



Epidemiology basics for non-epidemiologists

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- ❖ All links in this document are no longer active.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.

E is for Epi: Epidemiology basics for non-epidemiologists
Second Edition

2012

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Introduction

Welcome to the second edition of the *E is for Epi* 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 five modules that provide an introduction to the basics of epidemiology:

- ♦ Epidemiology in the Context of Public Health
- ♦ An Epidemiologist's Toolkit
- ♦ Descriptive and Analytic Epidemiology
- ♦ Surveillance
- ♦ Epidemiology Specialties Applied

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 from the original curriculum by:

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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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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: Epidemiology in the Context of Public Health

Session Overview

Summary

Public health services play a key role in assuring the health and well-being of communities. The Ten Essential Services of Public Health, which can provide a supportive context for any public health priority in a community, are presented. Epidemiology is one critical component of public health. The function and practice of epidemiology are explained with practical details and examples. The sub-specialties of epidemiology are discussed, and the three key elements that epidemiologists consider when they enter into an outbreak investigation are explained. Epidemiology and public health are also put into context as being relevant to bioterrorism preparedness and response. Examples of epidemiology practice are given, including outbreak investigations in Indiana and Iowa and a natural disaster in Virginia.

Intended Audience

Non-epidemiologists who collaborate or work with epidemiologists

Running Time

Part 1: 25 minutes of lecture
20 minutes for pre-test, post-test, and evaluation

Part 2: 25 minutes of lecture
20 minutes for pre-test, post-test, and evaluation

Optional Discussion: 15 minutes (approximate)

Learning Objectives

- ♦ Define the Ten Essential Services of Public Health
- ♦ Explain the relevance of the specialty of epidemiology in the broader context of the Ten Essential Services of Public Health
- ♦ Identify the diverse specialties in the field of epidemiology
- ♦ Describe how epidemiological methods and state and district health professionals work

Recommended Readings

CDC National Public Health Performance Standards Program. 10 Essential Public Health Services. Available at: <http://www.cdc.gov/nphpsp/essentialservices.html>. Updated December 9, 2010.

Kutty P, Rota J, Bellini W, Redd SB. Measles. In: Roush SW, McIntyre L, Baldy LM, eds. *Manual for the Surveillance of Vaccine-Preventable Diseases*. 5th ed. Atlanta, GA: Centers for Disease Control and Prevention; 2012:chap 7. Available at: <http://www.cdc.gov/vaccines/pubs/surv-manual/chpt07-measles.html>.

Session 1: Epidemiology in the Context of Public Health

Part 1: Epidemiology: A Basic Public Health Science

Pre-Test

1. The ten essential services of public health fit into the three core public health functions, which are:
 - a. Surveillance, monitoring, and reporting
 - b. Assessment, policy development, and assurance
 - c. Diagnosis, investigation, and mitigation
 - d. Research, evaluation, and policy development
2. Which of the following is one of the primary differences between the public health model of service and the medical model?
 - a. Public health focuses on the population, whereas medicine focuses on the individual
 - b. Public health has a public service ethic, whereas medicine has a community prevention focus
 - c. Public health has a personal service ethic, whereas medicine has medicine has a focus on patient diagnosis and treatment
 - d. There are no differences between the public health and medical models of service
3. Essential public health service #3 is to “inform, educate, and empower people about health issues.” Which of the following involves using epidemiology to carry out essential service #3?
 - a. Promoting healthy activities through social marketing
 - b. Ensuring that health education is available to the general public in resource-poor settings
 - c. Working with information officers to ensure that information about a health risk is conveyed accurately
 - d. Creating community partnerships to improve health
4. Sometimes epidemiologists work with other public health professionals to enhance community and state level disaster and emergency preparedness plans that promote better coordination between jurisdictions and agencies. Which essential public health service does this example illustrate?
 - a. #1: Monitor health status to identify and solve community health problems
 - b. #5: Develop policies and plans that support individual and community health efforts
 - c. #3: Inform, educate, and empower people about health issues
 - d. #9: Evaluate effectiveness, accessibility, and quality of personal and population-based health services

Session 1: Epidemiology in the Context of Public Health

Part 1: Epidemiology: A Basic Public Health Science

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:
Session1Part1.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:
Session1Part1handouts.pdf

Session 1: Epidemiology in the Context of Public Health

Part 1: Epidemiology: A Basic Public Health Science

Post-Test

1. The ten essential services of public health fit into the three core public health functions, which are:
 - a. Surveillance, monitoring, and reporting
 - b. Assessment, policy development, and assurance
 - c. Diagnosis, investigation, and mitigation
 - d. Research, evaluation, and policy development
2. Which of the following is one of the primary differences between the public health model of service and the medical model?
 - a. Public health focuses on the population, whereas medicine focuses on the individual
 - b. Public health has a public service ethic, whereas medicine has a community prevention focus
 - c. Public health has a personal service ethic, whereas medicine has medicine has a focus on patient diagnosis and treatment
 - d. There are no differences between the public health and medical models of service
3. Essential public health service #3 is to “inform, educate, and empower people about health issues.” Which of the following involves using epidemiology to carry out essential service #3?
 - a. Promoting healthy activities through social marketing
 - b. Ensuring that health education is available to the general public in resource-poor settings
 - c. Working with information officers to ensure that information about a health risk is conveyed accurately
 - d. Creating community partnerships to improve health
4. Sometimes epidemiologists work with other public health professionals to enhance community and state level disaster and emergency preparedness plans that promote better coordination between jurisdictions and agencies. Which essential public health service does this example illustrate?
 - a. #1: Monitor health status to identify and solve community health problems
 - b. #5: Develop policies and plans that support individual and community health efforts
 - c. #3: Inform, educate, and empower people about health issues
 - d. #9: Evaluate effectiveness, accessibility, and quality of personal and population-based health services

Session 1: Epidemiology in the Context of Public Health

Part 1: Epidemiology: A Basic Public Health Science

Answer Key

1. The ten essential services of public health fit into the three core public health functions, which are:

Answer: b. Assessment, policy development, and assurance

Feedback: The three core public health functions are assessment, policy development, and assurance. The ten essential public health services represent a more detailed model of the core public health functions.

2. Which of the following is one of the primary differences between the public health model of service and the medical model?

Answer: a. Public health focuses on the population, whereas medicine focuses on the individual

Feedback: Public health and medicine both have a primary intervention focus: The public health model focuses on the population, and the medical model focuses on the individual. Additionally, public health is based upon public service, and the medical model is based upon a personal service ethic. In the public health model, the emphasis is on community-level prevention and health promotion, while the medical model emphasizes individual patient diagnosis and treatment.

3. Essential public health service #3 is to “inform, educate, and empower people about health issues.” Which of the following involves using epidemiology to carry out essential service #3?

Answer: c. Working with information officers to ensure that information about a health risk is conveyed accurately

Feedback: Epidemiologists are not usually on the front-end of efforts to educate and empower people about health issues. However, public health epidemiologists use information in a variety of ways to communicate both internally with public health colleagues, and externally with physicians, the media, and the public. For examples, epidemiologists may communicate risks about the upcoming influenza season, or about an ongoing outbreak.

4. Sometimes epidemiologists work with other public health professionals to enhance community and state level disaster and emergency preparedness plans that promote better coordination between jurisdictions and agencies. Which essential public health service does this example illustrate?

Answer: b. #5: Develop policies and plans that support individual and community health efforts

Feedback: Collaborating across agencies and jurisdictions for emergency preparedness reflects essential service #5, Develop policies and plans that support individual and community health efforts. In particular, essential service #5 involves systematic community-level and state-level planning for health improvement in all jurisdictions; establishing strategies and actions to guide community health improvement at the state and local levels; and development of legislation, codes, rules, regulations, ordinances and other policies to enable performance of the Essential Public Health Services. All of these pertain to cross-jurisdictional preparedness activities.

Session 1: Epidemiology in the Context of Public Health

Part 1: Epidemiology: A Basic Public Health Science

Evaluation Instructions

Congratulations on completing Session 1, Part 1 of the *E is for Epi* 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/Session1Part1>

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 *E is for Epi* 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: Epidemiology in the Context of Public Health

Part 2: The Practice of Epidemiology: An Overview

Pre-Test

1. Epidemiology is which of the following?
 - a. The study of physical, chemical, biological, social and psychosocial factors in the environment that affect human health
 - b. The study of distribution and determinants of states or events in specified populations, and the application of this study to the control of health problems
 - c. The ongoing, systematic collection, analysis and interpretation of health-related data essential to the planning, implementation, and evaluation of public health practice
 - d. The study of actions taken by an individual or group of individuals to change or maintain their health status or prevent illness or injury
2. Epidemiology involves describing the distribution and determinants of health conditions by certain key elements. These elements include all of the following EXCEPT:
 - a. Severity
 - b. Person
 - c. Place
 - d. Time
3. John Snow's work investigating cholera in 1854 London was foundational to the science of epidemiology because...
 - a. He counted the number of cases that occurred
 - b. He met with city officials
 - c. He investigated possible causes of cholera
 - d. He mapped cases of cholera and looked at how they occurred over time
4. Epidemiology can be applied to which of the following disciplines?
 - a. Disaster response
 - b. Nutrition
 - c. Public policy
 - d. All of the above

Session 1: Epidemiology in the Context of Public Health

Part 2: The Practice of Epidemiology: An Overview

PowerPoint Presentation Instructions

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The presentation for this training is available on the CD-ROM as:
Session1Part2.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:
Session1Part2handouts.pdf

Session 1: Epidemiology in the Context of Public Health

Part 2: The Practice of Epidemiology: An Overview

Post-Test

1. Epidemiology is which of the following?
 - a. The study of physical, chemical, biological, social and psychosocial factors in the environment that affect human health
 - b. The study of distribution and determinants of states or events in specified populations, and the application of this study to the control of health problems
 - c. The ongoing, systematic collection, analysis and interpretation of health-related data essential to the planning, implementation, and evaluation of public health practice
 - d. The study of actions taken by an individual or group of individuals to change or maintain their health status or prevent illness or injury
2. Epidemiology involves describing the distribution and determinants of health conditions by certain key elements. These elements include all of the following EXCEPT:
 - a. Severity
 - b. Person
 - c. Place
 - d. Time
3. John Snow's work investigating cholera in 1854 London was foundational to the science of epidemiology because...
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4. Epidemiology can be applied to which of the following disciplines?
 - a. Disaster response
 - b. Nutrition
 - c. Public policy
 - d. All of the above

Session 1: Epidemiology in the Context of Public Health

Part 2: The Practice of Epidemiology: An Overview

Answer Key

1. Epidemiology is which of the following?

Answer: b. The study of distribution and determinants of states or events in specified populations, and the application of this study to the control of health problems

Feedback: Epidemiology examines the patterns (or distribution), of risk factors (or determinants) in populations in effort to prevent and control the occurrence of disease, injury, and disability.

2. Epidemiology involves describing the distribution and determinants of health conditions by certain key elements. These elements include all of the following EXCEPT:

Answer: a. Severity

Feedback: The three key elements that epidemiologists consider when they investigate the distribution of disease and exposure are person, place, and time characteristics.

3. John Snow's work investigating cholera in 1854 London was foundational to the science of epidemiology because...

Answer: d. He mapped cases of cholera and looked at how they occurred over time

Feedback: Dr. Snow put together a list of cases with date of onset of illness. The list represented the "Person" and "Time". He also mapped the cases, using stacked bars to represent where the cases were located, and found that cases tended to cluster near the Broad Street pump. Based on this information, Dr. Snow asked the London Board of Guardians to remove the pump handle so it could not be used. Thus, a precedent was established for modern epidemiology.

4. Epidemiology can be applied to which of the following disciplines?

Answer: d. All of the above

Feedback: Even though epidemiologists collectively work to study disease determinants and their distribution in the population, there are many applications or disciplines within epidemiology. Epidemiology can apply to nearly any science that overlaps with human health issues; additionally, epidemiology can be used to inform health care and policy issues.

Session 1: Epidemiology in the Context of Public Health Part 2: The Practice of Epidemiology: An Overview Evaluation Instructions

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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/Session1Part2>

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 *E is for Epi* 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: Epidemiology in the Context of Public Health Optional Discussion Guide

(Facilitator)

Now that you have heard what kind of work an epidemiologist does, how do you think “Essential Public Health Service #1” applies to the work of an epidemiologist in preparing for potential emergency event such as a natural disaster or chemical spill?

Essential Service #1: Monitor health status to identify community health problems

(Discussion cues)

A major component of this essential service is the ongoing and timely collection, analysis, and publication of information on access, utilization, costs, and outcomes of personal health services. This type of data collection is often conducted by epidemiologists and can provide a means to monitor for health events that may occur as a result of an emergency event (for example, the types of injuries that occur during an earthquake or hurricane). Data gathered during one event can be analyzed and disseminated, and used for policy and preparedness to prevent and mitigate similar disease and injury during the next event.

Another component, attention to the vital statistics and health status of specific groups at higher risk than the total population, also applies with an emphasis on those who would be most likely to be at risk during an emergency event. Higher risk individuals may be those who are most vulnerable due to geography, age, or prior health status, or those who are first responders (especially if the event is chemical or biological in nature).

A third component of this essential public health service is the identification of threats to health and assessment of health service needs. Examples of threats to health from emergency events include injuries, contamination of food and water, lack of regular medication due to lack of access or services, and infectious disease transmission in crowded temporary shelters, among others. Each state has (or should have) an extensive emergency preparedness program in place, as well as a plan for what to do in case of an actual emergency event. Preparedness for any threat involves prioritizing actions and populations depending on the epidemiology (person, place, and time characteristics) of the disease or health condition.

The fourth component, collaboration to manage integrated information systems with private providers and health benefit plans, is a part of many state and local disease surveillance systems operated by epidemiologists. States or localities may choose to monitor usage of private providers or health plans as a way to identify an outbreak, a growing health problem of concern, or an unexpected emergency event as early as possible.

(Facilitator)

Epidemiology can be a diverse field, with specialties ranging from cardiovascular health to war and civil conflict. What ‘variety’ of epidemiology do you interact with in your field of work? (If you do not interact with epidemiology, which areas might you be likely to encounter in the future?)

(Discussion cues)

Epidemiologists may or may not be specifically labeled as having a certain specialty (for example, chronic disease, nutrition, or infectious disease epidemiologists), but the work that they do on a daily basis usually defines their field of expertise. If there is an epidemiologist who you interact with, or who works in the same program area you do, their specialty will be highly dependent on the program area. For example, if you work in the division of HIV and STDs, or in the division of women’s and infants’ health, you are likely to find a reproductive health epidemiologist, or a maternal/child health specialist.

In truth, many epidemiologists wear several different hats. In an outbreak situation, they may have to be an infectious disease epidemiologist. On a routine basis, they may have a prevention and behavioral focus. When evaluating programs within the department, they may have to have a policy focus. Some additional types of epidemiologists mentioned in the lecture include injury, social, occupational, environmental, behavioral, forensic, healthcare, and disaster epidemiologists.

(Facilitator)

What epidemiologic methods have you seen at work in your district or state?

(Discussion cues)

Epidemiologic methods can involve the process of creating a study to examine health and disease in specific populations, collecting data, analyzing data, and translating health data into public health priorities, policies, interventions, or education programs. This covers a lot of territory! Some examples where you may note these methods in play are in childhood vaccination policies, influenza pandemic preparedness plans and bioterrorism preparedness plans (e.g., preparation and response for an influenza pandemic), safety awareness campaigns (e.g., water hazard safety or vehicle child restraint awareness), and rapid interventions to address acute situations or outbreaks.

(Facilitator)

The following is an excerpt from a state health department monthly bulletin. What principles of the 10 Essential Public Health Services are demonstrated in this passage?

Three important vaccine updates are being made in Alaska due to changes in the type of vaccine provided by the Alaska Immunization Program or revisions to guidance from the Advisory Committee on Immunization Practices (ACIP).

On February 24, 2010 the Food and Drug Administration licensed a 13-valent pneumococcal conjugate vaccine (PCV13 [Prevnar13™, Wyeth]) for the prevention of invasive pneumococcal disease (IPD) and otitis media. PCV13 incorporates the seven serotypes found in PCV7 (Prevnar®, Wyeth), as well as six additional serotypes known to cause invasive pneumococcal disease. The ACIP recommends PCV13 for all children aged 2–59 months and for children aged 60–71 months with underlying medical conditions that increase their risk for pneumococcal disease or complications.

— State of Alaska Epidemiology Bulletin, No. 9. April 2, 2010.
http://www.epi.alaska.gov/bulletins/docs/b2010_09.pdf

(Discussion cues)

There are many ways you could connect the paragraph given with the Essential Public Health Services – your own insight may provide unique answers to this question.

One obvious connection, however, is with Essential Service #3: “Inform, educate, and empower people about health issues.” The Bulletin is aimed at health professionals, but is available to the public and encourages practitioners to pass this information on to their patients, thus providing a means to inform and educate both the medical community and the public about this important health topic.

Another clear connection is with Essential Service #5: “Develop policies and plans that support individual and community health efforts.” The policy for vaccinating those at highest risk of pneumococcal disease is clearly presented, and is particularly important in the light of the updated number of strains within the vaccine.

Session 2: An Epidemiologist's Toolkit

Session Overview

Summary

This session provides an introduction to some important resources and “tools” upon which epidemiologists draw to conduct their day-to-day work, as well as to build an infrastructure for emergency preparedness. Topics covered include basic epidemiologic analysis tools and resources; public health laboratories and their role in outbreak investigation and other activities; the role of data from surveillance, interviews, and other sources; public health, allied health, and community collaborators; the media as a tool for risk communication; and the role of the Centers for Disease Control and Prevention in ongoing training and technical support for state and district epidemiologists. Examples of investigations in Chesapeake, Va., are given to show how epidemiology tools are used at the local level.

Intended Audience

Non-epidemiologists who collaborate or work with epidemiologists

Running Times

Part 1: 30 minutes of lecture
20 minutes for pre-test, post-test, and evaluation

Part 2: 25 minutes of lecture
20 minutes for pre-test, post-test, and evaluation

Optional Discussion: 15 minutes (approximate)

Learning Objectives

- ♦ List methods that can be used for epidemiologic assessment of a health problem
- ♦ Identify ways that public health laboratories carry out epidemiologic functions
- ♦ Identify ways that data can be collected during an epidemiologic investigation
- ♦ Identify allied health and community partners in the practice of epidemiology
- ♦ List ways in which epidemiologists work with the media
- ♦ Describe how the Centers for Disease Control and Prevention (CDC) serves as a resource for training, technical support, and surveillance and reporting of epidemiological data

Session 2: An Epidemiologist's Toolkit

Part 1: Epidemiology Tools and Methods

Pre-Test

1. Which of the following is NOT a resource that epidemiologists might use to find out more about a disease or health condition?
 - a. The scientific literature
 - b. Wiki-Health.com
 - c. *Control of Communicable Diseases Manual*
 - d. State-specific manuals and epidemiology websites
 - e. Websites such as the CDC and WHO
2. The entity that participates in food safety initiatives, newborn screening, public health surveillance, environmental health, and specialized diagnostic testing is the...
 - a. National Association of Food, Screening, Surveillance and Testing
 - b. Environmental health department
 - c. Epidemiology department
 - d. Public health laboratory
3. Public health data are collected from a variety of resources, including which of the following?
 - a. Questionnaires and interviews
 - b. Medical records
 - c. Surveillance systems
 - d. All of the above
4. A graph of surveillance data shows that incidence of a disease has been slowly but steadily declining over the last 15 years. Which of the following is NOT function of the surveillance graph?
 - a. Establish baseline rate of disease
 - b. Detect epidemics
 - c. Estimate magnitude of a health problem
 - d. Determine best course of treatment
 - e. Facilitate planning
5. A health department has received several reports of an infectious disease has not been previously reported in the area. Investigators aren't sure how the disease was introduced, or what factors might be facilitating transmission. Which data source would be most appropriate for investigating this cluster?
 - a. Surveillance data
 - b. Employment records
 - c. Questionnaires / interviews
 - d. Both **b** and **c**

Session 2: An Epidemiologist's Toolkit

Part 1: Epidemiology Tools and Methods

PowerPoint Presentation Instructions

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Session 2: An Epidemiologist's Toolkit

Part 1: Epidemiology Tools and Methods

Post-Test

1. Which of the following is NOT a resource that epidemiologists might use to find out more about a disease or health condition?
 - a. The scientific literature
 - b. Wiki-Health.com
 - c. *Control of Communicable Diseases Manual*
 - d. State-specific manuals and epidemiology websites
 - e. Websites such as the CDC and WHO
2. The entity that participates in food safety initiatives, newborn screening, public health surveillance, environmental health, and specialized diagnostic testing is the...
 - a. National Association of Food, Screening, Surveillance and Testing
 - b. Environmental health department
 - c. Epidemiology department
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 - a. Surveillance data
 - b. Employment records
 - c. Questionnaires / interviews
 - d. Both **b** and **c**

Session 2: An Epidemiologist's Toolkit

Part 1: Epidemiology Tools and Methods

Answer Key

1. Which of the following is NOT a resource that epidemiologists might use to find out more about a disease or health condition?

Answer: b. Wiki-Health.com

Feedback: Every day, epidemiologists are faced with the challenge of rapidly learning about a new health problem and putting in motion the efforts to control it. While the wiki-health site in the answer choice is (almost) fictional, epidemiologists must use their judgment in choosing reputable resources. Scientific literature, standard references, and CDC and state epidemiology websites provide a wealth of information.

2. The entity that participates in food safety initiatives, newborn screening, public health surveillance, environmental health, and specialized diagnostic testing is the...

Answer: d. Public health laboratory

Feedback: Although public health laboratories operate autonomously, there are 11 identified core functions that public health laboratories perform, including (but not limited to) food safety; disease prevention, control, and surveillance, inclusive of newborn screening; environmental health and protection; and reference and specialized testing. Epidemiology and environmental department may carry out some, but not all, of these functions in addition to or in partnership with public health laboratories.

3. Public health data are collected from a variety of resources, including which of the following?

Answer: d. All of the above

Feedback: There are many sources of data that epidemiologists can use to track, monitor, and investigate disease, including surveillance systems; questionnaires, surveys, or interviews, and medical records and health facility records.

4. A graph of surveillance data shows that incidence of a disease has been slowly but steadily declining over the last 15 years. Which of the following is NOT function of the surveillance graph?

Answer: d. Determine best course of treatment

Feedback: The type of graph described can be used in several different ways. Because it shows rates over a period time, a baseline rate of disease can be estimated. An increase over that baseline could be used to detect epidemics, and the graph also helps epidemiologists assess the magnitude of the disease and assess how the magnitude changes over time. The level of disease helps facilitate planning for prevention services and potentially for treatment planning. A graph, however, cannot show the medical details needed to assess individual treatment.

5. A health department has received several reports of an infectious disease has not been previously reported in the area. Investigators aren't sure how the disease was introduced, or what factors might be facilitating transmission. Which data source would be most appropriate for investigating this cluster?

Answer: c. Questionnaires / interviews

Feedback: Questionnaires and interviews are used to learn more information about new occurrences of disease or outbreaks. Outbreak investigation questionnaires can be administered in person, via telephone, or even via the Internet in some instances. Once data are collected via exploratory interviews, epidemiologists can review data to look for shared characteristics among cases to assess how transmission might be occurring.

Session 2: An Epidemiologist's Toolkit

Part 1: Epidemiology Tools and Methods

Evaluation Instructions

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Session 2: An Epidemiologist's Toolkit

Part 2: Epidemiology Partners and Resources

Pre-Test

1. Outbreak investigation teams are _____, because outbreak investigation methods involve numerous areas of expertise and a variety of resources.
 - a. composed of four epidemiologists
 - b. well-funded
 - c. multidisciplinary
 - d. federal entities
2. Which of the following is NOT a reason that epidemiologists and public health departments should use the media?
 - a. To deny outbreak rumors, regardless of the true situation
 - b. To communicate about health risks or crises
 - c. To reach people who may be exposed in an outbreak
 - d. To give press releases on a variety of routine and special interest topics
3. CDC takes a role in training because...
 - a. State and local offices do not have the capacity to train employees
 - b. State and local offices do not have the expertise to train employees
 - c. It is part of CDC's mission to promote health and prevent disease
 - d. It is a national law that only CDC can provide training
4. Which of the following are ways in which CDC provides technical support to epidemiologists and other public health practitioners?
 - a. Making information freely available from websites and publications
 - b. Review of state rules and regulations regarding public health functions and protocols
 - c. Providing subject matter expert consultation, such as Epidemic Intelligence Service (EIS) officers
 - d. Both a and c

Session 2: An Epidemiologist's Toolkit

Part 2: Epidemiology Partners and Resources

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Session 2: An Epidemiologist's Toolkit

Part 2: Epidemiology Partners and Resources

Post-Test

1. Outbreak investigation teams are _____, because outbreak investigation methods involve numerous areas of expertise and a variety of resources.
 - a. composed of four epidemiologists
 - b. well-funded
 - c. multidisciplinary
 - d. federal entities
2. Which of the following is NOT a reason that epidemiologists and public health departments should use the media?
 - a. To deny outbreak rumors, regardless of the true situation
 - b. To communicate about health risks or crises
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3. CDC takes a role in training because...
 - a. State and local offices do not have the capacity to train employees
 - b. State and local offices do not have the expertise to train employees
 - c. It is part of CDC's mission to promote health and prevent disease
 - d. It is a national law that only CDC can provide training
4. Which of the following are ways in which CDC provides technical support to epidemiologists and other public health practitioners?
 - a. Making information freely available from websites and publications
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 - c. Providing subject matter expert consultation, such as Epidemic Intelligence Service (EIS) officers
 - d. Both a and c

Session 2: An Epidemiologist's Toolkit

Part 2: Epidemiology Partners and Resources

Answer Key

1. Outbreak investigation teams are _____, because outbreak investigation methods involve numerous areas of expertise and a variety of resources.

Answer: c. multidisciplinary

Feedback: Outbreak investigation teams are multi-disciplinary by nature, because outbreak investigation methods involve the expertise and resources of multiple fields and public health professionals. The actual makeup of an outbreak investigation team will vary depending on the type of outbreak and the staff available to participate.

2. Which of the following is NOT a reason that epidemiologists and public health departments should use the media?

Answer: a. To deny outbreak rumors, regardless of the true situation

Feedback: The news media is a useful tool in outbreak situations. However, the media should be used for risk and crisis communication, and to warn or find people who may have been exposed in an outbreak. The media can be used to deny unfounded rumors, but the information given should be as accurate as possible.

3. CDC takes a role in training because...

Answer: c. It is part of CDC's mission to promote health and prevent disease

Feedback: CDC's mission is to protect health through health promotion, prevention of disease, injury and disability, and preparedness for new health threats. Providing specialized training – whether it is a two-year fellowship program or a one-hour webinar, is part of completing this mission. CDC training efforts can be used by state and local health department staff to complement any training available locally.

4. Which of the following are ways in which CDC provides technical support to epidemiologists and other public health practitioners?

Answer: d. Both a and c

Feedback: The CDC website provides information on pathogens, control measures, policies, and guidelines pertaining to the practice of epidemiology. Information is often available targeted toward multiple audiences, including the public, public health professionals, clinicians, laboratorians, the public, and the media. CDC makes available fact sheets, brochures, flyers, and other resources. CDC does not have a regulatory or review role regarding state rules or protocols.

Session 2: An Epidemiologist's Toolkit

Part 2: Epidemiology Partners and Resources

Evaluation Instructions

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Session 2: An Epidemiologist's Toolkit

Optional Discussion Guide

(Facilitator)

In the lecture, it was noted that a typical “triad” of specialists for an outbreak investigation will utilize at least one of each of the following professionals or resources: an epidemiologist, an environmental health specialist, and a public health laboratory. What is the role of the epidemiologist in this triad?

(Discussion cues)

An epidemiologist determines whether or not an outbreak is taking place when an unusual or “elevated” number of cases of a communicable or food borne illness arise. He or she determines the existence of an outbreak; creates a case definition; conducts interviews with cases, family members, contacts, and controls as needed; generates a research hypothesis; chooses an appropriate study design for an analytic study; and reviews, analyzes, and interprets interview data, analytic study data, and laboratory data.

The investigation also relies on environmental health specialists, who conduct activities to link suspected exposures or practices to the outbreak. The laboratory conducts testing of clinical or environmental samples collected during the investigation.

(Facilitator)

Public health laboratories are essential to public health practice. These laboratories have a role in serving as a liaison between the public and the public health system through surveillance, monitoring, and reporting activities. What are some of the functions that public health laboratories carry out through surveillance, monitoring, or reporting? Does your office use any of the information collected through public health laboratories?

(Discussion cues)

The public health laboratory has a role in the surveillance of vectorborne diseases (West Nile Virus, Lyme disease), communicable diseases (HIV/AIDS, SARS, tuberculosis), and food- and waterborne diseases (*E. coli*, *Salmonella*). The practical role of the laboratory is to report diagnoses to the state health department, as required by state law, as well as to the patient and doctor. The public health laboratory monitors conditions when it conducts newborn screening and genetic tests, radiation monitoring and detection, and food safety or other environmental issues. The public health laboratory reports the results of specific diseases and conditions to the health department. Surveillance systems rely on two-way communication between the state health department and public health laboratories, which is part of the “feedback loop” of information reporting and dissemination.

(Facilitator)

Questionnaires were noted in the lecture as being one of the data and technology “tools” available to epidemiologists. Questionnaires are used for collecting data on public health problems so that an intervention can be implemented or the problem can be controlled. What are the two common instances in which epidemiologists might use questionnaires? How do these two situations differ?

(Discussion cues)

Two common instances in which epidemiologists might employ questionnaires are outbreak investigations and rapid needs assessments.

Outbreak investigation questionnaires can be administered in person, via telephone, or even via the Internet. Once data are collected via exploratory interviews, epidemiologists can review data to look for shared characteristics among cases. (For example: Are most cases female? Are most within a certain age group? Did they all attend the same function or live in the same neighborhood?) Investigators then may determine a need for “follow-up” questionnaires with cases, family members, or other contacts.

Rapid needs assessments are another form of questionnaire. They allow epidemiologists and other community collaborators to collect population-based data in order to evaluate a situation in terms of the risk of health hazards or outcomes of disease in the aftermath of a natural disaster, identify priority needs and issues, and determine the best approach to addressing those needs. Rapid needs assessments might be used in situations after hurricanes, tornadoes, or floods. Data are gathered on damage to homes, usable utilities, illnesses and injuries, access to medical care, food, and water, and the like.

Two additional applications of questionnaires that you or your discussion group might think of are contact tracing and case follow-up.

(Facilitator)

The news and other media can be powerful tools in risk and crisis communication for public health. The power of the media can be harnessed to disseminate timely, accurate information to the public and physicians. What methods do epidemiologists and public health professionals employ to use the media as a tool? In what kinds of situations is this useful? Has your group ever used the media for crisis communication or risk communication purposes?

(Discussion cues)

Media news coverage about special topics, such as new study findings or ongoing outbreaks, can be a powerful tool to communicate risk to those who could be affected. Press releases are another method of using the media. Most health districts have a public information officer who works with health department staff to create and disseminate messages to the public in the form of press releases.

For example, if everyone on a particular airplane flight may have been exposed to a contagious respiratory illness, the media could be used to help contact every passenger on that flight by giving out a telephone number for exposed persons to reach the health department. Important study findings, such as the relationship between hormone replacement therapy among women and breast cancer, can be communicated to both the general public and to physicians through the media. The media can also be used to communicate important messages about outbreaks, drinking water systems, rodent problems, weather emergencies, and any number of other health or safety-related concern.

Session 3: Descriptive and Analytic Epidemiology

Session Overview

Summary

This session is an introduction to epidemiologic studies, terms, and study designs. Descriptive epidemiology is presented as a way to assess the *who*, *what*, *when*, and *where* of a health event, while analytic epidemiology answers the questions of *why* and *how*. Topics include key elements of descriptive epidemiology, calculations of incidence and prevalence, types of analytic study designs, measures of association, and tests of statistical significance. Scenarios and graphical examples are used to illustrate the principles presented.

Intended Audience

Non-epidemiologists who collaborate or work with epidemiologists

Running Time

Running Times

- Part 1: 25 minutes of lecture
20 minutes for pre-test, post-test, and evaluation
- Part 2: 15 minutes of lecture
20 minutes for pre-test, post-test, and evaluation
- Part 3: 20 minutes of lecture
20 minutes for pre-test, post-test, and evaluation
- Optional Discussion: 15 minutes (approximate)

Learning Objectives

- ♦ Define descriptive epidemiology
- ♦ Calculate incidence and prevalence
- ♦ List examples of the use of descriptive data
- ♦ Define analytic epidemiology
- ♦ List 3 types of observational study designs
- ♦ Interpret risk ratios and odds ratios
- ♦ Describe how a statistical test is used

Session 3: Descriptive and Analytic Epidemiology

Part 1: Descriptive Epidemiology

Pre-Test

1. From the sets of basic questions listed below, choose the set that descriptive epidemiology addresses about a particular health problem:
 - a. Who? What? When? Where? Why?
 - b. Who? What? When? Where?
 - c. Why? How?
 - d. Who? When? Where?
2. _____ and _____ are the two main quantities in descriptive epidemiology that are used to measure the amount of disease in a population, and to compare disease across populations.
 - a. Burden and rate
 - b. Risk and odds
 - c. Incidence and prevalence
 - d. Counts and cases
3. Which of the following is the calculation for prevalence?
 - a. The number of new cases divided by the number of people in the population, over a specific period of time
 - b. The number of existing cases divided by the number of people in the population
 - c. The number of exposed cases divided by the number of new cases over a specific period of time
 - d. The number of existing cases divided by the number of new cases in a specific population
4. Which of the following is the calculation for incidence?
 - a. The number of new cases divided by the number of people in the population, over a specific period of time
 - b. The number of existing cases divided by the number of people in the population
 - c. The number of exposed cases divided by the number of new cases over a specific period of time
 - d. The number of existing cases divided by the number of new cases in a specific population
5. Which of the following could represent “person” data?
 - a. Incidence among females
 - b. Natural history of disease
 - c. Incidence among the elderly
 - d. Incidence during the rainy season
 - e. Both a and c

Session 3: Descriptive and Analytic Epidemiology

Part 1: Descriptive Epidemiology

PowerPoint Presentation Instructions

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Session 3: Descriptive and Analytic Epidemiology

Part 1: Descriptive Epidemiology

Post-Test

1. From the sets of basic questions listed below, choose the set that descriptive epidemiology addresses about a particular health problem:
 - a. Who? What? When? Where? Why?
 - b. Who? What? When? Where?
 - c. Why? How?
 - d. Who? When? Where?
2. _____ and _____ are the two main quantities in descriptive epidemiology that are used to measure the amount of disease in a population, and to compare disease across populations.
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3. Which of the following is the calculation for prevalence?
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 - c. The number of exposed cases divided by the number of new cases over a specific period of time
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 - b. The number of existing cases divided by the number of people in the population
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 - b. Natural history of disease
 - c. Incidence among the elderly
 - d. Incidence during the rainy season
 - e. Both a and c

Session 3: Descriptive and Analytic Epidemiology

Part 1: Descriptive Epidemiology

Answer Key

1. From the sets of basic questions listed below, choose the set that descriptive epidemiology addresses about a particular health problem:

Answer: b. Who? What? When? Where?

Feedback: Descriptive epidemiology addresses the questions, Who? What? When? and Where? The classic descriptive epidemiology person, place, and time characteristics address the Who? When? and Where? questions. "What?" is also addressed as a basic function of which diseases or disease characteristics are being monitored or described.

2. _____ and _____ are the two main quantities in descriptive epidemiology that are used to measure the amount of disease in a population, and to compare disease across populations.

Answer: c. Incidence and prevalence

Feedback: Incidence and prevalence are measures that address the "what" question of the "who, what, when, and where" of descriptive epidemiology. They describe the magnitude of a health problem in a population, and allow comparisons across populations of different sizes. Risks and odds are measures used in analytic epidemiology. "Burden" is a general term for the amount of disease, but it does not reflect a specific type of measure. Counts are used in descriptive epidemiology, but cannot be used to compare the amount of disease in populations of different sizes.

3. Which of the following is the calculation for prevalence?

Answer: b. The number of existing cases divided by the number of people in the population

Feedback: Prevalence is the number of affected persons present in the population divided by the number of people in the population, calculated as:

$$\# \text{ of cases} / \# \text{ of people in the population}$$

This quantity can be expressed as a percent (per 100) or as a rate per 1,000 people in the population, per 10,000 people in the population, and so on.

4. Which of the following is the calculation for incidence?

Answer: a. The number of new cases divided by the number of people in the population, over a specific period of time

Feedback: Incidence is the number of new cases of a disease that occur during a specified period of time divided by the number of persons at risk of developing the disease during that period of time, calculated as:

$$\frac{\text{\# of new cases over a specific period of time}}{\text{\# of people in the population at risk for the disease over a specific period of time}}$$

This quantity can be expressed as a percent (per 100) or as a rate per 1,000 people in the population, per 10,000 people in the population, and so on.

5. Which of the following could represent “person” data?

Answer: e. Both a and c

Feedback: “Person” characteristics in descriptive epidemiology reflect the occurrence of disease, such as the incidence or prevalence, by specific personal characteristics such as sex or age. Other person characteristics, for example, are occupation, body-mass-index, and marital status.

Session 3: Descriptive and Analytic Epidemiology

Part 1: Descriptive Epidemiology

Evaluation Instructions

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Session 3: Descriptive and Analytic Epidemiology

Part 2: Study Designs for Analytic Epidemiology

Pre-Test

1. Analytic epidemiology answers which questions about the occurrence of a health problem?
 - a. Who, what, and when
 - b. Who, what, when, and where
 - c. Who, what, when, where, why and how
 - d. Why and how
2. Which of the following is NOT an analytic study design?
 - a. Experimental study
 - b. Descriptive study
 - c. Case-control study
 - d. Numerical study
3. Analytic epidemiology is a tool that epidemiologists use to do which of the following?
 - a. Test a hypothesis
 - b. Determine whether there is an association between an exposure and an outcome
 - c. Assess the possible causes of a disease
 - d. All of the above
4. An investigator assigns a specific exposure (a new formulation of a common medication) to some participants but assigns a different exposure (the original formulation of the medication) to others. During the study period, the investigator follows both groups to determine whether the new formulation works better and/or has fewer side effects. What type of study design is this?
 - a. Experimental study
 - b. Descriptive study
 - c. Case-control study
 - d. Cohort study
5. An investigator seeks out cases of a particular disease that she wishes to study. She then recruits people who do not have this disease from the same population. For each study participant, she researches past exposures to compare the exposures of those who have the disease to the exposures of those who do not have the disease. What type of study design is this?
 - a. Experimental study
 - b. Descriptive study
 - c. Case-control study
 - d. Cohort study

6. An investigator wants to know about the health effects of a particular exposure. He recruits a group of people who work in a location where the exposure is present, and recruits a separate group of people who work in a location where the exposure is not present. The investigator follows both of the groups for several years to assess whether one group experiences more diagnosed health problems than the other group. What type of study design is this?
- a. Experimental study
 - b. Descriptive study
 - c. Case-control study
 - d. Cohort study

Session 3: Descriptive and Analytic Epidemiology

Part 2: Study Designs for Analytic Epidemiology

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Session 3: Descriptive and Analytic Epidemiology

Part 2: Study Designs for Analytic Epidemiology

Post-Test

1. Analytic epidemiology answers which questions about the occurrence of a health problem?
 - a. Who, what, and when
 - b. Who, what, when, and where
 - c. Who, what, when, where, why and how
 - d. Why and how
2. Which of the following is NOT an analytic study design?
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 - b. Descriptive study
 - c. Case-control study
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3. Analytic epidemiology is a tool that epidemiologists use to do which of the following?
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 - b. Determine whether there is an association between an exposure and an outcome
 - c. Assess the possible causes of a disease
 - d. All of the above
4. An investigator assigns a specific exposure (a new formulation of a common medication) to some participants but assigns a different exposure (the original formulation of the medication) to others. During the study period, the investigator follows both groups to determine whether the new formulation works better and/or has fewer side effects. What type of study design is this?
 - a. Experimental study
 - b. Descriptive study
 - c. Case-control study
 - d. Cohort study
5. An investigator seeks out cases of a particular disease that she wishes to study. She then recruits people who do not have this disease from the same population. For each study participant, she researches past exposures to compare the exposures of those who have the disease to the exposures of those who do not have the disease. What type of study design is this?
 - a. Experimental study
 - b. Descriptive study
 - c. Case-control study
 - d. Cohort study

6. An investigator wants to know about the health effects of a particular exposure. He recruits a group of people who work in a location where the exposure is present, and recruits a separate group of people who work in a location where the exposure is not present. The investigator follows both of the groups for several years to assess whether one group experiences more diagnosed health problems than the other group. What type of study design is this?
- a. Experimental study
 - b. Descriptive study
 - c. Case-control study
 - d. Cohort study

Session 3: Descriptive and Analytic Epidemiology

Part 2: Study Designs for Analytic Epidemiology

Answer Key

1. Analytic epidemiology answers which questions about the occurrence of a health problem?

Answer: d. Why and how

Feedback: Analytic epidemiology answers the questions of why and how a health problem occurs. What are the possible causes of the health problem and how do these causes operate in a population? The questions of “who, what, when, and where” are answered by descriptive epidemiologic methods.

2. Which of the following is NOT an analytic study design?

Answer: b. Descriptive study

Feedback: A descriptive study provides information on a disease or health condition and the population that it affects, and it is NOT an analytic study design. Experimental studies and case-control studies are both analytic study designs (as are cohort studies).

3. Analytic epidemiology is a tool that epidemiologists use to do which of the following?

Answer: d. All of the above

Feedback: Analytic studies are used to test hypotheses. In epidemiology, the hypotheses to be tested focus on potential associations between exposures and outcomes. The purpose of testing these hypotheses is to assess whether an exposure is a possible cause of a disease, or outcome.

4. An investigator assigns a specific exposure (a new formulation of a common medication) to some participants but assigns a different exposure (the original formulation of the medication) to others. During the study period, the investigator follows both groups to determine whether the new formulation works better and/or has fewer side effects. What type of study design is this?

Answer: a. Experimental study

Feedback: In experimental studies, investigators assign exposure to study participants, usually using a random procedure for selecting which participants will receive the “exposure” and which participants will receive the placebo or standard treatment. Experimental studies can only be used when the exposure is known to be at least as good as the standard treatment (harmful exposures cannot be assigned).

5. An investigator seeks out cases of a particular disease that she wishes to study. She then recruits people who do not have this disease from the same population. For each study participant, she researches past exposures to compare the exposures of those who have the disease to the exposures of those who do not have the disease. What type of study design is this?

Answer: c. Case-control study

Feedback: In case-control studies, participants are selected based on their disease status. In other words, cases are selected because they have the disease of interest, and controls are selected because they do not have the disease. Investigators use specific criteria to ensure that standard selection methods are used, and then assess whether more cases have a history of a particular exposure than controls.

6. An investigator wants to know about the health effects of a particular exposure. He recruits a group of people who work in a location where the exposure is present, and recruits a separate group of people who work in a location where the exposure is not present. The investigator follows both of the groups for several years to assess whether one group experiences more diagnosed health problems than the other group. What type of study design is this?

Answer: d. Cohort study

Feedback: In cohort studies, participants are selected based on their exposure status. In a typical research study, an “exposed” group is selected and compared to an “unexposed” group. Health outcomes from both groups are tracked to see if the exposure could be contributing to one or several specific disease outcomes.

Session 3: Descriptive and Analytic Epidemiology

Part 2: Study Designs for Analytic Epidemiology

Evaluation Instructions

Congratulations on completing Session 3, Part 2 of the *E is for Epi* training curriculum.

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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 3: Descriptive and Analytic Epidemiology

Part 3: Data Analysis Basics for Analytic Epidemiology

Pre-Test

1. What is the purpose of a “measure of association”?
 - a. To show the strength of the relationship between an exposure and the outcome of interest
 - b. To indicate whether an exposure-outcome relationship is statistically significant
 - c. To standardize the way that cases are classified
 - d. None of the above
2. The measure of association that is calculated for a case-control study is known as ...
 - a. A risk ratio
 - b. An odds ratio
 - c. An incidence ratio
 - d. A relative ratio
3. A relative risk (RR) or odds ratio (OR) that is greater than one (>1) indicates that people who were exposed were...
 - a. less likely to have the outcome when compared with persons who were not exposed
 - b. more likely to have the outcome when compared with persons who were not exposed
 - c. no more or less likely to have the outcome when compared to persons who were not exposed
 - d. None of these options is correct
4. In a statistical test between a given exposure and outcome, a p -value of 0.7 can be interpreted as...
 - a. An unlikely result (RR or OR) if there was no true association
 - b. Statistically significant
 - c. A 5% chance that the RR or OR was observed by chance
 - d. Not statistically significant
5. Which of the following confidence intervals corresponds to a statistically significant result?
 - a. 0.5 – 1.5
 - b. 0.9 – 2.0
 - c. 0.3 – 0.9
 - d. 0.3 – 1.1

Session 3: Descriptive and Analytic Epidemiology

Part 3: Data Analysis Basics for Analytic Epidemiology

PowerPoint Presentation Instructions

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Session3Part3.ppt

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Session3Part3handouts.pdf

Session 3: Descriptive and Analytic Epidemiology

Part 3: Data Analysis Basics for Analytic Epidemiology

Post-Test

1. What is the purpose of a “measure of association”?
 - a. To show the strength of the relationship between an exposure and the outcome of interest
 - b. To indicate whether an exposure-outcome relationship is statistically significant
 - c. To standardize the way that cases are classified
 - d. None of the above
2. The measure of association that is calculated for a case-control study is known as ...
 - a. A risk ratio
 - b. An odds ratio
 - c. An incidence ratio
 - d. A relative ratio
3. A relative risk (RR) or odds ratio (OR) that is greater than one (>1) indicates that people who were exposed were...
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 - b. more likely to have the outcome when compared with persons who were not exposed
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5. Which of the following confidence intervals corresponds to a statistically significant result?
 - a. 0.5 – 1.5
 - b. 0.9 – 2.0
 - c. 0.3 – 0.9
 - d. 0.3 – 1.1

Session 3: Descriptive and Analytic Epidemiology

Part 3: Data Analysis Basics for Analytic Epidemiology

Answer Key

1. What is the purpose of a “measure of association”?

Answer: a. To show the strength of the relationship between an exposure and the outcome of interest

Feedback: The measure of association shows the strength of the relationship between an exposure and the outcome of interest. A larger number generally indicates a stronger association. This measure of the association provides evidence as to whether an exposure may cause disease. Measures of association, alone, do not indicate statistical significance.

2. The measure of association that is calculated for a case-control study is known as ...

Answer: b. An odds ratio

Feedback: The odds ratio is the measure of effect used in case-control studies. In cohort studies, the risk ratio is the measure of association that is used.

3. A relative risk (RR) or odds ratio (OR) that is greater than one (>1) indicates that people who were exposed were...

Answer: b. more likely to have the outcome when compared with persons who were not exposed

Feedback: A risk ratio or odds ratio that is greater than 1.0 means that the exposure is associated with an increased risk of developing the outcome. It is also called a positive association. A RR or OR value <1 indicates less risk of having the outcome, while an RR or OR = 1 indicates that the exposure makes no difference in likelihood of the outcome.

4. In a statistical test between a given exposure and outcome, a p -value of 0.7 can be interpreted as...

Answer: d. Not statistically significant

Feedback: The p -value is a measure of how likely the observed association would be to occur by chance alone, if there was not really a true association. Thus, a large p -value, defined as being greater than 0.05, means that the result would likely by chance alone, if there was no true association. We would conclude that this result is not statistically significant.

5. Which of the following confidence intervals corresponds to a statistically significant result?

Answer: c. 0.3 – 0.9

Feedback: In a significant association between exposure and outcome, the 95% CI does not include the value of 1.0. Therefore, a 95% CI range with both ends of the interval below 1 is significant, and suggests less risk of the outcome in the exposed population.

Session 3: Descriptive and Analytic Epidemiology

Part 3: Data Analysis Basics for Analytic Epidemiology

Evaluation Instructions

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Session 3: Descriptive and Analytic Epidemiology

Optional Discussion Guide

(Facilitator)

The concepts of incidence and prevalence were introduced in the lecture. Incidence measures the proportion of new cases of disease in a population, while prevalence is a measure of the proportion of total cases of disease in a population. For each of the following disease scenarios, would you describe the incidence as being high or low? Would you describe the prevalence as being high or low?

- ♦ Influenza: There are a high number of cases each year, but influenza does not cause long-lasting illness.
- ♦ Cardiovascular disease: There are an estimated 61 million cases, and is the leading cause of death in the US.
- ♦ Human rabies: There are usually fewer than 5 cases per year, and the disease is almost always fatal.

(Discussion cues)

First, remember that incidence is calculated by dividing the number of new cases of a disease that occur during a specified period of time by the number of persons at risk of developing the disease during that period of time. Prevalence is the number of affected persons (new or old) present in the population at a given time divided by the number of people in the population.

Because of the high number of influenza cases each year, the incidence is high. Because the illness does not last very long, however, the prevalence is fairly low.

Cardiovascular disease (CVD) has high prevalence (61 million cases is a lot!). One of the reasons for the high prevalence is that the disease can last for years. The other reason for the high prevalence of CVD is the high incidence; many people are diagnosed with CVD each year. The high incidence contributes to recommendations to have your cholesterol and other measures taken on a regular basis.

Human rabies has a low incidence: 5 cases per year is an extremely low rate. Rabies progresses fairly quickly and results in death, so the prevalence of human rabies is also very low (in fact, the prevalence is pretty much zero).

(Facilitator)

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

<u>Study designs:</u>	<u>Example studies:</u>
Randomized Clinical Trial	<ol style="list-style-type: none">1. Investigators looked at a hormone produced in the kidneys as a possible predictor of heart attack in patients with high blood pressure. They grouped the hormone level of their 1700 study participants into three profiles: high, normal, and low. They followed the patients for eight years to determine heart attack outcomes.2. Patients admitted for cancer of the stomach and patients without a diagnosis of cancer were interviewed about their chewing tobacco history to assess the possible association of chewing tobacco and gastric cancer.3. A random sample of middle-aged sedentary adults was selected from four census tracts, and each person was examined for coronary artery disease. All persons without disease were randomly assigned to either a two-year program of aerobic exercise or a two-year arthritis-prevention non-aerobic exercise program. Both groups were observed semi-annually for incidence of coronary artery disease.
Cohort Study	
Case-Control Study	

(Discussion cues)

Study #1 groups study participants by exposure groups (low, normal, and high hormone levels) and follows them forward in time to determine the outcome (heart attack). 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 stomach cancer or no cancer at all). The participants' past exposure to chewing tobacco 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 has a study design where participants are chosen based on random selection, and have their exposure assigned to them by the study investigators. A study where investigators assign the exposure is an experimental study, called a controlled trial (often referred to as a clinical trial). Because of the random selection of study participants, this is a **randomized clinical trial**.

(Facilitator)

In epidemiology, a hypothesis is an educated guess about an association between an exposure and an outcome that can be tested through an epidemiologic investigation. Two hypotheses are listed below; identify the corresponding exposure and outcome for each.

- ♦ A case-patient was infected with measles by a close colleague who had recently returned from a trip to South Africa.
- ♦ Children who grow up in a home with two smoking parents are more likely to develop lung cancer than children who grow up in a home with no smoking parents.

(Discussion cues)

In the first scenario, the hypothesis addresses how a measles patient became infected. The exposure is a person who was presumably also exposed, and the outcome is infection with measles. In the second scenario, the hypothesis addresses the effect of childhood exposure to second-hand tobacco smoke on the outcome of lung cancer.

(Facilitator)

Epidemiologists use tests of statistical significance to determine whether an observed association between an exposure and an outcome is a “true” association, or whether the observed association is due to chance. A common way of looking at statistical significance is to examine the 95% confidence interval (95% CI) surrounding a measure of association. Which of the following measures of association most strongly suggests that a true association exists?

- a. RR = 0.95 (95% CI = 0.70 – 1.29)
- b. RR = 9.85 (95% CI = 0.89 – 36.48)
- c. RR = 1.89 (95% CI = 1.81 – 1.95)
- d. RR = 1.91 (95% CI = 1.02 – 2.89)

(Discussion cues)

Answer choice **c** is correct. While a relative risk of 1.89 is not the largest relative risk shown, the both ends of the 95% CI for this estimate are above 1.

Answer choice **a** has confidence intervals that contain 1, and the relative risk itself is close to being 1 (remember that a RR or OR of 1 indicates that there is no association between the exposure and outcome being tested).

Answer choice **b** has a high relative risk, but the confidence interval contains 1, indicating that there is a possibility that there is no association at all.

Answer choice **d** also has a 95% CI that does not contain 1, but the lower end of the CI is extremely close to being 1, so the evidence of a true association is not as strong.

Session 4: Surveillance Session Overview

Summary

This session provides an introduction to public health surveillance. There are three major types of surveillance: passive, active, and syndromic. In the US, states hold the authority to gather information on disease occurrence through state communicable disease law. There are many applications of disease surveillance in setting public health priorities, but there are also limitations in using surveillance data. The CDC plays a primary role in standardized reportable disease surveillance throughout the nation, and national data sources and examples of surveillance systems are discussed. This session also briefly covers techniques for reviewing of surveillance data, including using the raw data, rates, descriptive epidemiology, and graphical presentations of data.

Intended Audience

Non-epidemiologists who collaborate or work with epidemiologists

Running Time

Part 1: 40 minutes of lecture

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

Part 2: 35 minutes of lecture

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

Optional Q&A: 15 minutes (approximate)

Learning Objectives

- ♦ Explain the surveillance “feedback loop” of data and information flow through local, state, and federal channels
- ♦ Describe characteristics of three different types of surveillance: active, passive, and syndromic
- ♦ List 5 applications of public health surveillance
- ♦ List federal public health surveillance systems relevant to epidemiology programs
- ♦ Discuss the major components of surveillance data analysis

Session 4: Surveillance

Part 1: Introduction to Surveillance

Pre-Test

1. Which of the following is NOT a characteristic of public health surveillance?
 - a. Systematic data collection
 - b. Ongoing
 - c. One-way
 - d. Timely dissemination
2. Which of the following is the “feedback loop” of a surveillance system?
 - a. Feedback from physician and laboratory reporters back to patients about their diagnosis
 - b. Feedback from the surveillance system back to physician and laboratory reporters about disease trends and changes as a result of surveillance
 - c. Feedback from the local health department back to physicians and laboratories about their reporting habits
 - d. Feedback from the state health department back to the local health department about duplicate reports
3. The National Notifiable Disease Surveillance System (NNDSS) is a national surveillance system whereby...
 - a. physicians and laboratorians in each state submit reports on a list of notifiable diseases, and reports are tallied at a state level only.
 - b. physicians and laboratorians in each state submit reports on a list of notifiable diseases, and reports are tallied on a state level and on a national level.
 - c. state health officials ask physicians and laboratorians in their state about notifiable diseases from a list of notifiable diseases.
4. Which of the following is passive surveillance?
 - a. Laboratories, physicians, or other health care providers regularly report cases of disease to the local or state health department based on a standard case definition of that particular disease
 - b. Local or state health departments initiate the collection of specific cases of disease from laboratories, physicians, or other health care providers
 - c. The ongoing, systematic collection, analysis, interpretation, and application of real-time indicators for disease that allow for detection before public health authorities would otherwise identify them

5. Which of the following is active surveillance?
- a. Laboratories, physicians, or other health care providers regularly report cases of disease to the local or state health department based on a standard case definition of that particular disease
 - b. Local or state health departments initiate the collection of specific cases of disease from laboratories, physicians, or other health care providers
 - c. The ongoing, systematic collection, analysis, interpretation, and application of real-time indicators for disease that allow for detection before public health authorities would otherwise identify them
6. Which of the following is a disadvantage of syndromic surveillance?
- a. Small outbreaks are not detected
 - b. Data collection is through automated means
 - c. Early, real-time information gathering
 - d. Health department staff burden for data collection is low

Session 4: Surveillance

Part 1: Introduction to Surveillance

PowerPoint Presentation Instructions

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The presentation for this training is available on the CD-ROM as:
Session4Part1.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.

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Session4Part1handouts.pdf

Session 4: Surveillance

Part 1: Introduction to Surveillance

Post-Test

1. Which of the following is NOT a characteristic of public health surveillance?
 - a. Systematic data collection
 - b. Ongoing
 - c. One-way
 - d. Timely dissemination
2. Which of the following is the “feedback loop” of a surveillance system?
 - a. Feedback from physician and laboratory reporters back to patients about their diagnosis
 - b. Feedback from the surveillance system back to physician and laboratory reporters about disease trends and changes as a result of surveillance
 - c. Feedback from the local health department back to physicians and laboratories about their reporting habits
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 - a. physicians and laboratorians in each state submit reports on a list of notifiable diseases, and reports are tallied at a state level only.
 - b. physicians and laboratorians in each state submit reports on a list of notifiable diseases, and reports are tallied on a state level and on a national level.
 - c. state health officials ask physicians and laboratorians in their state about notifiable diseases from a list of notifiable diseases.
4. Which of the following is passive surveillance?
 - a. Laboratories, physicians, or other health care providers regularly report cases of disease to the local or state health department based on a standard case definition of that particular disease
 - b. Local or state health departments initiate the collection of specific cases of disease from laboratories, physicians, or other health care providers
 - c. The ongoing, systematic collection, analysis, interpretation, and application of real-time indicators for disease that allow for detection before public health authorities would otherwise identify them

5. Which of the following is active surveillance?
- a. Laboratories, physicians, or other health care providers regularly report cases of disease to the local or state health department based on a standard case definition of that particular disease
 - b. Local or state health departments initiate the collection of specific cases of disease from laboratories, physicians, or other health care providers
 - c. The ongoing, systematic collection, analysis, interpretation, and application of real-time indicators for disease that allow for detection before public health authorities would otherwise identify them
6. Which of the following is a disadvantage of syndromic surveillance?
- a. Small outbreaks are not detected
 - b. Data collection is through automated means
 - c. Early, real-time information gathering
 - d. Health department staff burden for data collection is low

Session 4: Surveillance

Part 1: Introduction to Surveillance

Answer Key

1. Which of the following is NOT a characteristic of public health surveillance?

Answer: c. One-way

Feedback: Surveillance is the ongoing systematic collection, analysis, and interpretation of health data, and a key element of surveillance system operation is two-way communication between reporters and the system as well as between the system and those who need to know surveillance results.

2. Which of the following is the “feedback loop” of a surveillance system?

Answer: b. Feedback from the surveillance system back to physician and laboratory reporters about disease trends and changes as a result of surveillance

Feedback: The surveillance system feedback loop refers to the flow of information from physicians, laboratorians, and other public health reporters through the surveillance system and back to the reporting entities.

3. The National Notifiable Disease Surveillance System (NNDSS) is a national surveillance system whereby...

Answer: b. physicians and laboratorians in each state submit reports on a list of notifiable diseases, and reports are tallied on a state level and on a national level.

Feedback: NNDSS is a system where physicians, laboratories, and other disease reporting entities regularly submit reports of cases of notifiable disease through the channels defined by their state or local health departments. These reports are tallied on the state level, but the counts of disease are also submitted nationally and tallied by the CDC. A “notifiable” disease means that physicians and laboratories are required to report the disease on a regular basis, without health officials having to make any effort to contact them for the standard information.

4. Which of the following is passive surveillance?

Answer: a. Laboratories, physicians, or other health care providers regularly report cases of disease to the local or state health department based on a standard case definition of that particular disease

Feedback: Passive surveillance is characterized by passive receipt of disease reports by health officials. Reporting entities report on a regular basis, using standard, pre-determined case definitions as a guide for which cases to report, without being solicited for the information by the health department.

5. Which of the following is active surveillance?

Answer: b. Local or state health departments initiate the collection of specific cases of disease from laboratories, physicians, or other health care providers

Feedback: Active surveillance is characterized by the active effort that health department staff must take to collect the desired case report information. This requires extra time and effort on the part of the health department, and is usually reserved for short-term, special interest, or emergency situations.

6. Which of the following is a disadvantage of syndromic surveillance?

Answer: a. Small outbreaks are not detected

Feedback: Syndromic surveillance is a useful tool because the data collection is automated. This can allow for rapid detection of health events – earlier than would be possible from traditional surveillance. Also, automated collection minimizes the time that staff spend collecting and cleaning data. However, syndromic surveillance is not a sensitive tool – smaller outbreaks are not likely to be detected because there would not be a large enough “spike” in the automated indicators used. Thus, syndromic surveillance is a good supplement, but not replacement, to traditional surveillance techniques.

Session 4: Surveillance

Part 1: Introduction to Surveillance Evaluation Instructions

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Session 4: Surveillance
Part 2: Federal Public Health Surveillance
Pre-Test

1. At the national level, the Centers for Disease Control and Prevention (CDC) play a major role in public health surveillance. Which of the following is NOT a surveillance function performed by the CDC?
 - a. Support the states with surveillance guidelines, consultation, and funding
 - b. Receive, collate, analyze, and report data from states and territories
 - c. Suggest changes to be considered in public health surveillance activities
 - d. Report to the World Health Organization (WHO) as required
 - e. None of the above; these are all CDC functions
2. Separate from the notifiable disease surveillance system, federal surveillance systems collect data on infectious and non-infectious conditions from a variety of sources and participants. For example, ArboNet collects data on _____ from _____.
 - a. arboviruses; nationally networked hospitals and clinics
 - b. West Nile virus; local and state health departments
 - c. arboviruses; local and state health departments, veterinary laboratories, blood donation screening, and more
 - d. West Nile virus; the U.S. Geographic Survey
3. In the United States, influenza surveillance has a variety of components, including:
 - a. Viral strain surveillance and outpatient illness surveillance
 - b. Viral strain surveillance, outpatient illness surveillance, and mortality surveillance
 - c. Viral strain surveillance, outpatient illness surveillance, mortality surveillance and hospitalization surveillance
 - d. Viral strain surveillance, outpatient illness surveillance, mortality surveillance, hospitalization surveillance, and a summary of geographic spread from state health departments
4. Results of analysis from surveillance data can be used for all of the following EXCEPT:
 - a. Describing person, place, and time characteristics of a disease or condition
 - b. Generating hypotheses about the cause of a disease or condition
 - c. Determining the cause of a disease or condition
 - d. Describing how much more (or less) disease is present in one population compared to another

5. Which of the following is a comparison of population disease rates for surveillance?
- a. In City A, there were 12 cases of disease X per 1,000 population; in City B, there were 15 cases per 1,000 population
 - b. There were 100 cases of disease X in City A, but only 10 cases in City B
 - c. School-aged children had the fewest cases: 75, while children under the age of 2 had the most: 100 cases
 - d. Of all cases, 65% (n=50) were among agricultural workers

Session 4: Surveillance

Part 2: Federal Public Health Surveillance

PowerPoint Presentation Instructions

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Session4Part2handouts.pdf

Session 4: Surveillance
Part 2: Federal Public Health Surveillance
Post-Test

1. At the national level, the Centers for Disease Control and Prevention (CDC) play a major role in public health surveillance. Which of the following is NOT a surveillance function performed by the CDC?
 - a. Support the states with surveillance guidelines, consultation, and funding
 - b. Receive, collate, analyze, and report data from states and territories
 - c. Suggest changes to be considered in public health surveillance activities
 - d. Report to the World Health Organization (WHO) as required
 - e. None of the above; these are all CDC functions

2. Separate from the notifiable disease surveillance system, federal surveillance systems collect data on infectious and non-infectious conditions from a variety of sources and participants. For example, ArboNet collects data on _____ from _____.
 - a. arboviruses; nationally networked hospitals and clinics
 - b. West Nile virus; local and state health departments
 - c. arboviruses; local and state health departments, veterinary laboratories, blood donation screening, and more
 - d. West Nile virus; the U.S. Geographic Survey

3. In the United States, influenza surveillance has a variety of components, including:
 - a. Viral strain surveillance and outpatient illness surveillance
 - b. Viral strain surveillance, outpatient illness surveillance, and mortality surveillance
 - c. Viral strain surveillance, outpatient illness surveillance, mortality surveillance and hospitalization surveillance
 - d. Viral strain surveillance, outpatient illness surveillance, mortality surveillance, hospitalization surveillance, and a summary of geographic spread from state health departments

4. Results of analysis from surveillance data can be used for all of the following EXCEPT:
 - a. Describing person, place, and time characteristics of a disease or condition
 - b. Generating hypotheses about the cause of a disease or condition
 - c. Determining the cause of a disease or condition
 - d. Describing how much more (or less) disease is present in one population compared to another

5. Which of the following is a comparison of population disease rates for surveillance?
- a. In City A, there were 12 cases of disease X per 1,000 population; in City B, there were 15 cases per 1,000 population
 - b. There were 100 cases of disease X in City A, but only 10 cases in City B
 - c. School-aged children had the fewest cases: 75, while children under the age of 2 had the most: 100 cases
 - d. Of all cases, 65% (n=50) were among agricultural workers

Session 4: Surveillance
Part 2: Federal Public Health Surveillance
Answer Key

1. At the national level, the Centers for Disease Control and Prevention (CDC) play a major role in public health surveillance. Which of the following is NOT a surveillance function performed by the CDC?

Answer: e. None of the above, these are all CDC functions

Feedback: The CDC is central in U.S. public health surveillance activities. It provides expertise and funding to the states; through collation of data from all states, CDC provides a federal-level perspective on diseases trends and health risks; based on national data and a high level of expertise, CDC suggests changes to state level public health surveillance activities; and CDC is responsible for reporting globally notifiable diseases occurring in any state to the World Health Organization.

2. Separate from the notifiable disease surveillance system, federal surveillance systems collect data on infectious and non-infectious conditions from a variety of sources and participants. For example, ArboNet collects data on _____ from _____.

Answer: c. arboviruses; local and state health departments, veterinary laboratories, blood donation screening, and more

Feedback: ArboNet collects data on arbovirus cases from local and state health departments, but it also collects information on virus-infected blood donations, as well as data from a number of ecologic sources such as veterinary diagnoses of arboviruses in animals; species and location information for dead birds; and infection rates for mosquitoes and sentinel chickens. West Nile virus is just one of the types of arboviruses for which data are collected.

3. In the United States, influenza surveillance has a variety of components, including;

Answer: d. Viral strain surveillance, outpatient illness surveillance, mortality surveillance, hospitalization surveillance, and a summary of geographic spread from state health departments

Feedback: U.S. influenza surveillance has components reflecting viral strain (laboratory) surveillance, outpatient (ambulatory morbidity) surveillance, mortality surveillance, hospitalization (non-ambulatory morbidity), as well as a summary of spread from state health departments (e.g. sporadic or widespread). Each of these components contributes to providing information on specific aspects of influenza circulation, morbidity and mortality.

4. Results of analysis from surveillance data can be used for all of the following EXCEPT:

Answer: c. Determining the cause of a disease or condition

Feedback: Surveillance data are descriptive. This means that they can be used to describe person, place and time characteristics (such as who has a disease or condition, where is the disease or condition occurring, and when does it occur). This information can lead investigators to generate hypotheses about causes of a disease, and can also be used to compare the amount of disease in different populations, or among populations with different characteristics (for example male vs. female). Because surveillance data is collected on an aggregate level, it cannot be used to determine what might have caused a disease or condition.

5. Which of the following is a comparison of population disease rates for surveillance?

Answer: a. In City A, there were 12 cases of disease X per 1,000 population; in City B. there were 15 cases per 1,000 population

Feedback: A rate of disease has the number of cases in the numerator, with the number of people in the population in the denominator, e.g. 12 cases per 1,000 population. Rates allow comparisons of the amount of disease across populations of different sizes. While percentages can sometimes be rates, a percentage that is a rate would still follow same principle: number of cases per number of population. The percentage given in answer d is simply a percent of cases – not a rate of disease among a population.

Session 4: Surveillance

Part 2: Federal Public Health Surveillance Evaluation Instructions

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Session 4: Surveillance

Optional Discussion Guide

(Facilitator)

Three major types of surveillance were discussed in the lecture: active, passive, and syndromic. Which type of surveillance do you think would be best for detecting a new or “emerging” respiratory infectious disease?

(Discussion cues)

Each of the types of surveillance has its strengths and limitations. You or your discussion group might come to a consensus about which method would be best. Currently, most states rely on passive surveillance systems to detect new diseases. Your department or division may have experience with “astute physicians,” who see a patient with an unusual disease or a higher number of patients with a uniform presentation than they are used to seeing, and takes the time and effort to call and inform the health department of their concerns. This may not be the usual, paper-based or electronic route of passive surveillance, but because the initiative is on the part of the physician, it is passive. This type of surveillance is the easiest type for the health department to perform, and the least costly, because the health department waits for the data to come in. However, it would be easy to miss a new disease if only a few cases occur, if the illness is not severe, or if physicians do not recognize it as being something unusual to report. (Note: The illness does not have to be a *new* illness to cause the astute physician to report. The physician may call because of seeing a large number of Hepatitis A cases, for example).

Active surveillance is more costly than passive surveillance, and would generally be reserved for case-finding once a new infectious disease has been identified, rather than for detecting a new disease through routine surveillance. Your discussion group might think it is possible, however, that a new illness could be recognized through physicians participating in a currently existing active surveillance system for other respiratory infections.

Syndromic surveillance might be a viable option for detecting a new respiratory illness, particularly if the disease affected a large number of people. An upswing in over-the-counter medications for respiratory symptoms, coupled with high work or school absenteeism and/or increased clinic visits for respiratory ailments may lead investigators to believe there is an increase in respiratory disease. However, medical and laboratory investigation would still be required to determine that the infectious agent was not previously known.

(Facilitator)

How would surveillance data on the occurrence of tuberculosis help to attain the following objectives?

- 1. Establish public health priorities***
- 2. Assess public health programs / Facilitate research***

(Discussion cues)

1. Surveillance for tuberculosis would help establish public health priorities by indicating the incidence and prevalence of tuberculosis. Comparing this to the surveillance data for other diseases and conditions helps public health departments decide where to focus prevention and intervention efforts, and where policies need to be developed or revised.
2. Think about programs for tuberculosis control that your health department may have in place. For example, most health departments conduct contact tracing of cases, so that the case-patient and all those who the case-patient has exposed can be found and treated or given prophylaxis. Some health departments have a “directly observed therapy” or DOTs policy, where a nurse or other health department staff observe patients taking their medication to ensure that the treatment is effective. Comparing surveillance data before and after implementing these types of programs, or comparing communities with different methods of tuberculosis control, can show whether the programs are effective in reducing the transmission of disease and where more research might be needed to develop effective control measures.

(Facilitator)

Which of the following is the most important factor in setting public health priorities based on surveillance data?

- ♦ ***Disease frequency (such as incidence, prevalence)***
- ♦ ***Disease severity (case fatality rate, hospitalization or disability rate)***
- ♦ ***Cost (both direct and indirect)***

(Discussion cues)

It depends! These considerations are seldom taken in isolation, and the answers may vary according to the disease(s) under surveillance. Surveillance data can help public health officials establish public health priorities by indicating the frequency of disease, through incidence, mortality or other health outcomes, such as years of life lost. Those diseases with a larger impact may be given a higher priority. However, the severity of the disease is also important, as a mild, self-limiting illness that was very common might not be as high a priority as a very severe disease that is less common. By indicating the severity of disease through calculating fatality rates or tracking hospitalization or morbidity, health officials can assess both the magnitude and urgency of implementing an intervention. Surveillance data can help address cost and resource issues by tracking prevention measures, access to care, and healthcare utilization, which help public health officials know what can be done with the resources available.

(Facilitator)

Have you or your health department ever noted an increase in cases in the surveillance data of a particular disease that turned out to be false? If so, what were the reasons?

(Discussion cues)

There could be many reasons for a false spike in cases, some of which were mentioned in the lecture, as well as others that your group might have experienced. For example, a case definition could have changed to be broader. The method of reporting could have gotten easier, resulting in more reports (such as the initiation of electronic reporting, instead of paper-based reporting). The surveillance system may have expanded in its geographic coverage, to include a larger area or to have enrolled more reporters. A new intervention could have been implemented, resulting in the increased finding of cases, such as a skin cancer screening program implemented in office places, or new clinics targeting teenagers for testing and treatment of STDs. Additionally, there could be a change (or a mistake!) in laboratory diagnostic procedures, resulting in an artificial increase in cases.

Session 5: Epidemiology Applications

Session Overview

Summary

In this session, you will hear about four different applications of the practice of epidemiology: disaster epidemiology, environmental epidemiology, forensic epidemiology, and maternal and child health epidemiology. Discussion of each of these fields highlights the underlying methods of epidemiological practice that learned in the earlier sessions of the series.

The disaster epidemiology segment covers the methodology used to conduct rapid needs assessments after natural disasters and the use of geographic information systems and global positioning systems technology to enhance the rapid needs assessment methodology. Environmental health epidemiology focuses on the impact of the environment and environmental contaminants on human health. This segment touches on issues related to toxicology and environmental preparedness. The segment on forensic epidemiology gives a short history of the discipline, and the challenges it faces. The differences between a law enforcement investigation and a public health investigation are presented. Finally, the central role of issues surrounding pregnancy and neonatal health in health departments are highlighted.

Intended Audience

Non-epidemiologists who collaborate or work with epidemiologists

Running Time

Part 1: 30 minutes of lecture
20 minutes for pre-test, post-test, and evaluation

Part 2: 25 minutes of lecture
20 minutes for pre-test, post-test, and evaluation

Optional Discussion: 15 minutes (approximate)

Learning Objectives

- ♦ Identify epidemiology methods that can be used regardless of epidemiologic specialty
- ♦ Describe the Community Assessment for Public Health Emergency Response (CASPER) process
- ♦ List 4 functions of environmental epidemiology
- ♦ Define forensic epidemiology
- ♦ State two uses of forensic epidemiology
- ♦ Explain similarities and differences between law enforcement and public health investigations
- ♦ List maternal and child health related surveillance projects

Session 5: Epidemiology Applications

Part 1: Disaster and Environmental Epidemiology

Pre-Test

1. The application of epidemiologic methods to disaster settings using Community Assessment for Public Health Emergency Response (CASPER) is characterized by all of the following EXCEPT:
 - a. Rapid assessment of needs
 - b. Use of hand-held global information system technology to map affected areas
 - c. Selection of a random sample from the affected population
 - d. Provision of immediate needs such as clean water
2. Community Assessment for Public Health Emergency Response (CASPER) collects data from individuals using which method?
 - a. Face-to-face household interviews
 - b. Computer-based surveys
 - c. Paper-based questionnaires distributed at emergency shelters
 - d. Telephone interviews
3. An advantage of using GIS and global positioning methods in post-disaster surveys and community assessments is that these tools eliminate double data entry and allow users to quickly analyze and map data.
 - a. True
 - b. False
4. In general, the mission of a health department's environmental health program is to
 - a. Monitor pollutants in the air and water
 - b. Regulate environmental contaminants from industrial sources
 - c. Reduce incidence and severity of disease and adverse health conditions due to environmental exposures
 - d. Enact health department policies that protect the environment
5. Which of the following is NOT one of the functions of environmental epidemiology?
 - a. Conduct site-specific assessments
 - b. Enforce local environmental pollution standards
 - c. Conduct health, environmental, and biological surveillance
 - d. Respond to community concerns
 - e. Conduct health professional and community education

Session 5: Epidemiology Applications

Part 1: Disaster and Environmental Epidemiology

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:
Session5Part1handouts.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.

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Session5Part1handouts.pdf

Session 5: Epidemiology Applications

Part 1: Disaster and Environmental Epidemiology

Post-Test

1. The application of epidemiologic methods to disaster settings using Community Assessment for Public Health Emergency Response (CASPER) is characterized by all of the following EXCEPT:
 - e. Rapid assessment of needs
 - f. Use of hand-held global information system technology to map affected areas
 - g. Selection of a random sample from the affected population
 - h. Provision of immediate needs such as clean water
2. Community Assessment for Public Health Emergency Response (CASPER) collects data from individuals using which method?
 - e. Face-to-face household interviews
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 - b. Enforce local environmental pollution standards
 - c. Conduct health, environmental, and biological surveillance
 - d. Respond to community concerns
 - e. Conduct health professional and community education

Session 5: Epidemiology Applications

Part 1: Disaster and Environmental Epidemiology

Answer Key

1. The application of epidemiologic methods to disaster settings using Community Assessment for Public Health Emergency Response (CASPER) is characterized by all of the following EXCEPT:

Answer: d. Provision of immediate needs such as clean water

Feedback: The overall purpose of a CASPER is to take a random sample of the affected population and determine the type and magnitude of needs in the area, usually using hand-held global position units. This provides timely information so that planning and implementing relief efforts is done efficiently and effectively. CASPER teams are not meant to be relief missions that deliver water, medicine or other resources to the areas they visit.

2. Community Assessment for Public Health Emergency Response (CASPER) collects data from individuals using which method?

Answer: a. Face-to-face household interviews

Feedback: CASPERS are face-to-face interviews conducted with randomly selected households in disaster-affected areas.

3. An advantage of using GIS and global positioning methods in post-disaster surveys and community assessments is that these tools

Answer: a. True

Feedback: Handheld computers, GIS, and GPS add value to field data collection in rapid needs assessments by eliminating double data entry, providing routing and direction-finding for field teams, providing improved randomization through GIS, and giving the ability to quickly analyze and map data.

4. In general, the mission of a health department's environmental health program is to

Answer: c. Reduce incidence and severity of disease and adverse health conditions due to environmental exposures

Feedback: Environmental epidemiology is focused on reduce incidence and severity of disease and adverse health conditions due to environmental exposures. The mission of an environmental epidemiology department or program is aligned with the mission of epidemiology programs in general, which center around identifying risks and protecting populations (rather than protecting or managing the environment).

5. Which of the following is NOT one of the functions of environmental epidemiology?

Answer: b. Enforce local environmental pollution standards

Feedback: While environmental epidemiology programs may partner with enforcement agencies (such as the Environmental Protection Agency), they are not responsible for enforcement of standards. Environmental epidemiology programs are, however, involved in the research and recommendation of pollution levels that are considered safe for human health.

Session 5: Epidemiology Applications

Part 1: Disaster and Environmental Epidemiology

Evaluation Instructions

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Session 5: Epidemiology Applications
Part 2: Forensic Epidemiology &
Maternal and Child Health Epidemiology
Pre-Test

1. Which of the following describes forensic epidemiology?
 - a. Epidemiologic methods applied in a setting of potential criminal investigation
 - b. Use of epidemiologic evidence in a courtroom
 - c. 2x2 tables applied to criminal evidence
 - d. Both a and b
2. Which of the following goals do public health and law enforcement have in common?
 - a. Protecting the public
 - b. Preventing or stopping the spread of disease
 - c. Identifying those responsible for a threat or attack
 - d. Protecting employees during response and investigative phases
 - e. All of the above
3. Can specimens collected during a public health investigation be used for a criminal investigation?
 - a. No, because it would be illegal to use specimens collected during a public health investigation for a criminal investigation
 - b. No, because specimens collected for a public health investigation would not be collected in a way that is admissible to a court of law
 - c. Yes, because specimens that are collected as part of a legitimate public health investigation and have an established chain of custody can be considered legal evidence
 - d. Yes, because public health and law enforcement are both arms of the government, all specimens can be shared freely
4. Maternal and child health epidemiology is described by which of the following?
 - a. The collection, surveillance, analysis, and effective use of health data as it relates to the health of families, particularly women and children
 - b. The collection, surveillance, analysis, and effective use of health data as it relates to pregnant women
 - c. The collection, surveillance, analysis, and effective use of health data as it relates to birth complications and neonatal health
 - d. The collection, surveillance, analysis, and effective use of health data as it relates to fertility
5. Which of the following is NOT typically a focus of a maternal and child health epidemiology surveillance program?
 - a. Maternal mortality
 - b. Perinatal morbidity and mortality
 - c. Birth defects
 - d. Childhood immunization
 - e. Maternal / pediatric nutrition

Session 5: Epidemiology Applications Part 2: Forensic Epidemiology & Maternal and Child Health Epidemiology PowerPoint Presentation Instructions

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Session 5: Epidemiology Applications
Part 2: Forensic Epidemiology &
Maternal and Child Health Epidemiology
Post-Test

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 - c. Birth defects
 - d. Childhood immunization
 - e. Maternal / pediatric nutrition

Session 5: Epidemiology Applications
Part 2: Forensic Epidemiology &
Maternal and Child Health Epidemiology
Answer Key

1. Which of the following describes forensic epidemiology?

Answer: d. Both a and b

Feedback: Forensic epidemiology is defined as the use of epidemiologic methods applied in the setting of a potential criminal investigation, such as when there has been a criminal use of a biological agent. Epidemiologic studies can also be used as evidence in a courtroom. Forensic epidemiology does not refer to epidemiologic analysis, such as using 2x2 tables, with criminal evidence.

2. Which of the following goals do public health and law enforcement have in common?

Answer: e. All of the above

Feedback: While their specific aims and methods are different, law enforcement and public health officials share the common goals of protecting the public, preventing or stopping the spread of disease, identifying those responsible for a threat or attack, and protecting employees during response and investigative phases.

3. Can specimens collected during a public health investigation be used for a criminal investigation?

Answer: c. Yes, because specimens that are collected as part of a legitimate public health investigation and have an established chain of custody can be considered legal evidence

Feedback: There are two criteria that must be met in order for specimens from public health investigations to be used in criminal investigations: First, it must be collected as part of a legitimate public health investigation, and second, a chain of custody must be used in the collection and processing of the specimen.

4. Maternal and child health epidemiology is described by which of the following?

Answer: a. The collection, surveillance, analysis, and effective use of health data as it relates to the health of families, particularly women and children

Feedback: MCH epidemiology is the collection, surveillance, analysis, and effective use of health data as it relates to the health of families, particularly women and children. The MCH epidemiology program may be within a department focused on issues such as pregnancy and antenatal care, health insurance and administering Women, Infants, and Children (or WIC) funds; or it may be a part of a broader epidemiology program that focuses specifically and maternal and child health concerns.

5. Which of the following is NOT typically a focus of a maternal and child health epidemiology surveillance program?

Answer: d. Childhood immunization

Feedback: Surveillance for maternal mortality, perinatal morbidity and mortality, and birth defects surveillance and reporting, are common areas of epidemiologic surveillance in MCH epidemiology. Some programs may also be responsible for maternal and pediatric nutrition surveillance and interventions. Because of its broad-reaching scope, childhood immunization is not typically part of an MCH epidemiology program.

Session 5: Epidemiology Applications Part 2: Forensic Epidemiology & Maternal and Child Health Epidemiology Evaluation Instructions

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Session 5: Epidemiology Applications

Optional Discussion Guide

(Facilitator)

Public health and law enforcement have different philosophies on communicating with the public through the media. What has been your experience with the media? How do you think it would be different in the situation of a joint public health and law enforcement investigation?

(Discussion cues)

You or members of your discussion group may have experience pulling together information for a press release or interview, if not speaking with members of the media directly. Things to consider include the type of information released (Was it facts and reports, safety messages, or notice of potential outbreaks?) and the situation (Was it a routine publication of data or information, a special report or investigation, or information to answer questions coming in from the public?)

Generally, public health workers try to be very open to talking with the media and reaching the public. Media interest in any public health topic offers a “teachable moment.” A controversy over a foodborne source of an outbreak, for example, can allow public health officials to remind the public about safe food handling practices. An informed public can make better decisions about their health.

In a criminal investigation, however, offering up potential sources of illness may compromise an ongoing investigation. In this case, it is likely that very general information about the investigation would be given, with little or no information about the leads being investigated, and the message would focus on personal measures individuals could take to protect themselves. For example, a message concerning intentional contamination of food might be: “Law enforcement and public health are working together around the clock to resolve this problem. The public is in no immediate danger (or the public should avoid XXX food products), and should see their doctor immediately with questions or problems about their health (or with a list of symptoms).”

(Facilitator)

In what situations, besides post-hurricane, might a rapid assessment using Community Assessment for Public Health Emergency Response, or CASPER, methods be useful?

(Discussion cues)

CASPER methods can be useful in nearly any natural disaster situation, such as after flooding, tornadoes, ice storms, or windstorms. Each geographic area should tailor the questions they think need to be included on an assessment based on the most likely natural occurrences. CASPERs can also be useful to assess the needs of a community after non-natural incidents, be they accidental or intentional as well as in non-disaster settings. Some examples of these might be chemical spills/plumes or regular community health assessments.

(Facilitator)

What environmental health concerns have communities in your state raised? Has your state health department responded to these concerns? What do you think are the key characteristics the response of environmental epidemiologists to the community?

(Discussion cues)

Members of your group may not have direct experience with environmental health concerns, but as members of various communities they are likely to be aware of concerns that exist.

For example, a neighborhood may have concerns about increased noise and air pollution from a truck stop proposed nearby. Disposal of industrial or household waste near neighborhoods, schools, or recreation areas also can raise concerns. States with freshwater resources may have concerns about agricultural runoff, swimming safety, and recreational or commercial fishing safety.

Because they have the capability to analyze the existing scientific evidence and collect new data if needed, environmental epidemiologists are a key part of the response to concerned communities. If evidence that an exposure may be harmful exists, environmental epidemiologists can serve as advocates for measures to protect the public health by ensuring that their results reach decision makers and community members.

Whenever response to a community concern is necessary, it is important to inform community stakeholders of investigations and efforts that are being undertaken and to have a transparent process for keeping them informed. In environmental epidemiology, it is possible for a diverse number of other stakeholders to also proceed with respect for the community and other organizations, including businesses, industry, the EPA, and special interest groups, among others.

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I is for Investigation contains seven modules that use case studies to examine the concepts of an outbreak investigation.

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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.