



*is for
Investigation*

Outbreak investigation methods
from mystery to mastery

PLEASE NOTE:

- ❖ All links in this document are no longer active.
- ❖ Continuing Education Credits (CEUs) are no longer given.
- ❖ CD Roms are no longer available.

I is for Investigation: Outbreak investigation methods from mystery to mastery
Second Edition

2014

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Introduction

Welcome to the third edition of the *I is for Investigation* training series from the UNC Center for Public Health Preparedness (UNC CPHP). This edition is updated from content developed in 2005.

This CD-ROM and facilitator's guidebook contains seven modules that provide an introduction to the basics of outbreak investigation

- ♦ Recognizing an Outbreak
- ♦ Study Design
- ♦ Designing Questionnaires
- ♦ Interviewing Techniques
- ♦ Analyzing Data
- ♦ Writing an Outbreak Report
- ♦ Risk and Crisis Communication

Each module contains a PowerPoint™ presentation with detailed speaker's notes, guided discussion questions for individuals or groups, and additional resources. These modules are designed to be used for computer-based self-study, or as a face-to-face teaching tool for trainers for lunch and learn seminars or in-service trainings.

Computer-based self-study

Visit the UNC CPHP Training Web Site (<http://cphp.sph.unc.edu/training>), access the "Training Series" link, and select the desired training module. The online materials are identical to those included in this Guidebook and CD-ROM.

If you do not have Internet access, you may review the PowerPoint™ slide sets with speaker's notes provided on the CD-ROM and follow the instructions in this Guidebook to complete the accompanying pre- and post-tests.

Facilitated face-to-face training

Review the Facilitator's Guidelines and materials contained in this Guidebook and on the accompanying CD-ROM.

Use the CD-ROM to access printable copies of the PowerPoint™ slide handouts and pre-tests and post-tests for each module.

You may also wish to reference the guided discussion questions provided for each module, though this is not required to receive continuing education credit.

When training is completed, participants may access an online evaluation associated with each module to receive a certificate of completion and/or relevant continuing education credit. Specific information about completion requirements for certificates of completion and continuing education credit is provided at the end of each module.

We hope that you enjoy this series and find the training materials useful. If you have questions or comments about these materials, or are interested in working with UNC CPHP to develop training materials specifically for your staff, contact us at cphp@unc.edu or 919-843-5561.

Development Team

The UNC Center for Public Health Preparedness (UNC CPHP) is dedicated to improving the capacity of public health agencies and their staff through research, educational programs, and technical assistance. UNC CPHP is located in the North Carolina Institute for Public Health at the University of North Carolina Gillings School of Global Public Health.

The materials in this CD-ROM and facilitator's guidebook were updated and revised in 2012 and 2013 from the original curriculum by the following UNC CPHP staff:

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For additional trainings on a wide variety of topics related to public health preparedness; epidemiology and surveillance; and outbreak detection and investigation, please visit the UNC CPHP Training Web Site at <http://cphp.sph.unc.edu/training>. Certificates of completion and continuing education credits are available for some trainings.



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THE NORTH CAROLINA
Institute *for* Public Health

Formerly known as the North Carolina Center for Public Health Preparedness (NCCPHP), UNC CPHP brings together faculty and staff from the UNC Preparedness and Emergency Response Learning Center (PERLC), the North Carolina Preparedness and Emergency Response Research Center (NCPERRC) and projects on pandemic influenza planning, emerging and re-emerging infectious diseases, emergency law, public health surveillance, mental health preparedness, and applied epidemiology. This publication was produced by the UNC PERLC via funding from the Centers for Disease Control and Prevention's Office of Public Health Preparedness and Response under Cooperative Agreement 1U90TP000415. The contents of this CD-ROM and facilitator's guidebook are solely the responsibility of the authors and do not necessarily represent the official views of CDC.

Disclaimer: The materials contained in these presentations are obtained from a variety of sources. They are provided solely for educational purposes and are to be used as guidelines and reference materials only. In view of the possibility of human error or changes in medical sciences, neither the authors, nor the publisher, nor any other party who has been involved in the preparation or publication of this work warrants that the information contained herein is in every respect accurate or complete. Viewers are encouraged to confirm the information contained herein with other sources. Viewers should attempt to obtain the most current information when implementing programs or treating patients.

Facilitation Guidelines

If you plan to use these materials for training a group, you may want to review the following facilitation guidelines.

Prior to the session:

- ♦ Review the slides, scripts, and speaker's notes to become familiar with the content of the session
- ♦ Duplicate materials needed by participants
- ♦ Establish ground rules
- ♦ Establish roles
- ♦ Organize the room to encourage discussion; check the equipment

Opening remarks:

- ♦ Welcome the participants
- ♦ Clarify the purpose of the discussion
- ♦ If participants do not know each other, allow time for introductions
- ♦ Introduce a warm-up question or comments to help participants focus on the topic of the discussion

During the discussion:

- ♦ Proceed one question at a time
- ♦ Begin the discussion with a volunteer or by following a certain order
- ♦ Encourage participation by taking advantage of different fields of expertise represented by the group members
- ♦ Engage the passive or quieter participants by relating to their particular skills
- ♦ Share your own perspectives, but try not to dominate the discussion
- ♦ Be supportive of people's answers and provide positive feedback to encourage participation
- ♦ Maintain the pace of discussion so that time is distributed evenly among all questions
- ♦ Record key ideas on a board or flip chart if you find it to be helpful
- ♦ Maintain a positive, enthusiastic attitude throughout the discussion
- ♦ Bring the discussion to an end with a brief summary or by stating some aspects of the answers that were left unsaid

Closing remarks:

- ♦ Thank the participants for their involvement and contributions

Session 1: Recognizing an Outbreak

Session Overview

Summary

By definition, an outbreak is the occurrence of more cases of disease than expected for a given place and time. The decision whether or not to investigate an outbreak depends on several factors, including whether a true outbreak can be verified. There are basic steps that can be followed to investigate an outbreak, and but these steps can be followed in a flexible manner, so the order can change and steps can be skipped or repeated as needed. These steps include verification of the diagnosis, allow for identification of the incubation period, and are necessary for generating hypotheses about the exposure that may have caused the outbreak. A case definition is needed to classify case-patients related to the outbreak and to conduct additional case finding.

Conducting descriptive epidemiology is a first step in characterizing the outbreak so that possible causes can be identified. Descriptive epidemiology familiarizes the investigator with data about time, place, and person and is essential for hypothesis generation. Measures of central tendency provide a means of assessing the distribution of data. These measures include mean and median. Finally, epi curves, spot maps, and line listings are all ways in which you can summarize and review the time, place, and person elements – respectively – of descriptive statistics. These methods can provide additional information and clues about the cause of the outbreak.

Intended Audience

All public health, medical, veterinary, pharmacy, emergency management, hospital and other professionals interested in public health preparedness and field epidemiology.

Running Time

35 minutes of lecture

20 minutes for pre-test, post-test, and evaluation

Optional Discussion: 15 minutes (approximate)

Learning Objectives

- ♦ Identify steps of an outbreak investigation
- ♦ Develop a case definition
- ♦ Identify a process for case finding in an outbreak
- ♦ Apply methods used to orient data by person, place, and time
- ♦ Create and interpret epidemic curves

Session 1: Recognizing an Outbreak Pre-Test

1. Which of the following is NOT a reason for investigating an outbreak?
 - a. The outbreak involves a commercially distributed food
 - b. Signs and symptoms among the affected suggest that they might not have the same illness
 - c. The outbreak involves a severe illness
 - d. There is outside pressure to investigate the outbreak

2. Which of the following are components used to describe an outbreak?
 - a. Time
 - b. Place
 - c. Person
 - d. All of the above

3. In an outbreak of a disease with an average incubation period of 24 hours, what unit of time would you use for the x-axis of an epidemic curve?
 - a. 6 hours
 - b. 12 hours
 - c. 8 hours
 - d. 2 hours

4. An epidemic curve can provide information on the outbreak's:
 - a. Magnitude
 - b. Pattern of spread
 - c. Exposure and/or disease incubation period
 - d. All of the above

5. If a laboratory test of a specimen comes back negative, which of the following conclusions would be the best choice?
 - a. The pathogen tested for did not cause the illness being investigated
 - b. The pathogen was likely not present in the specimen at the time of testing
 - c. The pathogen was cleared by the person's immune response prior to the specimen being submitted to the laboratory
 - d. The specimen was collected too late in the patient's illness

Session 1: Recognizing an Outbreak PowerPoint Presentation Instructions

The CD-ROM that accompanies this Guidebook contains the complete PowerPoint presentation along with speaker's notes. The authors recommend that you thoroughly review these notes and practice the training before presenting it to an audience. *All participants should complete the pre-test on the preceding page before beginning this training presentation.*

The presentation for this training is available on the CD-ROM as:
Session1.ppt

The CD-ROM also contains presentation handouts formatted with 3 slides to each page and space for participants to take notes. Facilitators may wish to print and distribute copies of the handouts to each participant at the beginning of the training session.

The handout for this training is available on the CD-ROM as:
Session1handouts.pdf

Session 1: Recognizing an Outbreak Post-Test

1. Which of the following is NOT a reason for investigating an outbreak?
 - a. The outbreak involves a commercially distributed food
 - b. Signs and symptoms among the affected suggest that they might not have the same illness
 - c. The outbreak involves a severe illness
 - d. There is outside pressure to investigate the outbreak

2. Which of the following are components used to describe an outbreak?
 - a. Time
 - b. Place
 - c. Person
 - d. All of the above

3. In an outbreak of a disease with an average incubation period of 24 hours, what unit of time would you use for the x-axis of an epidemic curve?
 - a. 6 hours
 - b. 12 hours
 - c. 8 hours
 - d. 2 hours

4. An epidemic curve can provide information on the outbreak's:
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 - b. The pathogen was likely not present in the specimen at the time of testing
 - c. The pathogen was cleared by the person's immune response prior to the specimen being submitted to the laboratory
 - d. The specimen was collected too late in the patient's illness

Session 1: Recognizing an Outbreak Answer Key

1. Which of the following is NOT a reason for investigating an outbreak?

Answer: b. Signs and symptoms among the affected suggest that they might not have the same illness

Feedback: An investigation would not be warranted in a situation where the signs and symptoms among the affected suggest that they might not have the same illness. In this situation, the cases probably would not all meet the established case definition and thus might not meet the definition of an outbreak, which is the occurrence of more cases of a disease than expected for a particular place and time. If there is outside pressure to investigate the outbreak (from the media, politicians, etc.), it is probably in your best interest to conduct an investigation.

2. Which of the following are components used to describe an outbreak?

Answer: d. All of the above

Feedback: The three components used to describe an outbreak are person, place, and time.

3. In an outbreak of a disease with an average incubation period of 24 hours, what unit of time would you use for the x-axis of an epidemic curve?

Answer: a. 6 hours

Feedback: When you choose the time unit for the x-axis of an epidemic curve, you should begin with a unit approximately one-quarter the length of the incubation period. With an incubation period of 24 hours, one-quarter would be 6 hours.

4. An epidemic curve can provide information on the outbreak's:

Answer: d. All of the above

Feedback: An epidemic curve can provide information on the outbreak's magnitude (size of the outbreak), the pattern of spread (intermittent, continuous, point-source, or propagated), and the exposure and/or disease incubation period.

5. If a laboratory test of a specimen comes back negative, which of the following conclusions would be the best choice?

Answer: b. The pathogen was likely not present in the specimen at the time of testing

Feedback: A negative test result could be a true finding or it could be a false negative result. If the laboratory test comes back negative, we can conclude that the pathogen tested for was likely not present in the specimen when the testing was done. We cannot conclude that a patient's immune system cleared the infection or that the specimen was not collected at the right time. However, we also should not conclude that the pathogen tested for did not cause the illness being investigated, since a false negative is a possibility.

Session 1: Recognizing an Outbreak Evaluation Instructions

Congratulations on completing Session 1 of the *I is for Investigation* training curriculum.

To ensure the best learning experience possible for training participants, we would like your feedback. This feedback is carefully reviewed by UNC CPHP staff to make continual improvements to training materials.

In addition, you must complete the evaluation in order to receive a certificate of completion or continuing education credit (if applicable) for this training.

The evaluation for this training is available online at:

<http://tiny.cc/Session1>

To begin the evaluation, you will need to log in to the UNC CPHP Training Web Site. If you have previously taken online trainings through the Training Web Site (including other trainings in the *I is for Investigation* curriculum), you may use your existing username and password to log in to this evaluation. If this is your first time visiting the Training Web Site, you must complete a short registration to create your username and password; instructions will be provided.

Please Note: Be sure that you have completed all training components (pre-test, training activity, and post-test) before accessing the evaluation. You will be required to certify that you have completed all training components as part of the evaluation. Contact hours for this training are based on the completion of all training components.

Session 1: Recognizing an Outbreak

Optional Discussion Guide

(Facilitator)

Now that you have heard how to begin an outbreak investigation, consider the following:

You work for the county health department and have received 5 reports of *Salmonella* over the past 2 weeks.

Do you think this is an outbreak? What additional information might you want to know to determine if an outbreak is occurring?

(Discussion cues)

Whether or not an outbreak exists depends on the background rate of *Salmonella* cases in the county for that time. We do not know the background rate from the information provided. Remember that an outbreak exists when more than the expected number of cases occurs at a particular place and time. If you are in a county that normally sees 8-12 cases of *Salmonella* per month, 5 reports of *Salmonella* over two weeks might represent the normal number of cases reported. However, if you are in a county that normally sees one or two cases of *Salmonella* per month, this would seem to be more than the expected number of cases.

The timing of the reports also plays an important part in determining if an outbreak exists. If you are looking at baseline data, you need to be sure and compare to a similar time period. Looking back over years of data, we know that reports of *Salmonella* cases tend to increase in the summer months. The number of cases reported in February may not be a good indicator of the number of cases you would expect to see in July.

Additional information that might help to determine if this is an outbreak would include more detailed person, place, and time information from the case-patients. This information will help you begin to determine if these cases might have a common exposure, such as workplace, attendance at an event, or consumption of a specific food item. Also, the serotype of *Salmonella* would be important to know. This may take a little longer to get from the laboratory, but most laboratories will be able to provide the serotype. If the cases are of different serotypes, it is unlikely that they represent an outbreak.

(Facilitator)

Below are two fictitious outbreak scenarios. Due to limited time and resources, you can only investigate one of the outbreaks. What factors might you consider in deciding which outbreak to investigate? Why, or why not?

1. An outbreak of viral gastroenteritis affecting 30 out of 70 attendees of a wedding reception
2. An outbreak of *Escherichia coli* O157:H7 among 10 patrons dining at multiple sites of a chain restaurant

(Discussion cues)

Ideally, all reports of possible outbreaks should be investigated, with the goals of preventing further illness, identifying problematic practices, and adding to the knowledge of infectious diseases. However, in reality, not all outbreaks can be investigated due to lack of resources and time. Factors to consider when deciding to investigate include:

- ◆ complaints that involve severe illness,
- ◆ confirmed clusters/large numbers of a similar illness,
- ◆ illness in a food-handler, association with a commercially distributed food, and
- ◆ outside pressure to investigate, which may come from the public, political authorities, or other interest groups.

In the first scenario, there are a large number of similar illnesses. Also, because this scenario appears to be related to a wedding reception, the bride and groom may be upset and want to know what happened to make their guests ill.

The second scenario involves *E. coli* O157:H7, an organism that can cause severe illness and even death, especially in children and elderly. Additionally, because there are case reports from multiple restaurants within the same chain, this scenario indicates there may be an association with a widely distributed food product.

If forced to choose between the two, it seems reasonable to choose the *E. coli* O157:H7 outbreak scenario, as this is a more harmful organism and has the potential to have a wider impact than the wedding reception outbreak scenario.

(Facilitator)

Using the mock case study information provided below, develop a case definition that could be used in an outbreak investigation.

It is March 25 in Eritown, USA. Emergency rooms, local public health clinics, and primary care private practices have been visited by a total of 24 individuals complaining of abdominal cramps, fever, and diarrhea, some bloody, with onset of symptoms in the past 48 hours. So far, all individuals have been students at Eritown Elementary School. Initial laboratory testing on 4 specimens has identified *Shigella sonnei*.

(Discussion cues)

A case definition is a standard set of criteria for deciding whether an individual should be classified as having the illness of interest and should include clinical and person, place, and time criteria. Since we are just beginning our investigation, we will want to start with a broad case definition so that we are sure to catch all potential case-patients. You will also want to be careful not to include any potential exposures in your case definition – if you do, you will lose the ability to look at that exposure as a possible cause of the outbreak!

In this case study, clinical criteria could include anyone confirmed to have *S. sonnei* or anyone with fever and diarrhea. Diarrhea should be clearly defined so that it can be interpreted in the same way by all study personnel and participants. Person, place, and time criteria could include persons at Eritown Elementary who became ill in the week prior to March 25. Although we only know of ill students at this point, we know that *S. sonnei* can affect persons of all ages, so we may not want to exclude teachers and staff at this point. If we find later in the investigation that only students are being affected, we can refine our case definition. *S. sonnei* has an average incubation period of 1-3 days, so going back a week in time should allow for identification of all potential case-patients.

A complete case definition for this outbreak could be as follows: “A case is defined as a person at Eritown Elementary School who has confirmed illness with *S. sonnei* or has fever and diarrhea (3 or more loose stools in a 24-hour period) with onset in the week prior to March 25.”

Session 2: Study Design Session Overview

Summary

In this session, we will discuss the development and testing of hypotheses, and study designs to test these hypotheses. Specifically, we will look at cohort and case control studies and how to decide which one to use. We will conclude by briefly presenting considerations for sampling.

Analytic study is used to test scientific hypotheses about the exposures that could cause disease. These types of studies may help support actions for specific control measures and to help prevent recurrence of a problem.

A case definition with specific criteria helps you identify cases from the study population, as long as it does not include exposures in the hypothesis.

Cohort studies provide a direct estimate of the risk of disease, whereas case-control studies do not. Cohort studies may be preferable when you work with easily identifiable and accessible study populations such as on a cruise ship or at a wedding reception. Case-control studies, when conducted properly, can be an efficient alternative to cohort studies. However, controls in a case-control study should represent the source population, and *not* matched on the exposure factor if matching is used.

Intended Audience

All public health, medical, veterinary, pharmacy, emergency management, hospital and other professionals interested in public health preparedness and field epidemiology.

Running Time

30 minutes of lecture

20 minutes for pre-test, post-test, and evaluation

Optional Discussion: 15 minutes (approximate)

Learning Objectives

- ♦ Develop a hypothesis about an exposure and an outcome
- ♦ Describe the design of cohort studies and case control studies
- ♦ Assess which study design to apply during an outbreak investigation
- ♦ Explain the rationale for sampling in an outbreak investigation

Session 2: Study Design Pre-Test

1. In the early 1990s, the Department of Epidemiology of the Erasmus University in Rotterdam, the Netherlands, initiated the Rotterdam Study. To date, researchers have been following 8,000 elderly people to investigate the determinants of chronic disabling diseases such as Alzheimer's and cardiovascular disease. One study question is whether or not smoking increases the risk of Alzheimer's disease.

Which study design best applies to this research scenario?

- a. Prospective cohort
 - b. Case-control
 - c. Retrospective cohort
2. Which of the following is NOT an advantage of a cohort study?
 - a. Can examine rare exposures
 - b. Can reasonably conclude that cause preceded disease
 - c. Can examine rare diseases
 - d. Least prone to selection bias
 3. Which of the following is/are a problem with convenience sampling?
 - a. Convenience sampling may lead to biased results
 - b. Convenience sampling is based on subjective judgment
 - c. Cases may or may not be representative of the total population
 - d. People are selected randomly to participate
 - e. All of the above
 - f. Answer choices a, b and c
 4. In a case-control study, the study population is selected and grouped by:
 - a. Exposure status
 - b. Date of onset of illness
 - c. Outcome (disease) status
 - d. Sex (gender)

Session 2: Study Design

PowerPoint Presentation Instructions

The CD-ROM that accompanies this Guidebook contains the complete PowerPoint presentation along with speaker's notes. The authors recommend that you thoroughly review these notes and practice the training before presenting it to an audience. *All participants should complete the pre-test on the preceding page before beginning this training presentation.*

The presentation for this training is available on the CD-ROM as:
Session2.ppt

The CD-ROM also contains presentation handouts formatted with 3 slides to each page and space for participants to take notes. Facilitators may wish to print and distribute copies of the handouts to each participant at the beginning of the training session.

The handout for this training is available on the CD-ROM as:
Session2handouts.pdf

Session 2: Study Design Post-Test

1. In the early 1990s, the Department of Epidemiology of the Erasmus University in Rotterdam, the Netherlands, initiated the Rotterdam Study. To date, researchers have been following 8,000 elderly people to investigate the determinants of chronic disabling diseases such as Alzheimer's and cardiovascular disease. One study question is whether or not smoking increases the risk of Alzheimer's disease.

Which study design best applies to this research scenario?

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 - b. Case-control
 - c. Retrospective cohort
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 - a. Exposure status
 - b. Date of onset of illness
 - c. Outcome (disease) status
 - d. Sex (gender)

Session 2: Study Design

Answer Key

1. In the early 1990s, the Department of Epidemiology of the Erasmus University in Rotterdam, the Netherlands, initiated the Rotterdam Study. To date, researchers have been following 8,000 elderly people to investigate the determinants of chronic disabling diseases such as Alzheimer's and cardiovascular disease. One study question is whether or not smoking increases the risk of Alzheimer's disease. Which study design best applies to this research scenario?

Answer: a. Prospective cohort

Feedback: The study described is a prospective cohort study. The participants were identified by their exposure status (smoker / non-smoker) and then followed through time to determine whether they had the outcome (Alzheimer's disease). In a case-control study, the study population is selected and grouped by outcome or disease status. Remember, in a case-control study, you first identify the source population, then establish a case definition and select cases, then select controls, and finally determine past exposure status.

2. Which of the following is NOT an advantage of a cohort study?

Answer: c. Can examine rare diseases

Feedback: Cohort studies are not useful for examining rare diseases. With a rare disease, there is a good chance that within a cohort, you may see very few, if any, case-patients, therefore limiting the investigators ability to see relationships between exposure and disease. Rare diseases are best suited to a case-control study.

3. Which of the following is/are a problem with convenience sampling?

Answer: f. Answer choices a, b and c are correct.

Feedback: Convenience samples are based on subjective judgment; the investigator decides who to include in the study. Therefore, respondents may not be representative of the population of interest. In addition, the selection of persons who are easily accessible may end up being biased toward some demographic characteristic or exposure. This would ultimately bias your study results. In convenience sampling, people are not selected randomly to participate, instead people who are easily accessible are chosen.

4. In a case-control study, the study population is selected and grouped by:

Answer: c. Outcome (disease) status

Feedback: In a case-control study, the study population is selected and grouped by outcome or disease status. Remember, in a case-control study, you first identify the source population, then establish a case definition and select cases, then select controls, and finally determine past exposure status.

Session 2: Study Design Evaluation Instructions

Congratulations on completing Session 2 of the *I is for Investigation* training curriculum.

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The evaluation for this training is available online at:

<http://tiny.cc/Session2>

To begin the evaluation, you will need to log in to the UNC CPHP Training Web Site. If you have previously taken online trainings through the Training Web Site (including other trainings in the *I is for Investigation* curriculum), you may use your existing username and password to log in to this evaluation. If this is your first time visiting the Training Web Site, you must complete a short registration to create your username and password; instructions will be provided.

Please Note: Be sure that you have completed all training components (pre-test, training activity, and post-test) before accessing the evaluation. You will be required to certify that you have completed all training components as part of the evaluation. Contact hours for this training are based on the completion of all training components.

Session 2: Study Design

Optional Discussion Guide

(Facilitator)

Read the following mock case study:

It is October 29 in the city of Jonesville. Emergency rooms, local public health clinics, and primary care private practices have been visited by a total of 42 individuals complaining of abdominal cramps and bloody diarrhea, with onset of symptoms in the past 48 hours. So far, all individuals have been females ranging in age from their 20s to their 60s. Public health laboratory tests have identified the presence of *Escherichia coli* (*E. coli* O157:H7) bacterium in case stool samples.

Investigators have descriptively analyzed case interview data, and now know that 35 of the 42 case-patients worked out at the same local gym on October 21-23. Case-patients who did not work out at the gym have reported sharing living quarters with case-patients who *did* work out at the gym.

Case report data have revealed that in addition to two public water fountains, the gym has a water cooler with bottled water from a supplier, and a complementary juice bar that serves one seasonal juice each month. Five-day case food histories indicate that from October 21 to 23, 11 (25%) of the 42 cases consumed water cooler water, and 33 (79%) of the 42 cases consumed locally-bottled apple cider at the juice bar. Three (7%) cases ate at the same local restaurant—a franchise that serves hamburgers and chicken sandwiches.

Which of the following would be the best leading hypothesis?

- Exposure to gastrointestinal illness occurred at the local gym in October
- Exposure to *E. coli* O157:H7 occurred through juice served at the local gym after October 15
- Adult women who worked out at the local gym from October 21 to 23 are becoming infected with *E. coli* O157:H7 through drinking unpasteurized apple cider contaminated at the orchard and served at the gym's juice bar.

(Discussion cues)

The best hypothesis is **B**: Exposure to *E. coli* O157:H7 occurred through juice served at the local gym in late October.

Answer **A** is too general – we have enough information to suspect more than the vague fact that the gym was involved in exposure, and we can narrow down the time frame more than just “October.”

Answer **C** is too specific at this time. According to what we know, men could have been exposed as well. Additionally, women might have shared juice they purchased with their children or families. At this point we do not know enough to suspect whether the cider became contaminated at the orchard versus at some other point during production. Finally, October 21-23 is a very narrow time frame for exposure. Illnesses began appearing on October 29. The *average* incubation period for *E. coli* is 3-4 days, which would mean that on average, cases were exposed during October 25-26. In reality, some people could have been exposed a bit earlier or later, so we might widen this range to October 19-28. Thus, the “late October” time frame given in answer **B** is probably a better choice.

(Facilitator)

Listed below are several examples of epidemiologic studies. Match the appropriate epidemiologic study designs to each study listed.

<u>Study Designs:</u>	<u>Example studies:</u>
Prospective Cohort Study	<ol style="list-style-type: none">1. Investigators looked at pregnant women with varying degrees of asthma (none, mild, moderate/severe) and followed them over time to determine birth outcomes.2. Persons with <i>Salmonella</i> and persons without a diagnosis of <i>Salmonella</i> were interviewed about their exposure to eggs to assess a possible association between eggs and illness with <i>Salmonella</i>.3. Investigators interviewed all attendees of a wedding reception to determine what caused an outbreak of campylobacteriosis.
Retrospective Cohort Study	
Case-Control Study	

(Discussion cues)

Study #1 groups study participants by exposure groups (none, mild, and moderate/severe asthma) and follows them forward in time to determine the birth outcomes. A study that groups the population by exposure status and follows them for outcome is a **cohort study**. This study is **prospective**, because participants are followed forward in time.

Study #2 groups study participants by their outcome status (by whether they had *Salmonella* or no illness at all). The participants' past exposure to eggs was then assessed. A study that groups participants based on their outcome and then determines their exposure status is a **case-control study**.

Study #3 looks at a well-defined group (attendees at a wedding reception) and assesses exposures and outcomes in an outbreak situation. A study that assesses all members of a group for various exposures regardless of their outcome is a **cohort study**. This study is **retrospective**, because it looked back at an outcome that already occurred.

(Facilitator)

Based on the following scenario, what type of study (retrospective cohort or case-control) would you use for an investigation? Why would you choose that design?

You are on staff at a local health department when you receive a call about an increase in the number of cases of gastrointestinal illness among students at secondary school with 4,150 students. Currently, 105 cases have been identified over two weeks that meet the case definition. Typically, only 15 cases a week of gastrointestinal illness are reported. No illness has been identified in teachers or the surrounding community. A common exposure among the ill students is attendance at a school dance. Approximately 2,600 students attended the dance and the school can provide information on the attendees from ticket sales. You want to undertake an investigation to test the hypothesis that attendance at the school dance contributed to the illness.

(Discussion cues)

At this point, the goal of the epidemiologic study is to find the source of the outbreak. The population at risk is well-defined and consists of secondary school students. The primary exposure of interest is attendance at a school dance. The outcome is relatively rare (only 105 cases or approximately 2.5% of the 4,150 students in the secondary school are known to be ill) and the suspected exposure (the school dance) is common (about 2,600 or 63% of the students attended the dance). With unlimited resources, one could do either a cohort or a case-control study to investigate the source of this outbreak.

A retrospective cohort study would include all students who attend the secondary school, comparing those who attended the school dance with those who did not. With the large number of students in the cohort, however, a cohort study would be costly and take a lot of time, and response rates are likely to be poor. If a random sample of the cohort were selected (a more doable undertaking), the number of cases included in the study is likely to be small, decreasing the power of the study to find a source of the outbreak. If attending the dance is extremely common, a retrospective cohort study could be conducted among dance attendees only. This is still quite a large population in which to assess the exposure of every member of the cohort.

A case-control study would compare students with the illness (cases) with a sample of students without the illness (controls). It would allow one to limit the number of subjects involved in the study, include a sufficient number of cases to assure adequate study power, and focus one's efforts on the smaller number of subjects to get higher participation/response rates. Although a case-control study would not allow one to directly calculate attack rates, it would be much cheaper and quicker to undertake than a cohort study. As a result, it would seem that a case-control study would be the most cost-effective study type in this instance.

Session 3: Designing Questionnaires

Session Overview

Summary

In this session, we will begin by discussing how to prepare for designing a questionnaire. We will talk about the different types of questionnaires, the different types of questions, and then how to design questions and format them into a questionnaire.

Prepare to design a questionnaire with an understanding of good questionnaire design principles. Ask only about the information you need to meet your research objectives. Have clear research objectives; list variables to be measured; identify an analysis plan; and consider cost and logistical aspects.

A hypothesis generating questionnaire should be used to explore all potential sources of infection, but with a small number of cases and no comparison group. A hypothesis testing questionnaire literally tests a research hypothesis based on data collected via a hypothesis generating questionnaire. Include either all cases or a representative sample of cases, and it is also used for collecting data from a comparison group in the from the study population.

The three broad question types are: closed-ended, open-ended, and fill-in-the-blank. Include the key elements of question design to ensure that the data collected from your questionnaire can be used efficiently. These elements are: reliability, validity, specificity, simplicity, asking only one question, mutually-exclusive answer choices, providing date/time references, and using response options that parallel existing data sources. Consider specific formatting needs that will assist with navigation for self-administered versus interviewer-administered questionnaires. Finally, a well-formatted questionnaire minimizes respondent burden.

Intended Audience

All public health, medical, veterinary, pharmacy, emergency management, hospital and other professionals interested in public health preparedness and field epidemiology.

Running Time

35 minutes of lecture

20 minutes for pre-test, post-test, and evaluation

Optional Discussion: 15 minutes (approximate)

Learning Objectives

- ♦ List strategies for successful questionnaire design
- ♦ Differentiate between hypothesis generating and hypothesis testing questionnaires
- ♦ Identify three question types and when to use them
- ♦ Explain characteristics of well-designed questions
- ♦ Explain the type of data obtained from different question types
- ♦ List principles for formatting a questionnaire

Session 3: Designing Questionnaires Pre-Test

1. In preparation for questionnaire design, you should do which of the following?
 - a. Have an analysis plan
 - b. Focus on only one possible contributor to the outbreak
 - c. Have a clear purpose and research objectives
 - d. List variables to be measured
 - e. All of the above
 - f. Answers a, c and d

2. Which of the following is NOT a characteristic of a hypothesis testing questionnaire?
 - a. Includes targeted, specific questions
 - b. Is intended for case-patients only
 - c. Limits the use of open-ended questions
 - d. Only asks about suspected risk factors

3. Closed-ended questions:
 - a. Provide answer choices in pre-coded categories that represent counts, ranges, or demographic information
 - b. Are most appropriate when possible response categories are too numerous to list
 - c. Are most appropriate for hypothesis generating questionnaires
 - d. Allow respondents to provide answers in their own words

4. In general, questionnaires should:
 - a. Maintain white space on the page
 - b. Provide clear but brief instructions for survey completion
 - c. Utilize transitional cues for each subsection of questions
 - d. Ask only open-ended questions
 - e. Not include any names or identification numbers, so that participants have complete confidentiality
 - f. All of the above
 - g. Answers a, b and c

5. Pilot-testing of questionnaires is important for which reason(s)?
 - a. To help standardize questionnaires
 - b. To assess whether the questions mean the same thing to every respondent
 - c. To show the community that you are taking action
 - d. To determine how long it takes respondents to complete the questionnaire
 - e. All of the above
 - f. Answers a, b and d

Session 3: Designing Questionnaires PowerPoint Presentation Instructions

The CD-ROM that accompanies this Guidebook contains the complete PowerPoint presentation along with speaker's notes. The authors recommend that you thoroughly review these notes and practice the training before presenting it to an audience. *All participants should complete the pre-test on the preceding page before beginning this training presentation.*

The presentation for this training is available on the CD-ROM as:
Session3.ppt

The CD-ROM also contains presentation handouts formatted with 3 slides to each page and space for participants to take notes. Facilitators may wish to print and distribute copies of the handouts to each participant at the beginning of the training session.

The handout for this training is available on the CD-ROM as:
Session3handouts.pdf

Session 3: Designing Questionnaires Post-Test

1. In preparation for questionnaire design, you should do which of the following?
 - a. Have an analysis plan
 - b. Focus on only one possible contributor to the outbreak
 - c. Have a clear purpose and research objectives
 - d. List variables to be measured
 - e. All of the above
 - f. Answers a, c and d

2. Which of the following is NOT a characteristic of a hypothesis testing questionnaire?
 - a. Includes targeted, specific questions
 - b. Is intended for case-patients only
 - c. Limits the use of open-ended questions
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 - b. Are most appropriate when possible response categories are too numerous to list
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 - c. Utilize transitional cues for each subsection of questions
 - d. Ask only open-ended questions
 - e. Not include any names or identification numbers, so that participants have complete confidentiality
 - f. All of the above
 - g. Answers a, b and c

5. Pilot-testing of questionnaires is important for which reason(s)?
 - a. To help standardize questionnaires
 - b. To assess whether the questions mean the same thing to every respondent
 - c. To show the community that you are taking action
 - d. To determine how long it takes respondents to complete the questionnaire
 - e. All of the above
 - f. Answers a, b and d

Session 3: Designing Questionnaires

Answer Key

1. In preparation for questionnaire design, you should do which of the following?

Answer: f. Answers a, c and d

Feedback: In preparation for questionnaire design, you should first have a clear purpose and research objective, list the variables to be measured, and have an analysis plan. A clear purpose and research objective will help you to determine whether the questionnaire should serve the purpose of collecting data for hypothesis generating or hypothesis testing. A list of variables to be measured ensures that you have a reason for asking each question in your questionnaire and that you know what you will do with the data. An analysis plan will guide the selection of question types and response option categories used on the questionnaire and will help ensure that the data collection yields variable coding that can be analyzed efficiently. You should not focus on only one possible contributor to the outbreak when you first prepare for questionnaire design. Typically, you begin with a hypothesis-generating questionnaire which is open-ended and covers more than one possible contributor to an outbreak.

2. Which of the following is NOT a characteristic of a hypothesis testing questionnaire?

Answer: b. Is intended for case-patients only

Feedback: A hypothesis testing questionnaire should not be intended for case-patients only; it should be intended for both case-patients and controls. In order to test a hypothesis, you need information not only from those who were ill, but also from those who were not ill so that comparisons between the two groups can hopefully identify a cause for the illness. A hypothesis testing questionnaire will limit the use of open-ended questions.

3. Closed-ended questions:

Answer: a. Provide answer choices in pre-coded categories that represent counts, ranges, or demographic information

Feedback: Closed-ended questions provide answer choices in pre-coded categories that represent counts, ranges, or demographic information. Examples of closed-ended questions include yes/no questions, sex, number of serving sizes, etc.

4. In general, questionnaires should:

Answer: g. Answers a, b and c

Feedback: In general, questionnaires should maintain white space on the page, provide clear but brief instructions for survey completion, and utilize transitional cues for each subsection of questions. Hypothesis generating questionnaires should use some open-ended questions while hypothesis-testing questionnaires should have limited use of open-ended questions. Closed-ended questions are preferable for hypothesis-testing questionnaires because the data will be used to test for a statistically significant association between exposure and outcome. Questionnaire participants should be assigned a unique identification number so that their responses will be confidential while you are still able to link data.

5. Pilot-testing of questionnaires is important for which reason(s)?

Answer: f. Answers a, b and d are correct.

Feedback: Pilot-testing of questionnaires is important in order to standardize questionnaires, clear up any ambiguous questions or wording, determine how long it takes respondents to complete the questionnaire, and to assess if skip patterns are being used correctly. Pilot-testing of questionnaires is not done to show the community that you are taking action, in fact pilot testing is often done by public health colleagues behind the scenes.

Session 3: Designing Questionnaires Evaluation Instructions

Congratulations on completing Session 3 of the *I is for Investigation* training curriculum.

To ensure the best learning experience possible for training participants, we would like your feedback. This feedback is carefully reviewed by UNC CPHP staff to make continual improvements to training materials.

In addition, you must complete the evaluation in order to receive a certificate of completion or continuing education credit (if applicable) for this training.

The evaluation for this training is available online at:

<http://tiny.cc/Session3>

To begin the evaluation, you will need to log in to the UNC CPHP Training Web Site. If you have previously taken online trainings through the Training Web Site (including other trainings in the *I is for Investigation* curriculum), you may use your existing username and password to log in to this evaluation. If this is your first time visiting the Training Web Site, you must complete a short registration to create your username and password; instructions will be provided.

Please Note: Be sure that you have completed all training components (pre-test, training activity, and post-test) before accessing the evaluation. You will be required to certify that you have completed all training components as part of the evaluation. Contact hours for this training are based on the completion of all training components.

Session 3: Designing Questionnaires

Optional Discussion Guide

(Facilitator)

Below are several questionnaire items to critique. Read the questions and recommend modifications that you think will improve the questions; modifications can be made to the question type, the question wording, or the response options.

1. During the seven days before your illness, did you have any pets at home, have contact with household pets elsewhere, or visit a household with pets (including reptiles)?	Yes	No
2. Did you take any prescription medications for this illness? 2a. If yes, what medications? _____	Yes	No
3. Did you travel anywhere during the seven days before your illness? 3a. If airline travel, what airline? _____ 3b. Outgoing flight number: _____ 3c. Returning flight number: _____	Yes	No

(Discussion cues)

Question 1

This question has several problems. First, the question is really asking three separate questions: (1) “Did you have any pets at home?” (2) “Did you have contact with household pets elsewhere?” and (3) “Did you visit a household with pets?”

Additionally, there is reference to both “pets” and “household pets.” If these are different, they need to be defined. Reptiles are specifically mentioned in the last part of the question. If one possible exposure is suggested, why not include others? Or, if reptile exposure may contribute to illness (as might be the case with *Salmonella*), it might be better to ask about reptile exposure as a separate question.

Finally, the question seems to be asking more than it needs to. The question poses locations of pet contact (home, elsewhere), but seems to imply that the contact and not the location is important. If the location is important, this should be asked separately. Otherwise, it may be sufficient to ask if there was any contact with pets or animals.

Question 2

The first part of this question is fine. The wording is specific enough to distinguish between prescription versus over-the-counter medication.

However, the follow-up question could be formatted as a closed-ended question with pre-determined, categorical responses (such as the medications most commonly used to treat the symptoms of the illness under investigation) with a fill-in-the-blank “other” option. Respondents may have trouble remembering the name of a prescription medication. In a self-administered setting in which you want the questionnaire to be easy (and quick) to fill out, the closed-ended format would be easier for a respondent than trying to recall the name(s) of medications. If you were interested in a particular medication, it might be best to ask a yes/no question specifically addressing that medication.

Question 3

While asking about travel history is appropriate, you probably need to better define “travel anywhere.” Does a shopping trip to the next town constitute travel? In most investigations, the answer is probably no, but the respondent may not know that. Wording such as “travel more than XX miles” or “outside the county” would be more specific. Additionally, it is good practice to include specific dates of interest if possible.

Question 3a should probably be two separate questions: “Did you travel by air?” and “What airline did you fly?” It may not be realistic to expect a person to remember their flight numbers or have them on file. In this scenario, the actual flight may not be as important as the location of travel.

Finally, you should include instructions for a skip pattern within this question. Questions 3a-c could be skipped if the respondent did not travel.

(Facilitator)

Distribute copies of this page to participants so they can mark changes prior to discussion.

Below is a questionnaire for you to critique. When looking at the questionnaire, consider the layout, content, and flow of the questionnaire.

Questionnaire to Assist in Determining the Source of Your Infection

1. What date and time did you start feeling ill (onset)?
2. Did you travel outside of County A in the 7 days prior to the onset? If yes, where, what dates, what did you eat?
3. Did you touch any animals or pet chews made out of pork or beef in the 7 days prior to the onset? Did you touch any puppies, kittens, reptiles, pigs, cattle, or birds?
4. Do you know of anyone else who is also ill with similar symptoms? If yes, what do you have in common with this person?
5. What type of work do you do?
6. Does anyone in your household work as a foodhandler, child care worker, or patient care provider?
7. Does anyone in your household attend a preschool or daycare?
8. Did you go swimming (or hot tubing) in the 7 days prior to your illness? If yes, when and where?
9. Did you drink any freshly squeezed (not pasteurized) juice or fresh apple cider in the 7 days prior to your illness?
10. Did you eat any melons in the 7 days prior to your onset?
11. Did you eat any un-washed produce in the 7 days prior to your onset?
12. Did you eat any raw sprouts in the 7 days prior to your onset?
13. Did you eat out in the 7 days prior to your illness? If you can remember, when, where, and what did you eat?
14. Did you eat any undercooked hamburger or other meat in the 7 days prior to onset?
15. What are your sources of drinking water? Do you drink well water or bottled water? What type of bottled water?

(Discussion cues)

This questionnaire is lacking in several areas. First, there is no introduction to let respondents know what the questionnaire is about, tell them who is collecting the information, inform them of the confidentiality of responses, or estimate the time to complete the questionnaire.

There are no questions regarding demographic information or symptom information. These are two sections that should always be included.

The structure of the questionnaire could be better, with clear headings for demographic questions, clinical/symptom questions, and exposure questions.

The questions have no clear space for answers or listed response options. This is particularly important for the questions that would have Yes/No responses – it will be easier and quicker to have the respondent circle Yes or No versus having them write it in. In addition, for questions like number 13, most respondents would not be able to fit their answer into the small space provided before question 14.

More than half of the questions in this questionnaire are actually asking two or more questions at a time. For example, question 6 should be divided into 3 questions about working as a foodhandler, a child care worker, and a patient care provider.

Session 4: Interviewing Techniques

Session Overview

Summary

In this session, we will discuss the different methods of interviewing, standardization of interviews, interviewer training, including interviewing techniques and respondent confidentiality.

Questionnaire design and interview methods are interrelated in the overall process of an outbreak investigation.

The primary purpose of interviews in outbreak investigations is to collect data for case identification, risk factor identification, or hypothesis generation.

Interviews can be interviewer administered (face-to-face or telephone) or self-administered (mailed, emailed, or Web-based). There are advantages and disadvantages to employing either method.

Survey data collection error is a result of both bias and variance in the interview process. Interviewer error can be prevented with adequate interviewer training and the standardization of the questionnaire.

Sound interviewing procedures include: reading questions exactly as they are worded; probing inadequate answers; recording answers without interviewer discretion; and maintaining rapport with respondents. An interviewer manual is something you can also develop to provide interviewer support. Such documentation reduces error and enhances the quality of data collected.

Intended Audience

All public health, medical, veterinary, pharmacy, emergency management, hospital and other professionals interested in public health preparedness and field epidemiology.

Running Time

35 minutes of lecture

20 minutes for pre-test, post-test, and evaluation

Optional Discussion: 15 minutes (approximate)

Learning Objectives

- ♦ Describe the advantages and disadvantages of different interview methods
- ♦ Identify strategies to reduce interviewer error
- ♦ List topics to address in interviewer training
- ♦ Outline confidentiality concerns of both the respondent and the outbreak investigator

Session 4: Interviewing Techniques Pre-Test

1. Which of the following is an interviewer-administered interview?
 - a. Mailed-out
 - b. Telephone
 - c. E-mail
 - d. Web-based

2. Interview method is influenced by:
 - a. Question types used in the study
 - b. Length and format of the
 - c. Cost considerations for survey implementation
 - d. All of the above

3. Which of the following is a disadvantage of a telephone interview?
 - a. Under-coverage
 - b. The survey design can be more efficient
 - c. Higher response rates than mailed questionnaires
 - d. Quicker access to participants

4. True or False: Interviewer training is optional.
 - a. True
 - b. False

5. Which of the following is/are true about face-to-face interviews?
 - c. They tend to have higher response rates than other types of interviews
 - d. They should be shorter than other types of interviews
 - e. They should have more simple skip patterns than other types of interviews
 - f. Non-response is reduced compared with other types of interviews
 - g. They tend to be inexpensive to conduct
 - h. Answers a and d

Session 4: Interviewing Techniques PowerPoint Presentation Instructions

The CD-ROM that accompanies this Guidebook contains the complete PowerPoint presentation along with speaker's notes. The authors recommend that you thoroughly review these notes and practice the training before presenting it to an audience. *All participants should complete the pre-test on the preceding pages before beginning this training presentation.*

The presentation for this training is available on the CD-ROM as:
Session4.ppt

The CD-ROM also contains presentation handouts formatted with 3 slides to each page and space for participants to take notes. Facilitators may wish to print and distribute copies of the handouts to each participant at the beginning of the training session.

The handout for this training is available on the CD-ROM as:
Session4handouts.pdf

Session 4: Interviewing Techniques Post-Test

1. Which of the following is an interviewer-administered interview?
 - a. Mailed-out
 - b. Telephone
 - c. E-mail
 - d. Web-based

2. Interview method is influenced by:
 - a. Question types used in the study
 - b. Length and format of the
 - c. Cost considerations for survey implementation
 - d. All of the above

3. Which of the following is a disadvantage of a telephone interview?
 - a. Under-coverage
 - b. The survey design can be more efficient
 - c. Higher response rates than mailed questionnaires
 - d. Quicker access to participants

4. True or False: Interviewer training is optional.
 - a. True
 - b. False

5. Which of the following is/are true about face-to-face interviews?
 - a. They tend to have higher response rates than other types of interviews
 - b. They should be shorter than other types of interviews
 - c. They should have more simple skip patterns than other types of interviews
 - d. Non-response is reduced compared with other types of interviews
 - e. They tend to be inexpensive to conduct
 - f. Answers a and d

Session 4: Interviewing Techniques

Answer Key

1. Which of the following is an interviewer-administered interview?

Answer: b. Telephone

Feedback: Telephone interviews are interviewer-administered interviews. The interviewer will call the respondent and go through a questionnaire over the phone.

2. Interview method is influenced by:

Answer: d. All of the above

Feedback: Interview method is influenced by the question types used in the study, the length and format of the questionnaire, and cost considerations for survey implementation.

3. Which of the following is a disadvantage of a telephone interview?

Answer: a. Under-coverage

Feedback: Under-coverage is a disadvantage of a telephone interview. All potential study participants may not have a telephone and therefore cannot be reached for a telephone interview.

4. True or False: Interviewer training is optional.

Answer: b. False

Feedback: This statement is false. Interviewer training is NOT optional. Even though outbreak investigations require a rapid response, some training must be done. Ideally, trainings should be interactive. Interviewers should practice reading the questions out loud to become familiar with the survey instrument and help predict problems with questions on the survey. In addition, some sort of support documentation, known as an interviewer manual, must be provided to all interviewers.

5. Which of the following is/are true about face-to-face interviews?

Answer: f. Answers a and d are correct.

Feedback: Face-to-face interviews tend to have higher response rates because another person is directly involved and motivating the respondent to complete the interview. Since the interviewer will be involved in helping the respondent complete the interview, more complex skip patterns may be used and the interview may be longer but the cost is increased. Non-response is reduced in face-to-face interviews because the interviewer can go to where the respondent is at and meet in person with the respondent.

Session 4: Interviewing Techniques Evaluation Instructions

Congratulations on completing Session 4 of the *I is for Investigation* training curriculum.

To ensure the best learning experience possible for training participants, we would like your feedback. This feedback is carefully reviewed by UNC CPHP staff to make continual improvements to training materials.

In addition, you must complete the evaluation in order to receive a certificate of completion or continuing education credit (if applicable) for this training.

The evaluation for this training is available online at:

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Session 4: Interviewing Techniques

Optional Discussion Guide

(Facilitator)

Three outbreak scenarios are listed below. For each scenario, which interviewing method would be most appropriate (face-to-face, telephone, mailed, web-based)? Why?

1. An outbreak of *Salmonella* at a wedding reception that you hypothesize was caused by a food item. Guests at the reception came from all across the country and most have since returned home.
2. An outbreak of Legionnaire's disease in a long-term care facility that you hypothesize is due to exposure to water from a cooling tower.
3. An outbreak of gastrointestinal illness at a large university that you hypothesize may be due to an ill food handler.

(Discussion cues)

Scenario 1 is ideally suited to a telephone interview. In most cases, the bride and groom will have a list of guests and the phone numbers of those in attendance. Face-to-face interviews would be very difficult, as many reception attendees are from across the country and have returned home. Web-based interviews might be a possibility, but because weddings tend to have pretty diverse attendance, it is not safe to assume that all attendees will have Internet access or be computer savvy enough to complete a web-based questionnaire. When trying to collect information quickly in an outbreak investigation, mailed questionnaires are not a viable option.

Scenario 2 is best suited to face-to-face interviews. Your audience is in one location, making access to respondents easy. Additionally, depending on the population in the facility, it may be useful to have facility staff or family members on hand to assist in the completion of the interview (i.e., act as proxy respondents). Telephone interviews might be an option, but depending on the condition of the residents of the long-term care facility, they may not be feasible. Web-based questionnaires will probably not be effective in this situation due to a likely lack of computer/Internet access and computer knowledge among elderly adults. As with scenario 1, mailed questionnaires would not be a timely option for an outbreak investigation.

Scenario 3 is best suited for web-based questionnaires. A university will be a highly technology-driven environment, where most students will have or have access to a personal computer or other device with email and Internet. Telephone interviews are also an option here, but due to the rarely-at-home nature of college students, it may take some time to track down respondents. Additionally, it may be difficult to access valid telephone numbers on students (especially if they use a mobile phone as their primary telephone). Face-to-face interviews will also encounter problems in reaching students to set up an interview and finding time in the students' schedules to conduct the interview. Mailed interviews, again, are not going to be a timely option.

(Facilitator)

Imagine you are conducting an interview where diarrhea is defined as “3 or more loose bowel movements in a 24-hour period.”

Listed below are three responses to the question “Are you still experiencing diarrhea?” Provide an example of a clarification, a probe, or feedback that could be used. Try to think of one correct use of each technique.

Respondent 1: “I’m not sure.”

Respondent 2: “I definitely had diarrhea last Tuesday.”

Respondent 3: “Yes.”

(Discussion cues)

In the situation with respondent 1, you could clarify the question for the respondent. For example, you could say, “For the purposes of this survey, we consider diarrhea to be 3 or more loose bowel movements in a 24-hour period.” If this does not work, you can give the respondent more time to think about it or as a last resort, move to the next question.

Respondent 2 has given an irrelevant answer. Try to redirect him/her with the most neutral probe, repeating the question.

Respondent 3 gave a straightforward response. You could simply move on to the next question, or try giving some neutral feedback such as “I see.” Let’s pretend that this respondent is a study control and you believe that the respondent should not be having diarrhea. If you said something like “Are you sure?” that would be an example of very poor interviewer technique. Not only is it leading the respondent, but it also implies that you don’t believe him/her.

(Facilitator)

You are responsible for coordinating the interviews for a large outbreak. Due to the number of interviews that need to be conducted, you have pulled in staff from several areas that are not familiar with interviewing. What topics will you want to be sure to cover in an interviewer training? What materials might you provide to the interviewers?

(Discussion cues)

Although time is of the essence in conducting an outbreak investigation, interviewer training is a crucial component that should not be left out, especially in a situation where you are using inexperienced interviewers.

There are several things you should cover in an interviewer training.

- ♦ You should first provide interviewers with an overview of the outbreak situation and review the purpose of the questionnaire. Interviewers should also be informed any rules for proxy respondents and of the respondent selection process – often times, respondents will ask the interview how they got their contact information.
- ♦ A majority of the training should focus on the questionnaire – how to use it, the intent and meaning of each question, and how to record or code responses.
- ♦ Discuss how the interviewer should respond to questions from the respondents.
- ♦ In terms of logistics, tell interviewers the hours during which it is acceptable to call, how to track their calls, how many times they should call a prospective respondent, whether they should leave a message if they get an answering machine, and what to do with completed questionnaires.
- ♦ Finally, discuss confidentiality of the interviews and questionnaires.

At the training, you might want to provide materials to the interviewers in a manual (what exactly is included in a manual will depend on the outbreak situation). You might include a calendar to help keep dates straight, a map of a facility, or guidelines related to but not directly associated with the outbreak (for example, a copy of vaccination guidelines if you are investigating an influenza outbreak) that might be useful if there are questions. Also, you might create a list of frequently asked questions and answers that can be used by interviewers as a quick reference tool. Interviewers might also find it useful to have some background information available on the outbreak, such as information about the organism or the epidemic curve.

Session 5: Analyzing Data

Session Overview

Summary

In this session, we are going to cover a range of topics that you should be familiar with when you analyze data during an outbreak investigation.

An essential part of data analysis are the fundamental procedures that you should complete *prior* to analyzing data. This includes planning the analysis and cleaning the data.

After we discuss these precursors to data analysis, we will talk about attack rates as a function of descriptive epidemiology, and measures of association and tests of significance as a function of analytic epidemiology.

Analysis planning will ensure that your investigation will produce data that is useful in the analytic phase and can efficiently addresses your hypotheses.

Attack rates are descriptive statistics used in cohort studies that are useful for comparing the risk of disease in groups with different exposures (such as consumption of individual food items).

Analytic epidemiology allows you to test the hypotheses generated via review of descriptive statistics and the medical literature.

The measures of association for case-control and cohort analytic studies, respectively, are odds ratios and risk ratios.

Confidence intervals and p-values that accompany measures of association can be used to evaluate the statistical significance of measures of association.

Intended Audience

All public health, medical, veterinary, pharmacy, emergency management, hospital and other professionals interested in public health preparedness and field epidemiology.

Running Time

35 minutes of lecture

20 minutes for pre-test, post-test, and evaluation

Optional Discussion: 15 minutes (approximate)

Learning Objectives

- ♦ Discuss the purpose of an analytic study in an epidemiologic outbreak investigation
- ♦ Establish measures of association for cohort and case-control studies
- ♦ Interpret measures of association (risk ratios, odds ratios) and corresponding confidence intervals
- ♦ Interpret a statistical test of significance

Session 5: Analyzing Data Pre-Test

1. True or False: Attack rates can be used in a case-control study.
 - a. True
 - b. False

2. What measure of association is used with a cohort study?
 - a. Odds ratio
 - b. Risk ratio
 - c. Attack rate
 - d. p-value

3. An odds ratio greater than 1 indicates what?
 - a. No association between disease and exposure
 - b. Negative association between disease and exposure
 - c. Positive association between disease and exposure

4. Which of the following risk ratios and 95% confidence intervals indicates a statistically significant association?
 - a. $RR = 0.4$ (95% CI = 0.1 - 1.3)
 - b. $RR = 1.5$ (95% CI = 0.8 - 2.0)
 - c. $RR = 10.9$ (95% CI = 0.6 - 33.5)
 - d. $RR = 6.3$ (95% CI = 5.4 - 7.8)

5. Which of the following may affect the data analysis you do?
 - a. Collection of qualitative versus quantitative data
 - b. Type of study design used
 - c. The way in which the sample population was selected
 - d. The research question(s) asked
 - e. Answers a, b and c
 - f. Answers a, b, c and d

Session 5: Analyzing Data

PowerPoint Presentation Instructions

The CD-ROM that accompanies this Guidebook contains the complete PowerPoint presentation along with speaker's notes. The authors recommend that you thoroughly review these notes and practice the training before presenting it to an audience. *All participants should complete the pre-test on the preceding page before beginning this training presentation.*

The presentation for this training is available on the CD-ROM as:
Session5.ppt

The CD-ROM also contains presentation handouts formatted with 3 slides to each page and space for participants to take notes. Facilitators may wish to print and distribute copies of the handouts to each participant at the beginning of the training session.

The handout for this training is available on the CD-ROM as:
Session5handouts.pdf

Session 5: Analyzing Data Post-Test

1. True or False: Attack rates can be used in a case-control study.
 - a. True
 - b. False

2. What measure of association is used with a cohort study?
 - a. Odds ratio
 - b. Risk ratio
 - c. Attack rate
 - d. p-value

3. An odds ratio greater than 1 indicates what?
 - a. No association between disease and exposure
 - b. Negative association between disease and exposure
 - c. Positive association between disease and exposure

4. Which of the following risk ratios and 95% confidence intervals indicates a statistically significant association?
 - a. $RR = 0.4$ (95% CI = 0.1 - 1.3)
 - b. $RR = 1.5$ (95% CI = 0.8 - 2.0)
 - c. $RR = 10.9$ (95% CI = 0.6 - 33.5)
 - d. $RR = 6.3$ (95% CI = 5.4 - 7.8)

5. Which of the following may affect the data analysis you do?
 - a. Collection of qualitative versus quantitative data
 - b. Type of study design used
 - c. The way in which the sample population was selected
 - d. The research question(s) asked
 - e. Answers a, b and c
 - f. Answers a, b, c and d

Session 5: Analyzing Data

Answer Key

1. True or False: Attack rates can be used in a case-control study.

Answer: b. False

Feedback: This statement is false. Attack rates can only be used in cohort studies. Attack rates are calculated by dividing the number of people at risk who become ill by the number of people at risk in the population. The reason that attack rates cannot be used with case-control studies is that we do not know the number of people at risk; we only know this for cohorts.

2. What measure of association is used with a cohort study?

Answer: b. Risk ratio

Feedback: The risk ratio is the measure of association used with a cohort study. A risk ratio is calculated by first measuring the risk of disease in the exposed group and the risk of disease in the unexposed group. These risks are calculated by dividing the number of new diseases by the total number of people in the exposed group and doing the same for the unexposed group.

3. An odds ratio greater than 1 indicates what?

Answer: c. Positive association between disease and exposure

Feedback: An odds ratio greater than 1 indicates a positive association between disease and exposure. For example, if you have an odds ratio of 6, cases were 6 times more likely to have had the exposure when compared to controls.

4. Which of the following risk ratios and 95% confidence intervals indicates a statistically significant association?

Answer: d. RR = 6.3 (95% CI = 5.4 - 7.8)

Feedback: The risk ratio of 6.3 indicates that those exposed were 6.3 times more likely to develop disease than those not exposed. The confidence interval does not include 1, indicating that this estimate is statistically significant, and the confidence interval is narrow, indicating that the estimate is fairly precise.

5. Which of the following may affect the data analysis you do?

Answer: f. Answers a, b, c and d are correct.

Feedback: Research question(s) may affect data analysis and often determine if qualitative, quantitative or both types of data are collected. Some population sampling methods require specific data analysis techniques. The study design also affects data analysis and what study measures of association are used.

Session 5: Analyzing Data Evaluation Instructions

Congratulations on completing Session 5 of the *I is for Investigation* training curriculum.

To ensure the best learning experience possible for training participants, we would like your feedback. This feedback is carefully reviewed by UNC CPHP staff to make continual improvements to training materials.

In addition, you must complete the evaluation in order to receive a certificate of completion or continuing education credit (if applicable) for this training.

The evaluation for this training is available online at:

<http://tiny.cc/Session5>

To begin the evaluation, you will need to log in to the UNC CPHP Training Web Site. If you have previously taken online trainings through the Training Web Site (including other trainings in the *I is for Investigation* curriculum), you may use your existing username and password to log in to this evaluation. If this is your first time visiting the Training Web Site, you must complete a short registration to create your username and password; instructions will be provided.

Please Note: Be sure that you have completed all training components (pre-test, training activity, and post-test) before accessing the evaluation. You will be required to certify that you have completed all training components as part of the evaluation. Contact hours for this training are based on the completion of all training components.

Session 5: Analyzing Data Optional Discussion Guide

(Facilitator)

Distribute copies of this page to participants so they can calculate the attack rates.

The output below was generated from an outbreak of norovirus following a Thanksgiving meal. Out of 100 attendees, 75 became ill. Review the following output and calculate food-specific attack rates. What food item appears to have a possible association with illness?

	Consumed Item			Did Not Consume Item		
Item	Ill	Total	Attack Rate	Ill	Total	Attack Rate
Gravy	60	80		15	20	
Milk	35	60		40	40	
Beans	55	75		20	25	
Pie	55	70		20	30	
Turkey	70	85		5	15	

(Discussion cues)

The food-specific attack rates are calculated by dividing the number of ill people who ate the item by the total number of people who ate the item and multiplying by 100 to get a percentage. For this example, the attack rates are as follows:

Item	Consumed Item			Did Not Consume Item		
	Ill	Total	Attack Rate	Ill	Total	Attack Rate
Gravy	60	80	75%	15	20	75%
Milk	35	60	58%	40	40	100%
Beans	55	75	73%	20	25	80%
Pie	55	70	79%	20	30	67%
Turkey	70	85	82%	5	15	33%

When reviewing this table, remember to look for the 3 situations mentioned in the presentation:

1. The attack rate is high among those who consumed the food item.
2. The attack rate is low among persons who did not consume the item.
3. Most of the cases were exposed to the food item-making the exposure a reasonable explanation for most or all cases.

In our example, most of the items consumed had a high attack rate. However, the only item with a low attack rate for those who did not consume it is the turkey. Additionally, the turkey meets the third criteria – 70/75 (93%) of the cases ate the turkey. Based on this evidence, it appears that the turkey the main exposure of interest.

(Facilitator)

Distribute copies of this page to participants so they can interpret the output.

The following analysis output is from an outbreak of staphylococcal food poisoning at a church picnic. To investigate the outbreak, health officials conducted a cohort study and generated the output below. How would you interpret this output? Which measures of association would you use? If you are interested in the Chi square value, for purposes of this discussion, use the Chi square - corrected (Yates).

(This output is from a computer program used to analyze data in epidemiological investigations. You are not meant to understand all the values it provides, just to be familiar with what this type of output may look like.)

Single Table Analysis

ILL?			
Vanilla Ice Cream	Yes	No	TOTAL
Yes	43	11	54
No	3	18	21
TOTAL	46	29	75

	Point Estimate	95% Confidence Interval	
		Lower	Upper
PARAMETERS: Odds-based			
Odds Ratio (cross product)	23.4545	5.8410	94.1811 (T)
Odds Ratio (MLE)	22.1490	5.9280	109.1473 (M)
		5.2153	138.3935 (F)

PARAMETERS: Risk-based			
Risk Ratio (RR)	5.5741	1.9383	16.0296 (T)
Risk Difference (RD%)	65.3439	46.9212	83.7666 (T)

(T=Taylor series; C=Cornfield; M=Mid-P; F=Fisher Exact)

STATISTICAL TESTS	Chi-square	1-tailed p	2-tailed p
Chi square - uncorrected	27.2225		0.0000013505
Chi square - Mantel-Haenszel	26.8596		0.0000013880
Chi square - corrected (Yates)	24.5370		0.0000018982
Mid-p exact		0.0000001349	
Fisher exact		0.0000002597	

(Discussion cues)

First, since investigators conducted a cohort study, we use the risk ratio as our measure of association. Here, that estimate is 5.57, meaning that those who ate the vanilla ice cream were 5.57 times more likely to become ill than those who did not eat the vanilla ice cream. Can we say that this is a significant association? Not based solely on the risk ratio. To address the significance of the association, we need to look at the 95% confidence interval and/or the p-value. In this example, the confidence interval ranges from 1.94 to 16.03, indicating that this range has a 95% chance of capturing the "true" risk ratio - which we can never really find out through an epidemiologic investigation. Because the confidence interval does not cross 1 (indicating no association), we can say that there is a significant association between eating vanilla ice cream and illness.

The p-value also establishes the significance of an association. Here, the p-value is 0.0000018982, indicating that we are more than 99% sure that the observed association between eating vanilla ice cream and illness did not occur by chance. Usually, a p-value of <0.05 is accepted as an indication of significance, and our example p-value is definitely below that threshold.

(Facilitator)

Which one of the following measures of association most strongly suggests that a true association between the exposure and outcome exists?

- a. OR = 1.3 (95% CI = 0.61 – 2.45)
- b. OR = 0.4 (95% CI = 0.25 – 0.56)
- c. OR = 5.4 (95% CI = 0.92 – 13.97)
- d. OR = 3.6 (95% CI = 1.38 – 6.45)

(Discussion cues)

Answer choice b is correct. Remember, an odds ratio less than 1 can indicate a protective effect and in this choice, both ends of the 95% confidence interval are below 1.

Answer choice a has confidence intervals that contain 1, and also the odds ratio itself is close to being 1 (remember that an odds ratio of 1 indicates that there is no association between the exposure and outcome being tested).

Answer choice c has a high odds ratio, but the confidence interval contains 1, indicating that there is a possibility that there is no association.

Answer choice d indicates a significant association: the odds ratio is well above 1 and the confidence interval does not include 1. However, the confidence interval for this choice is very wide when compared to choice b. Remember that a narrower confidence interval indicates a more precise estimate, thus making b the better choice.

Session 6: Writing an Outbreak Report

Session Overview

Summary

In this session, we will discuss the function of outbreak reports and their structure. We will also walk through two case studies to compare different types of outbreak reports: a 2012 journal article on an outbreak of a mycobacterial skin infection in New York, and a Morbidity and Mortality Weekly Report of a 2011 multi-state outbreak of foodborne listeriosis.

An outbreak investigation is not complete without documenting the investigation in a written report. These reports serve many purposes, both internally and externally, including the monitoring of health problems in the community as well as the monitoring of the performance of the health department and outbreak investigation process. And, though outbreak reports may differ in purpose and audience, reports generally follow the same foundational structure.

Intended Audience

All public health, medical, veterinary, pharmacy, emergency management, hospital and other professionals interested in public health preparedness and field epidemiology.

Running Time

40 minutes of lecture

20 minutes for pre-test, post-test, and evaluation

Optional Discussion: 15 minutes (approximate)

Learning Objectives

- ♦ Explain the role of outbreak investigation reports
- ♦ Describe different types of outbreak reports
- ♦ List elements to include in outbreak investigation reports

Session 6: Writing an Outbreak Report Pre-Test

1. Why do we communicate our findings?
 - a. As a document for action
 - b. To share new insights
 - c. As a record of performance
 - d. All of the above
2. True or False: You should always have some form of investigation documentation.
 - a. True
 - b. False
3. Which of the following is the most basic type of outbreak report?
 - a. MMWR article
 - b. Peer-reviewed journal article
 - c. Internal report
 - d. Complaint form
4. Which of the following is NOT a section of a basic outbreak report?
 - a. Methods
 - b. Abstract
 - c. Results
 - d. Recommendations
5. True or False: A report to communicate investigation findings is one of the most important steps in an investigation.
 - a. True
 - b. False
6. True or False: Sometimes it is a good idea to publish an investigation report before the investigation is actually finished.
 - a. True
 - b. False

Session 6: Writing an Outbreak Report PowerPoint Presentation Instructions

The CD-ROM that accompanies this Guidebook contains the complete PowerPoint presentation along with speaker's notes. The authors recommend that you thoroughly review these notes and practice the training before presenting it to an audience. *All participants should complete the pre-test on the preceding page before beginning this training presentation.*

The presentation for this training is available on the CD-ROM as:
Session6.ppt

The CD-ROM also contains presentation handouts formatted with 3 slides to each page and space for participants to take notes. Facilitators may wish to print and distribute copies of the handouts to each participant at the beginning of the training session.

The handout for this training is available on the CD-ROM as:
Session6handouts.pdf

Session 6: Writing an Outbreak Report Post-Test

1. Why do we communicate our findings?
 - a. As a document for action
 - b. To share new insights
 - c. As a record of performance
 - d. All of the above
2. True or False: You should always have some form of investigation documentation.
 - a. True
 - b. False
3. Which of the following is the most basic type of outbreak report?
 - a. MMWR article
 - b. Peer-reviewed journal article
 - c. Internal report
 - d. Complaint form
4. Which of the following is NOT a section of a basic outbreak report?
 - a. Methods
 - b. Abstract
 - c. Results
 - d. Recommendations
5. True or False: A report to communicate investigation findings is one of the most important steps in an investigation.
 - a. True
 - b. False
6. True or False: Sometimes it is a good idea to publish an investigation report before the investigation is actually finished.
 - a. True
 - b. False

Session 6: Writing an Outbreak Report

Answer Key

1. Why do we communicate our findings?

Answer: d. All of the above

Feedback: We communicate our findings as a document for action, outlining what, if any, control measures are recommended; to share new insights about the outbreak, such as a newly-discovered transmission mechanism; and as a record of performance. All of these reasons for communicating the findings help to prevent future outbreaks and assist in the investigation and control of similar incidents that may occur in the future.

2. True or False: You should always have some form of investigation documentation.

Answer: a. True

Feedback: This statement is true. No matter how small the investigation, you should always have some form of investigation documentation. The length and purpose of the report will depend on the complexity of the incident under investigation.

3. Which of the following is the most basic type of outbreak report?

Answer: c. Internal report

Feedback: An internal report is the most basic type of outbreak report. Although internal reports will not be distributed outside of the agency, they should thoroughly document the outbreak and the ensuing investigation so they can serve as resources during future outbreaks.

4. Which of the following is NOT a section of a basic outbreak report?

Answer: b. Abstract

Feedback: An abstract is not a section of a basic outbreak report. Abstracts provide a synopsis of the entire outbreak report and may be required for a peer-reviewed journal article.

5. True or False: A report to communicate investigation findings is one of the most important steps in an investigation.

Answer: a. True

Feedback: An outbreak report is a key step in an outbreak investigation. Outbreak reports may serve to prevent or minimize future outbreaks, assist in other investigations, provide legal documentation, give insight about a pathogen or outbreak, justify activities or serve as a resource for further work or research.

6. True or False: Sometimes it is a good idea to publish an investigation report before the investigation is actually finished.

Answer: a. True

Feedback: Outbreak reports may be written and published at various stages of an investigation. Often reports are written once the investigation is complete. However, sometimes it may be important to let public health and medical practitioners and the public know about an investigation immediately, if this may protect the public's health. Reports are also sometimes published before an investigation is complete if the outbreak is high profile or if there is a lot of media interest in the outbreak.

Session 6: Writing an Outbreak Report Evaluation Instructions

Congratulations on completing Session 6 of the *I is for Investigation* training curriculum.

To ensure the best learning experience possible for training participants, we would like your feedback. This feedback is carefully reviewed by UNC CPHP staff to make continual improvements to training materials.

In addition, you must complete the evaluation in order to receive a certificate of completion or continuing education credit (if applicable) for this training.

The evaluation for this training is available online at:

<http://tiny.cc/Session6>

To begin the evaluation, you will need to log in to the UNC CPHP Training Web Site. If you have previously taken online trainings through the Training Web Site (including other trainings in the *I is for Investigation* curriculum), you may use your existing username and password to log in to this evaluation. If this is your first time visiting the Training Web Site, you must complete a short registration to create your username and password; instructions will be provided.

Please Note: Be sure that you have completed all training components (pre-test, training activity, and post-test) before accessing the evaluation. You will be required to certify that you have completed all training components as part of the evaluation. Contact hours for this training are based on the completion of all training components.

Session 6: Writing an Outbreak Report

Optional Discussion Guide

(Facilitator)

Why is it important to communicate the findings of an outbreak investigation?

(Discussion cues)

Communication via an outbreak report serves several purposes. First, the report documents the actions taken during the outbreak:

- ♦ The outbreak report provides details about decisions and actions during the outbreak, including what control measures are recommended. These may be important to refer to during a future outbreak.
- ♦ As a means of information sharing, reports can serve as a solid foundation for presentations at state or national conferences.
- ♦ The report also serves as a record of your performance

The outbreak report also serves as a scientific record of the public health problem that occurred:

- ♦ The report records information or insights about the outbreak, such as a newly discovered transmission mechanism.
- ♦ The report documents the magnitude of health problems and justifies program spending and activities.
- ♦ It is often useful to analyze data from multiple outbreaks to present a summary of outbreaks over time. Some health departments may want to know how many outbreaks they investigated in a given year, and, for instance, what types of pathogens were linked to them. Your state may summarize such data annually.
- ♦ Reports can also be a useful internal document for persons conducting research or evaluation. For example, if your department has been conducting multiple outbreak investigations due to Salmonella cross-contamination in the home, you may decide that the public needs to be re-educated about food safety practices.
- ♦ Or, someone may want to do a study about whether the number of outbreaks due to a specific pathogen decreased after an intervention was put in place; outbreak reports can then serve as research records with trend data.

All of these reasons for communicating the findings help to prevent future outbreaks and assist in the investigation and control of similar incidents that may occur in the future. Public health officials may reference past outbreak reports to review the type of investigation, relevant findings, and important lessons learned. Epidemic Intelligence Officers from the CDC, who frequently travel for field investigations, review past trip reports as a regular part of trip preparation to learn from the mistakes of past investigations and take advantage of techniques that were successful.

(Facilitator)

What are the differences between an internal and an external outbreak report?

(Discussion cues)

Every outbreak investigation should include the writing of an internal outbreak report. An internal report should detail the outbreak and investigation thoroughly, including practical details of carrying out the study and the problems encountered. Internal reports provide documentation for future reference, as well as a record of the investigation for purposes of possible litigation. An internal report doesn't have to be as formal as an external report will be.

An external report often does not have as much detailed information (such as names of implicated establishments or other parties), due to confidentiality issues. However, these reports will focus on the scientific interpretation for a wider public health and medical audience. External reports that are submitted to a journal for publication must follow the author guidelines for the newsletter or journal that you are submitting it to.

The CDC's Morbidity and Mortality Weekly Report (MMWR), available at <http://www.cdc.gov/mmwr/>, includes published bulletin-style outbreak reports.

(Facilitator)

Who should get a copy of the outbreak report?

(Discussion cues)

The distribution of the outbreak report will depend on who was involved in the investigation. Ideally, all agencies or partners participating in the investigation will get a copy of the report, such as the environmental health unit or laboratory partners.

Additionally, if the investigation and report was done at the local level, you will want to provide a copy of the report to the state health agency, and possibly to regional public health teams, if your state has them. You may get requests for the report from the parties involved in the outbreak or from the media. You should provide a copy upon request; however, you should be sure to delete any confidential information before dissemination.

Session 7: Risk and Crisis Communication

Session Overview

Summary

In this session, we will discuss what risk communication is, touch on some risk communication theories, and talk about strategies to use in the real world.

What we commonly refer to as risk communication has several branches:

- ♦ Risk communication provides information about expected outcomes resulting from a behavior or exposure.
- ♦ Crisis communication is an effort to inform the public about a crisis and how to react.
- ♦ Emergency risk communication attempts to provide information to people so they can make decisions.

Effective risk communication takes into account theories of defining risk, trust determination, and mental noise. Basic strategies for implementing risk communication include:

- ♦ Having a plan before the crisis arises
- ♦ Listening to the public
- ♦ Responding to media requests
- ♦ Preparing for questions, and
- ♦ Paying attention to body language

In summary, during a crisis, people external to your public health agency will be frightened and seeking information, guidance, and reassurance. Communication should be open and honest and should respect the rights of the public to gain information, ask questions, and disagree with the experts. To get your message to the public, keep messages clear, short, consistent, and memorable. When delivering your message, remember that your audience is human: speak with compassion, humanity, and show your personal concern in addition to presenting facts and instructions.

Intended Audience

All public health, medical, veterinary, pharmacy, emergency management, hospital and other professionals interested in public health preparedness and field epidemiology.

Running Time

35 minutes of lecture

20 minutes for pre-test, post-test, and evaluation

Optional Discussion: 15 minutes (approximate)

Learning Objectives

- ♦ Define risk communication
- ♦ Identify theories of risk communication
- ♦ Determine basic strategies for implementing risk communication; and
- ♦ List components of a risk communication message

Session 7: Risk and Crisis Communication Pre-Test

1. Which of the following is a description of crisis communication?
 - a. A crisis in which an organization has the 'luxury' of advance knowledge of the impending crisis and the opportunity may choose the timing of communication to the public about the issue and the organization's plan to resolve it
 - b. An organization is facing an unexpected event and needs to communicate about that crisis to the public. This event may not be under the control of the organization, and may cause harm to the organization's reputation or viability
 - c. An expert opinion provided in the hope that it benefits its receivers and advances a behavior or action that allows for rapid and efficient recovery from the crisis event
 - d. None of the above
2. What is the mental noise theory?
 - a. When people are upset, the crisis at hand does not seem as important
 - b. Loud noises during a crisis mean that people can't hear themselves think
 - c. When people are upset, they have difficulty hearing, understanding, and remembering
 - d. The noise during a crisis reminds people of other things they need to do
3. The best way to handle an emergency risk communication situation is to already have a plan in place before a crisis occurs. Which of the following are actions that you should be prepared to accomplish rapidly in an emergency situation?
 - a. Contact local TV and radio stations
 - b. Write and distribute educational fliers in the major languages spoken in your region
 - c. Release a statement that denies or downplays the emergency
 - d. Both a and b
4. Body language is important when communicating in a crisis situation because body language often overrides verbal communication. Which of the following body language statements should you AVOID?
 - a. Maintaining good eye contact with the audience
 - b. Sitting forward in your chair
 - c. Keeping your vocal tone level and not too loud
 - d. Touching your hand(s) to your face frequently
5. True or False: In emergency risk communication, the communicator is perceived as a participant in the crisis or disaster.
 - a. True
 - b. False

Session 7: Risk and Crisis Communication PowerPoint Presentation Instructions

The CD-ROM that accompanies this Guidebook contains the complete PowerPoint presentation along with speaker's notes. The authors recommend that you thoroughly review these notes and practice the training before presenting it to an audience. *All participants should complete the pre-test on the preceding page before beginning this training presentation.*

The presentation for this training is available on the CD-ROM as:
Session7.ppt

The CD-ROM also contains presentation handouts formatted with 3 slides to each page and space for participants to take notes. Facilitators may wish to print and distribute copies of the handouts to each participant at the beginning of the training session.

The handout for this training is available on the CD-ROM as:
Session7handouts.pdf

Session 7: Risk and Crisis Communication Post-Test

1. Which of the following is a description of crisis communication?
 - a. A crisis in which an organization has the 'luxury' of advance knowledge of the impending crisis and the opportunity may choose the timing of communication to the public about the issue and the organization's plan to resolve it
 - b. An organization is facing an unexpected event and needs to communicate about that crisis to the public. This event may not be under the control of the organization, and may cause harm to the organization's reputation or viability
 - c. An expert opinion provided in the hope that it benefits its receivers and advances a behavior or action that allows for rapid and efficient recovery from the crisis event
 - d. None of the above
2. What is the mental noise theory?
 - a. When people are upset, the crisis at hand does not seem as important
 - b. Loud noises during a crisis mean that people can't hear themselves think
 - c. When people are upset, they have difficulty hearing, understanding, and remembering
 - d. The noise during a crisis reminds people of other things they need to do
3. The best way to handle an emergency risk communication situation is to already have a plan in place before a crisis occurs. Which of the following are actions that you should be prepared to accomplish rapidly in an emergency situation?
 - a. Contact local TV and radio stations
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 - c. Keeping your vocal tone level and not too loud
 - d. Touching your hand(s) to your face frequently
5. True or False: In emergency risk communication, the communicator is perceived as a participant in the crisis or disaster.
 - a. True
 - b. False

Session 7: Risk and Crisis Communication

Answer Key

1. Which of the following is a description of crisis communication?

Answer: b. An organization is facing an unexpected event and needs to communicate about that crisis to the public. This event may not be under the control of the organization, and may cause harm to the organization's reputation or viability

Feedback: Crisis communication is the communication of facts to the public by an involved organization. Usually, an event occurs unexpectedly, may not be under the control of the organization, and may cause harm to the organization's reputation or viability. In most instances, the organization is facing some legal or moral culpability for the crisis and the public is often judging the organization's response to the crisis.

2. What is the mental noise theory?

Answer: c. When people are upset, they have difficulty hearing, understanding, and remembering

Feedback: The mental noise theory states that when people are upset, they have difficulty hearing, understanding, and remembering. Communication is aided by using a limited number (i.e., 3) of short, clear, key messages that are easy for people to remember. Typically during a crisis, the current events are very important.

3. The best way to handle an emergency risk communication situation is to already have a plan in place before a crisis occurs. Which of the following are actions that you should be prepared to accomplish rapidly in an emergency situation?

Answer: d. Both a and b

Feedback: The risk communication plan you create should include ways to contact local TV and radio stations, and preparations for writing and distributing educational fliers. In addition, you should be ready to build or update a web site to disseminate information; to set up and staff a 24-hour hotline; to coordinate with police, fire, and emergency services personnel; and to prepare press materials to announce your response to the crisis. You should be prepared to tell the truth about the emergency than trying to deny or downplay it. The public will find out anyway, and dishonesty can result in a major loss of credibility now and in the future, so it is best to be truthful and give people all the information they need to handle the crisis.

4. Body language is important when communicating in a crisis situation because body language often overrides verbal communication. Which of the following body language statements should you AVOID?

Answer: d. Touching your hand(s) to your face frequently

Feedback: You should NOT make frequent hand-to-face contact. This can make you look dishonest or nervous, even if you are not! Other body language to avoid includes sitting back in your chair, crossing your arms, drumming or tapping your fingers, and resting your head in your hand. It is good to sit straight or slightly forward in your chair. Sitting back in your chair can make you look uninterested or unconcerned. Please see the correct answer above.

5. True or False: In emergency risk communication, the communicator is perceived as a participant in the crisis or disaster.

Answer: b. False

Feedback: In emergency risk communication, an expert serves as the communicator. The expert communicator is not perceived to be a participant in the crisis or disaster, except as someone to help resolve the crisis.

Session 7: Risk and Crisis Communication Evaluation Instructions

Congratulations on completing Session 7 of the *I is for Investigation* training curriculum.

To ensure the best learning experience possible for training participants, we would like your feedback. This feedback is carefully reviewed by UNC CPHP staff to make continual improvements to training materials.

In addition, you must complete the evaluation in order to receive a certificate of completion or continuing education credit (if applicable) for this training.

The evaluation for this training is available online at:

<http://tiny.cc/Session7>

To begin the evaluation, you will need to log in to the UNC CPHP Training Web Site. If you have previously taken online trainings through the Training Web Site (including other trainings in the *I is for Investigation* curriculum), you may use your existing username and password to log in to this evaluation. If this is your first time visiting the Training Web Site, you must complete a short registration to create your username and password; instructions will be provided.

Please Note: Be sure that you have completed all training components (pre-test, training activity, and post-test) before accessing the evaluation. You will be required to certify that you have completed all training components as part of the evaluation. Contact hours for this training are based on the completion of all training components.

Session 7: Risk and Crisis Communication Optional Discussion Guide

(Facilitator)

A reporter from your local television news station has left you a message wanting to set up a time to talk about the local impact of an outbreak of E. coli in bagged spinach. Using the following scenario as background, quickly decide what you will say to this reporter based on your own job duties and your actual community. Develop a message map to help you organize your response.

Yesterday, CDC officials were alerted by epidemiologists in Wisconsin and Oregon that fresh spinach was the suspected source of small clusters of Escherichia coli serotype O157:H7 infections in those states. On the same day, New Mexico epidemiologists contacted Wisconsin and Oregon epidemiologists about a cluster of E. coli infections in New Mexico associated with fresh spinach consumption. CDC PulseNet has confirmed that the E. coli strains from infected patients in Wisconsin had matching pulsed-field gel electrophoresis (PFGE) patterns and identified the same pattern in patient isolates from other states. The investigation and additional case finding are ongoing.

This morning, the Food and Drug Administration (FDA) advised consumers by press release and press conference to not eat bagged fresh spinach.

(From "Ongoing Multistate Outbreak of Escherichia coli serotype O157:H7 Infections Associated with Consumption of Fresh Spinach --- United States, September 2006." *MMWR Morbidity and Mortality Weekly Report*, September 29, 2006/55(38);1045-1046.)

(Discussion cues)

First of all, after gathering your thoughts, be sure to return the call promptly! Reporters work on a deadline and will appreciate a quick response. If they do not receive any information from your agency, they may report a more alarmist viewpoint from someone else, or they may report that the local health department did not return their call.

Your response will vary based on your personal job responsibilities and the facts in your community. One appropriate response may simply be that you are not the right person to talk about this. In that case, be sure to give the reporter the name and phone number of the person who can help. Your agency may have a designated press contact, or you may want to direct them to the department head or the person who normally investigates foodborne outbreaks.

At this point in the investigation, you may not have much information, especially if there have not been any cases identified in your area. You should share what you know, but do not guess if you do not know the answer to a question or speculate about what might happen.

As you develop a message map, remember that you should create no more than 3 key messages and use no more than 3 supporting statements for each key message. These key messages and supporting statements should be clear, short, and easy to remember. An example of a possible message map is below.

Key Message #1: We advise consumers to follow the FDA guidelines and not eat bagged fresh spinach	Key Message #2: We have had no reports of <i>E. coli</i> infections related to bagged spinach in our area. –OR– We have had X number of reports of <i>E. coli</i> related to bagged spinach in our state. Supporting Statements: As always, we continue to monitor any foodborne illness due to <i>E. coli</i> . –OR– We are investigating these infections in cooperation with the CDC.	Key Message #3: Other ways to protect against foodborne illness are to wash hands and surfaces often, reduce cross contamination, wash fruits and vegetables before eating them, cook foods to proper temperatures, and refrigerate promptly.
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(Facilitator)

Because of great interest being generated by this story, your agency decides to issue a statement to your community about the outbreak. Develop a basic message using the six parts discussed in the presentation. Remember to use simple sentence structure, avoid jargon, and use inclusive language.

(Discussion cues)

Your message should include each of the following, although your responses will vary based on the outbreak selected.

1. An expression of empathy and caring
 - ♦ We know that many people are concerned about the recent outbreak of *E. coli*.
2. Confirmed facts: who, what, when, where, why, how
 - ♦ Cases have been identified in Wisconsin, Oregon, and New Mexico.
 - ♦ These cases have been linked to bagged fresh spinach.
 - ♦ At this time, we have had no confirmed reports of *E. coli* associated with bagged fresh spinach in our state.
3. What you don't know about the situation
 - ♦ We do not know if all brands of bagged fresh spinach are affected, or where the spinach was distributed.
4. Process to deal with the problem
 - ♦ Therefore, we advise that consumers follow the FDA recommendations issued this morning and not eat bagged fresh spinach.
 - ♦ To reduce all forms of foodborne illness, including *E. coli*, remember to wash hands and surfaces often, cook foods to proper temperature, and refrigerate promptly.
 - ♦ Cooking fresh spinach at 160 degrees Fahrenheit for 15 seconds will kill any *E. coli* present.
5. Statement of commitment
 - ♦ We are continuing to be alert to any possible cases of *E. coli* in our area. The CDC is continuing to investigate the outbreak. We will keep the public of any new developments in this investigation as we learn of them.
6. Where people can get more information
 - ♦ For more information about this outbreak, you can visit the CDC's website or call the local health department at 987-555-1234.

(Facilitator)

Realizing that your statement may generate further questions, think of at least 5 questions that the reporter or a member of the community may ask you and develop a one-line response or explanation for each (if you don't know the answer right now, note where you could find the answer). Remember to use simple sentence structure, avoid jargon, and use inclusive language.

(Discussion cues)

Possible questions that a reporter may ask include those listed below:

- ♦ What is your name and job title? What are your qualifications to talk about this?
- ♦ Can you tell us what happened?
- ♦ How certain are you about this information?
- ♦ What is *E. coli*? How dangerous is it?
- ♦ How many people were harmed? What are their names? Can we talk to them?
- ♦ What effects will this have on the people involved?
- ♦ What would you like to say to those that have been harmed and to their families?
- ♦ Is the situation under control?
- ♦ What is being done in response to what happened?
- ♦ Who is in charge?
- ♦ What are you advising people to do?
- ♦ How long before the situation returns to normal?
- ♦ Why did this happen?
- ♦ Could this have been avoided?
- ♦ If you are not sure of the cause, what is your best guess?
- ♦ Who is to blame?
- ♦ Has this ever happened before? Can this happen elsewhere?
- ♦ What can be done to prevent this from happening again?
- ♦ What else can go wrong?
- ♦ Has anyone broken the law?
- ♦ Do you think those involved handled the situation well enough?
- ♦ How much will all this cost? Who will pay for it all?
- ♦ What are you going to do after the investigation?
- ♦ What is your personal opinion? What are you telling your own family?
- ♦ Are people over reacting?
- ♦ What is the worst-case scenario? (Again, remember not to speculate!)
- ♦ Have you told us everything you know?
- ♦ When will we find out more?

Your answers should be truthful, based on what you know. Remember that you should respond to emotional questions with emotion-based responses, not just data and facts. Do not speculate on things you do not know, and protect the privacy of people involved in the outbreak.

Congratulations on completing I is for Investigation!

Are you ready to learn more?

Try this training series from the UNC Center for Public Health Preparedness, available at <http://cphp.sph.unc.edu/trainingpackages/>:

E is for Epi contains five modules that provide an introduction to the basics of epidemiology.

P is for Practice features six case studies developed to allow non-epidemiologists to practice basic epidemiology skills.

For additional trainings on a wide variety of topics related to public health preparedness, epidemiology and surveillance, and outbreak detection and investigation, please visit the UNC CPHP Training Web Site at <http://cphp.sph.unc.edu/training>. Certificates of completion and continuing education credits are available for some trainings.

Would your organization benefit from custom training?

The UNC Center for Public Health Preparedness works with partner agencies to develop custom curriculum and training projects upon request.

Our trainings:

- ♦ Include both face-to-face and distance learning formats (Web, video, CD-ROM),
- ♦ Have varying ranges of interactivity to match a target audience's technical skills/capabilities, and
- ♦ Address different levels of cognitive learning (knowledge, application and synthesis level) appropriate for a wide range of audiences.

In recent years, UNC CPHP has contracted with international, national and state partners to provide curriculum development for a wide variety of projects. We have particular expertise in developing distance learning programs.

UNC CPHP can develop courses based on your organization's specific training needs and audience. To learn more please visit <http://cphp.sph.unc.edu/customtrainings/> or contact us at cphp@unc.edu or 919-843-5561.