

Terms Introduced in This Chapter

After reading Chapter 11, you should be familiar with the following terms. These terms are defined in Chapter 11 and in the Glossary.

Active carrier	Incidence
Biologic warfare (bw) agents	Incubatory carrier
Bioterrorist agents	Morbidity rate
Coliforms	Mortality rate
Communicable disease	Pandemic disease
Contagious disease	Parenteral injection
Convalescent carrier	Passive carrier
Endemic disease	Prevalence
Epidemic disease	Reservoirs of infection (reservoirs)
Epidemiology	Sporadic disease
Fomites	



Insight



Epidemiologists

Epidemiologists are scientists who specialize in the study of disease and injury patterns (incidence and distribution patterns) in populations, and ways to prevent or control diseases and injuries. Epidemiologists study virtually all types of diseases, including heart, hereditary, communicable, and zoonotic diseases and cancer. In some ways, epidemiologists are like disease detectives, gathering and piecing together clues to determine what causes a particular disease, why it occurs only at certain times, and why certain people in a population get the disease while others do not. Quite often, epidemiologists are called on to track down the cause of epidemics, and figure out how to stop them. Data collection and statistical analysis of data are among the many duties of epidemiologists.

Epidemiologists have a variety of educational backgrounds. Some are physicians, with specialization in epidemiology or public health. Others have a doctoral degree (PhD or DrPH), a master's degree (MS or MPH), or a bachelor's degree (e.g., an RN degree) plus specialized training in epidemiology. Many epidemiologists are employed at public health agencies and healthcare institutions. The Centers for Disease Control and Prevention (CDC) employs many epidemiologists, and offers a 2-year, postgraduate course to train health professionals as Epidemic Intelligence Service (EIS) Officers. EIS Officers, many of whom are employed at state health departments, conduct epidemiologic investigations, research, and public health surveillance. To learn more about the EIS, visit this CDC web site: www.cdc.gov/eis.

Preparing for a Bioterrorist Attack

Perhaps you've wondered what you can do as an individual to prepare yourself and your family for a bioterrorist attack. The best thing you can do is to be aware of what's going on around you and throughout the nation. Remain vigilant and cautious, but not scared. Stay healthy by eating

Chapter 11 – Epidemiology and Public Health

well and by boosting your immune system. A fully competent immune system is your best defense against pathogens of all types.

Authorities (such as the CDC) advise against purchasing gas masks and taking or stockpiling antibiotics. Prepare your home and family as you would for any natural disaster (e.g., a hurricane or tornado), by ensuring that you have emergency supplies on hand, such as a flashlight, radio, extra batteries, and plenty of food and water. Should a bioterrorist attack occur, state and federal public health authorities will advise you of what actions to take. Be sure to comply with their recommendations regarding vaccination, including the anthrax and smallpox vaccines.

With respect to the mail, be on the lookout for suspicious packages and envelopes. Check the CDC web site (www.cdc.gov) for the characteristics of suspicious pieces of mail. Be sure to follow the United States Postal Service and CDC recommendations regarding actions to take should you receive any suspicious pieces of mail.



Increase Your Knowledge

1. Students interested in learning more about the World Health Organization (WHO), including updated information on epidemics, should visit their web site (www.who.int/en). If you click on “Health Topics,” you can find information about many different diseases (such as AIDS, anthrax, Ebola hemorrhagic fever, malaria, tuberculosis).
2. For additional information about the Centers for Disease Control and Prevention (CDC), including information about various infectious diseases, visit their web site (www.cdc.gov). If you click on “A–Z Index,” you can find information about many different diseases. The National Center for Infectious Diseases (NCID) web site is www.cdc.gov/ncidod/ncid.htm.
3. In the winter of 1989, an Ebola virus epidemic occurred among monkeys at an Army research facility in Reston, VA, near Washington, D.C. A SWAT team of soldiers and scientists worked feverishly for 18 days to end the outbreak, not knowing at the time whether the virus could infect humans. To learn more about this exciting epidemic, read *The Hot Zone*, by Richard Preston (Random House, New York, 1994).
4. To learn more about a variety of exotic and emerging pathogens that have the potential to cause widespread epidemics, read *The Coming Plague*, by Laurie Garrett (Penguin Books, New York, 1994).
5. To learn more about biologic weapons, biowarfare, and bioterrorism, read *Germs: Biological Weapons and America’s Secret War*, by Judith Miller, Stephen Engelberg, and William Broad (Simon & Schuster, New York, 2001).



Microbiology—Hollywood Style

- Epidemics are very serious, and should never be taken lightly. Nonetheless, Hollywood has produced several excellent movies about them. In the 1971 movie, *The Andromeda Strain*, a team of scientists attempts to isolate a deadly strain of virus from outer space. The 1993 movie, *And the Band Played On*, tells the powerful and moving story of the initial years of the AIDS epidemic in the United States. In the 1995 movie, *Outbreak*, U.S. Army and CDC epidemiologists attempt to contain an epidemic in California, caused by a deadly virus (similar to Ebola virus) that was transported from the jungles of Zaire, Africa, to the United States by a monkey.
- Likewise, bioterrorist attacks are very serious, and should never be taken lightly. However, if you'd like to watch a movie about bioterrorism in the United States, you might want to rent the 1998 movie, *The Patriot*, starring Steven Seagal. A violent extremist group unleashes a rapidly spreading lethal biologic agent in a small community and then takes over the town.



Critical Thinking

1. The Centers for Disease Control and Prevention (CDC) is an agency of the Federal Government of the United States, and yet CDC epidemiologists travel to foreign countries to investigate epidemics. A friend of yours thinks that this is a waste of taxpayers' dollars. Explain to her why it isn't.
- 2.
3. Visit the CDC web site to learn what actions have been or are being taken to protect the public from bioterrorism. Can you think of any additional actions that could be taken?
- 4.
3. The cryptosporidiosis epidemic in Milwaukee, WI, in the spring of 1993 was the largest waterborne epidemic that has ever occurred in the United States. Search the Internet to learn more details about this epidemic.



Additional Chapter 11 Self-Assessment Exercises

(Note: Don't peek at the answers before you attempt to solve these self-assessment exercises.)

Matching Questions

- | | | |
|--------------------------|-----------|---|
| A. communicable diseases | _____ 1. | Diseases that are always present in a population are known as _____. |
| B. endemic diseases | _____ 2. | Diseases that are transmissible from person to person are known as _____. |
| C. epidemic diseases | _____ 3. | Diseases that occur only occasionally in a particular population are known as _____. |
| D. pandemic diseases | _____ 4. | Because large numbers of cases of AIDS, malaria, and tuberculosis are presently occurring in many different countries, they are known as _____. |
| E. sporadic diseases | _____ 5. | Diseases with unusually high numbers of cases that often occur in one particular geographic location are known as _____. |
| | | |
| A. biting flies | _____ 6. | The causative agents of dengue fever, filariasis, malaria, West Nile encephalitis, and yellow fever are all transmitted by _____. |
| B. bugs | _____ 7. | _____ transmit the causative agents of babesiosis, ehrlichiosis, Lyme disease, relapsing fever, and Rocky Mountain spotted fever. |
| C. lice | _____ 8. | The causative agent of American trypanosomiasis (Chagas' disease) is transmitted by arthropods in a class of insects known as _____. |
| D. mosquitos | _____ 9. | _____ transmit the causative agents of epidemic typhus and trench fever. |
| E. ticks | _____ 10. | African sleeping sickness, leishmaniasis, and onchocerciasis are transmitted by various types of _____. |

Chapter 11 – Epidemiology and Public Health

True/False Questions

- _____ 1. Influenza is an example of a contagious disease.
- _____ 2. Zoonotic diseases are diseases that humans acquire from zoo animals.
- _____ 3. The largest waterborne outbreak ever to occur in the United States was caused by *Giardia lamblia*.
- _____ 4. Water containing 1 coliform per 100 mL would be considered potable.
- _____ 5. The most common zoonotic infection in the United States is Rocky Mountain spotted fever.
- _____ 6. Soil can contain the spores that cause botulism, gas gangrene, and tetanus.
- _____ 7. Chlamydial genital infections and gonorrhea are the two most common nationally notifiable infectious diseases in the United States.
- _____ 8. The levels of chlorine routinely used for water treatment are sufficient to kill *Giardia* cysts and *Cryptosporidium* oocysts.
- _____ 9. *Yersinia pestis*, the bacterium that causes plague, is one of the pathogens most often discussed as a potential biologic weapon.
- _____ 10. Gonorrhea is considered to be a communicable disease, but *not* a contagious disease.



Answers to the Chapter 11 Self-Assessment Exercises in the Text

- | | | | |
|----|---|-----|---|
| 1. | B | 6. | B |
| 2. | D | 7. | A |
| 3. | A | 8. | C |
| 4. | D | 9. | C |
| 5. | A | 10. | D |



Answers to the Additional Chapter 11 Self-Assessment Exercises

Matching Questions

- | | | | |
|----|---|-----|---|
| 1. | B | 6. | D |
| 2. | A | 7. | E |
| 3. | E | 8. | B |
| 4. | D | 9. | C |
| 5. | C | 10. | A |

True/False Questions

1. True
2. False (zoonotic diseases can be acquired from many types of animals, not just zoo animals)
3. False (it was caused by *Cryptosporidium parvum*)
4. True
5. False (Lyme disease is the most common zoonotic disease in the United States)
6. True
7. True
8. False (the levels of chlorine routinely used for water treatment will not kill *Giardia* cysts or *Cryptosporidium* oocysts)
9. True
10. True