table and the relative risk, what are you considering? What else would you like to see?
- What does this new information tell you about the association of becoming ill and the consumption of certain foods?
- Does the p-value calculation support the findings of the confidence intervals as a measure of statistical significance?
- Review the findings of the cohort study and the ingredients of the entrees in the boxed lunches. Is there an ingredient that concerns you?

11-7

As you recall from module 6, a cohort study is an analysis where people are categorized as to whether they ate a particular food or not and a proportion is determined of the ill in each of the groups (eat or not).

A cohort study was conducted with all participants interviewed (will wonders never cease!). The following attack rate table with associated relative risks are provided below.

Foods Served	Ate the Food		Attack Rate	Did Not Eat the Food		Attack Rate	Relative Risk
	Ill (a)	Not Ill (b)		Ill (c)	Not Ill (d)		
Chicken Salad Wrap	11	4	73%	11	32	26%	2.87
Mixed Green Salad	6	4	60%	12	33	27%	2.25
Ham Sandwich	3	15	17%	19	18	51%	0.32
Turkey Sandwich	2	11	15%	20	22	48%	0.32
Chips	15	27	36%	7	6	54%	0.66
Apple	19	20	49%	3	13	19%	2.60
Cookie	16	23	41%	6	10	38%	1.09

Question 10. Based on the attack rate table and the relative risk, what are you considering? What else would you like to see?

Confidence Intervals and P-values

The following table includes the confidence intervals for each of the foods.

Foods Served	Ate the Food		Attack Rate	Did Not Eat the Food		Attack Rate	Relative Risk	Confidence Intervals	
	Ill (a)	Not Ill (b)		Ill (c)	Not Ill (d)			Lower Limit	Upper Limit
Chicken Salad Wrap	11	4	73%	8	32	20%	3.67	1.8375	7.3166
Mixed Green Salad	6	4	60%	12	33	27%	2.25	1.1166	4.5338
Ham Sandwich	3	15	17%	19	18	51%	0.32	0.1103	0.9553
Turkey Sandwich	2	11	15%	20	22	48%	0.32	0.0868	1.2018
Chips	15	27	36%	7	6	54%	0.66	0.6517	1.9555
Apple	19	20	49%	3	13	19%	2.60	0.08916	7.5722
Cookie	16	23	41%	6	10	38%	1.09	0.524	2.2839

Question 11. What does this new information tell you about the association of becoming ill and the consumption of certain foods?

P-value Calculation

Foods Served	Ate the Food		Attack Rate	Did Not Eat the Food		Attack Rate	Relative Risk	p-value
	Ill (a)	Not Ill (b)		Ill (c)	Not Ill (d)			
Chicken Salad Wrap	11	4	73%	8	32	20%	3.67	0.0002
Mixed Green Salad	6	4	60%	12	33	27%	2.25	0.042
Ham Sandwich	3	15	17%	19	18	51%	0.32	0.014
Turkey Sandwich	2	11	15%	20	22	48%	0.32	0.038
Chips	15	27	36%	7	6	54%	0.66	0.24
Apple	19	20	49%	3	13	19%	2.60	0.039
Cookie	16	23	41%	6	10	38%	1.09	0.81

Question 12. Does the p-value calculation support the findings of the confidence intervals as a measure of statistical significance?

Question 13. Review the findings of the cohort study and the ingredients of the entrees in the boxed lunches. Is there an ingredient that concerns you?

Case-Control Study

Case-Control Study

- Why are results similar but not as close to the results observed with the cohort study?
- Does the case-control study have validity?

11-8

Another way to estimate association may be to conduct a case-control study. The 19 ill case-patients were matched against 19 controls.

Foods Served	Cases		Controls		Odds Ratio	Confidence Intervals	
	Ate	Did not eat	Ate	Did not eat		Lower Limit	Upper Limit
Chicken Salad Wrap	11	8	2	17	11.68	2.082	65.608
Mixed Green Salad	6	13	1	18	6.00	1.078	33.379
Ham Sandwich	3	16	10	9	0.17	0.0367	0.777
Turkey Sandwich	2	17	5	14	0.33	0.0552	1.965
Chips	15	4	16	3	0.70	0.1344	3.6774
Apple	14	5	15	4	0.75	0.1661	3.3566
Cookie	16	3	17	2	0.63	0.0924	4.2587

Question 14. Why are results similar but not as close to the results observed with the cohort study? Does the case-control study have the same validity?

Monday Morning

Monday Morning

- Review the ingredients of the four entrees and look for a common ingredient that may be associated with illness.
- What are your next steps?

11-9

Monday morning the outbreak response team convenes to share any findings. The epidemiologic investigator shares the results of the cohort study and states that those that ate the chicken salad wrap and the mixed green salad were more likely to become ill than those that did not eat either of the foods.

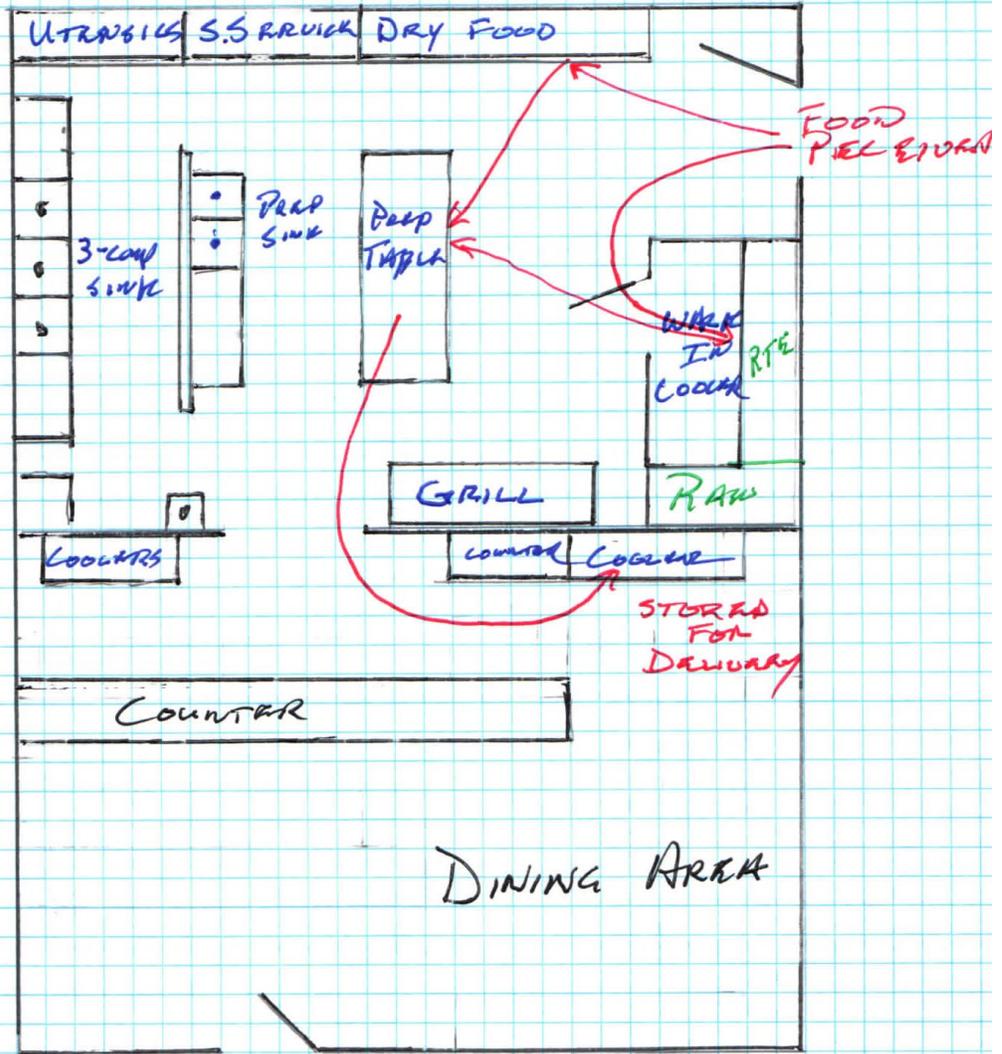
Question 15. Review the ingredients of the four entrees and look for a common ingredient that may be associated with illness. What are your next steps?

Monday Afternoon

The health department has received information back from the state public health lab that the first three STEC samples that were sent to PulseNet for cgMLST indicate that the three isolates differed by 3 alleles or less. Note that the soft “cut-off” established by the CDC is 10 alleles or less for relatedness of strains. They were also informed that there were two cases of STEC from a neighboring county that were closely related to the three from West County. They are not on the participants list for the birds of prey seminar. The environmental investigation team shared the finding of their investigation of the Raptor Deli.

11-12

RAPTOR DEZ1



MONDAY Aug 8th RAPTOR DELI
MEETING w ADDY EGGLETON, OWNER

SALAD

- MIXED GREENS PURCHASED THROUGH RESTAURANT SUPPLY (BAILED LOT 1681)
- TOMATO & CUCUMBER ALSO FROM RESTAURANT SUPPLY - BOXED
- CILANTRO FROM HERBS FROM HERBERT
- PRODUCT STORED IN WALK-IN (RT SIDE)
- * MIXED IN LARGE STAINLESS STEEL BOWL AND PORTIONED INTO SINGLE SERVE CONTAINER

WRAP

- LETTUCE PURCHASED THROUGH RESTAURANT SUPPLY
- CILANTRO FROM HERBS
- CHICKEN COOKED DAY BEFORE (BONED), CUBED AND STORED IN WALK-IN
- * CHICKEN SAUCE MIXED SATURDAY MORNING AND WRAPPED IN TORTILLA IMMEDIATELY
- ALL BOXED LUNCHES STORED IN REACH-IN COOLERS BEHIND COUNTERS

PAGE 1

GENERAL THOUGHTS

- RAPTOR HAS BEEN SUPPLYING BOARD LUNCHES FOR THE PAST 10 YEARS
- ROUTINE INSPECTIONS HAVE NOT IDENTIFIED ANY SIGNIFICANT VIOLATIONS
- WALK-IN TRAYS ARE COOLED AND RATHER BETWEEN 38°F AND 41°F
- DELI HAS NO-BARE HAND ON RTE FOODS APPEARS TO UNDERSTAND GLOVE USE
- TRUCK DOES NOT APPEAR TO BE A SOURCE OF CONTAMINATION IN FACILITY
- THERE WAS SOME CILANTRO FROM FH/SATURDAY - PRODUCT OBTAINED PRODUCT STORED IN FH SAMPLE REFRIGERATOR.

PAGE 2

The cilantro is obtained from a local source this time of year. Herbs by Herbert is the local producer and delivers to only a few retail establishments – Raptor Deli and two small grocery

stores catering with a health food section. Their product is organic and it has been USDA certified. Cilantro was obtained from Raptor Deli.

The environmental investigators visited the small farm where the cilantro was grown. All product had been harvested from the raised containers.

Monday Afternoon

- With this new information what are the next steps of the response team?
- If production occurred as depicted in the photo, what would be the main focus of an environmental assessment of the production facility?



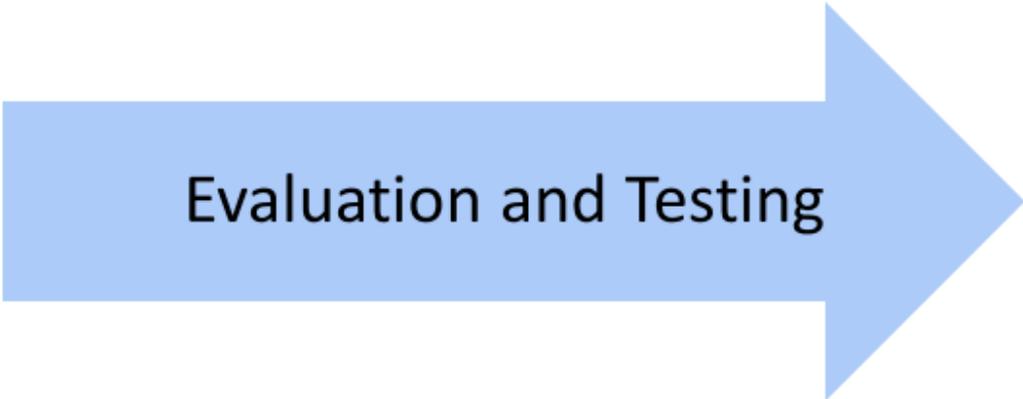
11-10

Question 16. With this new information what are the next steps of the response team?

Question 17. If production occurred as depicted in the photo, what would be the main focus of an environmental assessment of the production facility?

The outbreak has now been contained as all cilantro from Herbs by Herbert has been removed from the distribution. An environmental assessment of the producer revealed that the water supply to the cilantro may have been contaminated during some recent heavy rains. Runoff from a neighboring property was evident. The neighbor raises cattle.

Coming Up Next



Evaluation and Testing

11-11