



Exercise 1.1

Below are four key terms taken from the definition of epidemiology, followed by a list of activities that an epidemiologist might perform. Match the term to the activity that best describes it. You should match only one term per activity.

- A. *Distribution*
- B. *Determinants*
- C. *Application*

- _____ 1. Compare food histories between persons with *Staphylococcus* food poisoning and those without
- _____ 2. Compare frequency of brain cancer among anatomists with frequency in general population
- _____ 3. Mark on a map the residences of all children born with birth defects within 2 miles of a hazardous waste site
- _____ 4. Graph the number of cases of congenital syphilis by year for the country
- _____ 5. Recommend that close contacts of a child recently reported with meningococcal meningitis receive Rifampin
- _____ 6. Tabulate the frequency of clinical signs, symptoms, and laboratory findings among children with chickenpox in Cincinnati, Ohio



Check your answers on page 1-81



Exercise 1.2

In August 1999, epidemiologists learned of a cluster of cases of encephalitis caused by West Nile virus infection among residents of Queens, New York. West Nile virus infection, transmitted by mosquitoes, had never before been identified in North America.

Describe how this information might be used for each of the following:

1. Assessing the community's health
2. Making decisions about individual patients
3. Documenting the clinical picture of the illness
4. Searching for causes to prevent future outbreaks



Check your answers on page 1-81



Exercise 1.3

Match the appropriate core function to each of the statements below.

- A. *Public health surveillance*
- B. *Field investigation*
- C. *Analytic studies*
- D. *Evaluation*
- E. *Linkages*
- F. *Policy development*

- _____ 1. Reviewing reports of test results for *Chlamydia trachomatis* from public health clinics
- _____ 2. Meeting with directors of family planning clinics and college health clinics to discuss *Chlamydia* testing and reporting
- _____ 3. Developing guidelines/criteria about which patients coming to the clinic should be screened (tested) for *Chlamydia* infection
- _____ 4. Interviewing persons infected with *Chlamydia* to identify their sex partners
- _____ 5. Conducting an analysis of patient flow at the public health clinic to determine waiting times for clinic patients
- _____ 6. Comparing persons with symptomatic versus asymptomatic *Chlamydia* infection to identify predictors



Check your answers on page 1-82



Exercise 1.4

Investigators of an outbreak of trichinosis used a case definition with the following categories:

Clinical Criteria

- Confirmed case: Signs and symptoms plus laboratory confirmation
 - Probable case: Acute onset of at least three of the following four features: myalgia, fever, facial edema, or eosinophil count greater than 500/mm³
 - Possible case: Acute onset of two of the four features plus a physician diagnosis of trichinosis
 - Suspect case: Unexplained eosinophilia
 - Not a case: Failure to fulfill the criteria for a confirmed, probable, possible, or suspect case
- Time: Onset after October 1, 2006
 Place: Metropolitan Atlanta
 Person: Any

Using this case definition, assign the appropriate classification to each of the persons included in the line listing below. Use the highest rate classification possible. (All were residents of Atlanta with acute onset of symptoms in November.)

ID#	Last Name	Myalgias	Fever	Facial Edema	Eosinophil Count	Physician Diagnosis	Laboratory Confirmation	Classification
1	Anderson	yes	yes	no	495	trichinosis	yes	_____
2	Buffington	yes	yes	yes	pending	possible trichinosis	pending	_____
3	Callahan	yes	yes	no	1,100	possible trichinosis	pending	_____
4	Doll	yes	yes	no	2,050	EMS*	pending	_____
5	Ehrlich	no	yes	no	600	trichinosis	not done	_____

*Eosinophilia-Myalgia Syndrome

✓ Check your answers on page 1-82



Exercise 1.5

Consider the initial case definition for SARS presented on page 1-26. Explain how the case definition might address the purposes listed below.

1. Diagnosing and caring for individual patients
2. Tracking the occurrence of disease
3. Doing research to identify the cause of the disease
4. Deciding who should be quarantined (quarantine is the separation or restriction of movement of persons who are not ill but are believed to have been exposed to infection, to prevent further transmission)



Check your answers on page 1-82



Exercise 1.6

Using the data in Tables 1.5 and 1.6, describe the death rate patterns for the "Unusual Event." For example, how do death rates vary between men and women overall, among the different socioeconomic classes, among men and women in different socioeconomic classes, and among adults and children in different socioeconomic classes? Can you guess what type of situation might result in such death rate patterns?

Table 1.5 Deaths and Death Rates for an Unusual Event, by Sex and Socioeconomic Status

Sex	Measure	Socioeconomic Status			Total
		High	Middle	Low	
Males	Persons at risk	179	173	499	851
	Deaths	120	148	441	709
	Death rate (%)	67.0	85.5	88.4	83.3
Females	Persons at risk	143	107	212	462
	Deaths	9	13	132	154
	Death rate (%)	6.3	12.6	62.3	33.3
Both sexes	Persons at risk	322	280	711	1313
	Deaths	129	161	573	863
	Death rate (%)	40.1	57.5	80.6	65.7

Table 1.6 Deaths and Death Rates for an Unusual Event, by Age and Socioeconomic Status

Age Group	Measure	Socioeconomic Status		Total
		High/Middle	Low	
Adults	Persons at risk	566	664	1230
	Deaths	287	545	832
	Death rate (%)	50.7	82.1	67.6
Children	Persons at risk	36	47	83
	Deaths	3	28	31
	Death rate (%)	8.3	59.6	37.3
All Ages	Persons at risk	602	711	1313
	Deaths	290	573	863
	Death rate (%)	48.2	80.6	65.7



Check your answers on page 1-82



Exercise 1.7

Classify each of the following studies as:

- A. *Experimental*
 - B. *Observational cohort*
 - C. *Observational case-control*
 - D. *Observational cross-sectional*
 - E. *Not an analytical or epidemiologic study*
-
- _____ 1. Representative sample of residents were telephoned and asked how much they exercise each week and whether they currently have (have ever been diagnosed with) heart disease.
 - _____ 2. Occurrence of cancer was identified between April 1991 and July 2002 for 50,000 troops who served in the first Gulf War (ended April 1991) and 50,000 troops who served elsewhere during the same period.
 - _____ 3. Persons diagnosed with new-onset Lyme disease were asked how often they walk through woods, use insect repellent, wear short sleeves and pants, etc. Twice as many patients without Lyme disease from the same physician's practice were asked the same questions, and the responses in the two groups were compared.
 - _____ 4. Subjects were children enrolled in a health maintenance organization. At 2 months, each child was randomly given one of two types of a new vaccine against rotavirus infection. Parents were called by a nurse two weeks later and asked whether the children had experienced any of a list of side-effects.



Check your answers on page 1-83



Exercise 1.8

Read the Anthrax Fact Sheet on the following 2 pages, then answer the questions below.

1. Describe its causation in terms of agent, host, and environment.

a. Agent:

b. Host:

c. Environment:

2. For each of the following risk factors and health outcomes, identify whether they are necessary causes, sufficient causes, or component causes.

	Risk Factor	Health Outcome
_____ a.	Hypertension	Stroke
_____ b.	<i>Treponema pallidum</i>	Syphilis
_____ c.	Type A personality	Heart disease
_____ d.	Skin contact with a strong acid	Burn



Check your answers on page 1-83



Exercise 1.9

Information about dengue fever is provided on the following pages. After studying this information, outline the chain of infection by identifying the reservoir(s), portal(s) of exit, mode(s) of transmission, portal(s) of entry, and factors in host susceptibility.

Reservoirs:

Portals of exit:

Modes of transmission:

Portals of entry:

Factors in host susceptibility:



Check your answers on page 1-84



Exercise 1.10

For each of the following situations, identify whether it reflects:

- A. Sporadic disease*
- B. Endemic disease*
- C. Hyperendemic disease*
- D. Pandemic disease*
- E. Epidemic disease*

- _____ 1. 22 cases of legionellosis occurred within 3 weeks among residents of a particular neighborhood (usually 0 or 1 per year)
- _____ 2. Average annual incidence was 364 cases of pulmonary tuberculosis per 100,000 population in one area, compared with national average of 134 cases per 100,000 population
- _____ 3. Over 20 million people worldwide died from influenza in 1918—1919
- _____ 4. Single case of histoplasmosis was diagnosed in a community
- _____ 5. About 60 cases of gonorrhoea are usually reported in this region per week, slightly less than the national average



Check your answers on page 1-84



Exercise 1.11

For each of the following situations, identify the type of epidemic spread with which it is most consistent.

- A. *Point source*
 - B. *Intermittent or continuous common source*
 - C. *Propagated*
-
- _____ 1. 21 cases of shigellosis among children and workers at a day care center over a period of 6 weeks, no external source identified (incubation period for shigellosis is usually 1–3 days)
 - _____ 2. 36 cases of giardiasis over 6 weeks traced to occasional use of a supplementary reservoir (incubation period for giardiasis 3–25 days or more, usually 7–10 days)
 - _____ 3. 43 cases of norovirus infection over 2 days traced to the ice machine on a cruise ship (incubation period for norovirus is usually 24–48 hours)



Check your answers on page 1-84



Exercise Answers

Exercise 1.1

1. B
2. B
3. A
4. A
5. C
6. A

Exercise 1.2

1. Having identified a cluster of cases never before seen in the area, public health officials must seek additional information to assess the community's health. Is the cluster limited to persons who have just returned from traveling where West Nile virus infection is common, or was the infection acquired locally, indicating that the community is truly at risk? Officials could check whether hospitals have seen more patients than usual for encephalitis. If so, officials could document when the increase in cases began, where the patients live or work or travel, and personal characteristics such as age. Mosquito traps could be placed to catch mosquitoes and test for presence of the West Nile virus. If warranted, officials could conduct a serosurvey of the community to document the extent of infection. Results of these efforts would help officials assess the community's burden of disease and risk of infection.
2. West Nile virus infection is spread by mosquitoes. Persons who spend time outdoors, particularly at times such as dusk when mosquitoes may be most active, can make personal decisions to reduce their own risk or not. Knowing that the risk is present but may be small, an avid gardener might or might not decide to curtail the time spent gardening in the evening, or use insect repellent containing DEET, or wear long pants and long-sleeve shirts even though it is August, or empty the bird bath where mosquitoes breed.
3. What proportion of persons infected with West Nile virus actually develops encephalitis? Do some infected people have milder symptoms or no symptoms at all? Investigators could conduct a serosurvey to assess infection, and ask about symptoms and illness. In addition, what becomes of the persons who did develop encephalitis? What proportion survived? Did they recover completely or did some have continuing difficulties?
4. Although the cause and mode of transmission were known (West Nile virus and mosquitoes, respectively), public health officials asked many questions regarding how the virus was introduced (mosquito on an airplane? wayward bird? bioterrorism?), whether the virus had a reservoir in the area (e.g., birds), what types of mosquitoes could transmit the virus, what were the host risk factors for infection or encephalitis, etc.

Exercise 1.3

1. A
2. E
3. F
4. B
5. D
6. C

Exercise 1.4

1. Confirmed
2. Probable
3. Probable
4. Probable
5. Possible

Exercise 1.5

1. Third criterion may be limiting because patient may not be aware of close contact
2. Probably reasonable
3. Criteria do not require sophisticated evaluation or testing, so can be used anywhere in the world
4. Too broad. Most persons with cough and fever returning from Toronto, China, etc., are more likely to have upper respiratory infections than SARS.

Exercise 1.6

The following tables can be created from the data in Tables 1.5 and 1.6:

Table A. Deaths and Death Rates for an Unusual Event, By Sex and Socioeconomic Status

	Female			Male		
	High	Middle	Low	High	Middle	Low
Persons at risk	143	107	212	179	173	499
Survivors	134	94	80	59	25	58
Deaths	9	13	132	120	148	441
Death rate (%)	6.3	12.1	62.3	67.0	85.5	88.4

Table B. Deaths and Death Rates for an Unusual Event, By Sex

	Female	Male	Total
Persons at risk	462	851	1,313
Survivors	308	142	450
Deaths	154	709	863
Death rate (%)	33.3	83.3	65.7

Table C. Deaths and Death Rates for an Unusual Event, By Age Group

	Child	Adult	Total
Persons at risk	83	1,230	1,313
Survivors	52	398	450
Deaths	31	832	863
Death rate (%)	37.3	67.6	65.7

By reviewing the data in these tables, you can see that men (see Table B) and adults (see Table C) were more likely to die than were women and children. Death rates for both women and men declined as socioeconomic status increased (see Table A), but the men in even the highest socioeconomic class were more likely to die than the women in the lowest socioeconomic class. These data, which are consistent with the phrase “Women and children first,” represent the mortality experience of passengers on the Titanic.

Data Sources: Passengers on the Titanic [Internet]. StatSci.org; [updated 2002 Dec 29; cited 2005 April]. Available from <http://www.statsci.org/data/general/titanic.html>.

Victims of the Titanic Disaster [Internet]. Encyclopedia Titanica; [cited 2005 April]. Available from <http://www.encyclopedia-titanica.org>.

Note: the precise number of passengers, deaths, and class of service are disputed. The Encyclopedia Titanica website includes numerous discussions of these disputed numbers.

Exercise 1.7

1. D
2. B
3. C
4. A

Exercise 1.8

1.
 - a. Agent: *Bacillus anthracis*, a bacterium that can survive for years in spore form, is a necessary cause.
 - b. Host: People are generally susceptible to anthrax. However, infection can be prevented by vaccination. Cuts or abrasions of the skin may permit entry of the bacteria.
 - c. Environment: Persons at risk for naturally acquired infection are those who are likely to be exposed to infected animals or contaminated animal products, such as veterinarians, animal handlers, abattoir workers, and laboratorians. Persons who are potential targets of bioterrorism are also at increased risk.
2.
 - a. Component cause
 - b. Necessary cause
 - c. Component cause
 - d. Sufficient cause

Exercise 1.9

Reservoirs: humans and possibly monkeys

Portals of exit: skin (via mosquito bite)

Modes of transmission: indirect transmission to humans by mosquito vector

Portals of entry: through skin to blood (via mosquito bite)

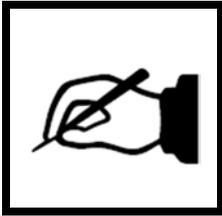
Factors in host susceptibility: except for survivors of dengue infection who are immune to subsequent infection from the same serotype, susceptibility is universal

Exercise 1.10

1. E
2. C
3. D
4. A
5. B

Exercise 1.11

1. C
 2. B
 3. A
-



SELF-ASSESSMENT QUIZ

Now that you have read Lesson 1 and have completed the exercises, you should be ready to take the self-assessment quiz. This quiz is designed to help you assess how well you have learned the content of this lesson. You may refer to the lesson text whenever you are unsure of the answer.

Unless instructed otherwise, choose ALL correct answers for each question.

1. In the definition of epidemiology, "distribution" refers to:
 - A. Who
 - B. When
 - C. Where
 - D. Why
2. In the definition of epidemiology, "determinants" generally includes:
 - A. Agents
 - B. Causes
 - C. Control measures
 - D. Risk factors
 - E. Sources
3. Epidemiology, as defined in this lesson, would include which of the following activities?
 - A. Describing the demographic characteristics of persons with acute aflatoxin poisoning in District A
 - B. Prescribing an antibiotic to treat a patient with community-acquired methicillin-resistant *Staphylococcus aureus* infection
 - C. Comparing the family history, amount of exercise, and eating habits of those with and without newly diagnosed diabetes
 - D. Recommending that a restaurant be closed after implicating it as the source of a hepatitis A outbreak
4. John Snow's investigation of cholera is considered a model for epidemiologic field investigations because it included a:
 - A. Biologically plausible hypothesis
 - B. Comparison of a health outcome among exposed and unexposed groups
 - C. Multivariate statistical model
 - D. Spot map
 - E. Recommendation for public health action
5. Public health surveillance includes which of the following activities:
 - A. Diagnosing whether a case of encephalitis is actually due to West Nile virus infection
 - B. Soliciting case reports of persons with symptoms compatible with SARS from local hospitals
 - C. Creating graphs of the number of dog bites by week and neighborhood
 - D. Writing a report on trends in seat belt use to share with the state legislature
 - E. Disseminating educational materials about ways people can reduce their risk of Lyme disease

6. The hallmark feature of an analytic epidemiologic study is: (Choose one best answer)
 - A. Use of an appropriate comparison group
 - B. Laboratory confirmation of the diagnosis
 - C. Publication in a peer-reviewed journal
 - D. Statistical analysis using logistic regression

7. A number of passengers on a cruise ship from Puerto Rico to the Panama Canal have recently developed a gastrointestinal illness compatible with norovirus (formerly called Norwalk-like virus). Testing for norovirus is not readily available in any nearby island, and the test takes several days even where available. Assuming you are the epidemiologist called on to board the ship and investigate this possible outbreak, your case definition should include, at a minimum: (Choose one best answer)
 - A. Clinical criteria, plus specification of time, place, and person
 - B. Clinical features, plus the exposure(s) you most suspect
 - C. Suspect cases
 - D. The nationally agreed standard case definition for disease reporting

8. A *specific* case definition is one that:
 - A. Is likely to include only (or mostly) true cases
 - B. Is considered "loose" or "broad"
 - C. Will include more cases than a *sensitive* case definition
 - D. May exclude mild cases

9. Comparing numbers and rates of illness in a community, rates are preferred for: (Choose one best answer)
 - A. Conducting surveillance for communicable diseases
 - B. Deciding how many doses of immune globulin are needed
 - C. Estimating subgroups at highest risk
 - D. Telling physicians which strain of influenza is most prevalent

10. For the cruise ship scenario described in Question 7, how would you display the time course of the outbreak? (Choose one best answer)
 - A. Endemic curve
 - B. Epidemic curve
 - C. Seasonal trend
 - D. Secular trend

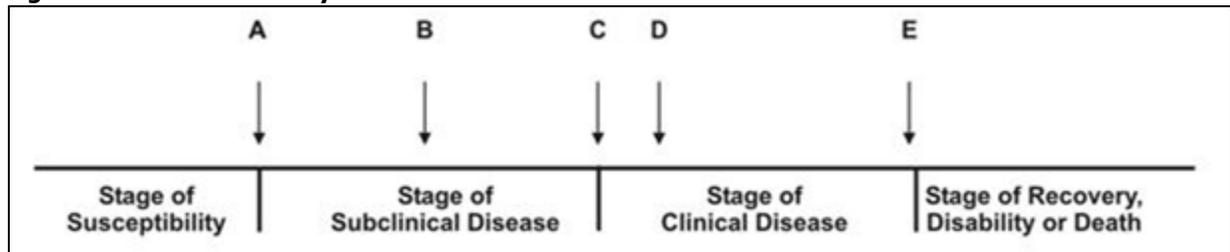
11. For the cruise ship scenario described in Question 7, if you suspected that the norovirus may have been transmitted by ice made or served aboard ship, how might you display "place"?
 - A. Spot map by assigned dinner seating location
 - B. Spot map by cabin
 - C. Shaded map of United States by state of residence
 - D. Shaded map by whether passenger consumed ship's ice or not

12. Which variables might you include in characterizing the outbreak described in Question 7 by person?
- A. Age of passenger
 - B. Detailed food history (what person ate) while aboard ship
 - C. Status as passenger or crew
 - D. Symptoms
13. When analyzing surveillance data by age, which of the following age groups is preferred? (Choose one best answer)
- A. 1-year age groups
 - B. 5-year age groups
 - C. 10-year age groups
 - D. Depends on the disease
14. A study in which children are randomly assigned to receive either a newly formulated vaccine or the currently available vaccine, and are followed to monitor for side effects and effectiveness of each vaccine, is an example of which type of study?
- A. Experimental
 - B. Observational
 - C. Cohort
 - D. Case-control
 - E. Clinical trial
15. The Iowa Women's Health Study, in which researchers enrolled 41,837 women in 1986 and collected exposure and lifestyle information to assess the relationship between these factors and subsequent occurrence of cancer, is an example of which type(s) of study?
- A. Experimental
 - B. Observational
 - C. Cohort
 - D. Case-control
 - E. Clinical trial
16. British investigators conducted a study to compare measles-mumps-rubella (MMR) vaccine history among 1,294 children with pervasive development disorder (e.g., autism and Asperger's syndrome) and 4,469 children without such disorders. (They found no association.) This is an example of which type(s) of study?
- A. Experimental
 - B. Observational
 - C. Cohort
 - D. Case-control
 - E. Clinical trial

Source: Smeeth L, Cook C, Fombonne E, Heavey L, Rodrigues LC, Smith PG, Hall AJ. MMR vaccination and pervasive developmental disorders. Lancet 2004;364:963-9.

17. A cohort study differs from a case-control study in that:
- Subjects are enrolled or categorized on the basis of their exposure status in a cohort study but not in a case-control study
 - Subjects are asked about their exposure status in a cohort study but not in a case-control study
 - Cohort studies require many years to conduct, but case-control studies do not
 - Cohort studies are conducted to investigate chronic diseases, case-control studies are used for infectious diseases
18. A key feature of a cross-sectional study is that:
- It usually provides information on prevalence rather than incidence
 - It is limited to health exposures and behaviors rather than health outcomes
 - It is more useful for descriptive epidemiology than it is for analytic epidemiology
 - It is synonymous with survey
19. The epidemiologic triad of disease causation refers to: (Choose one best answer)
- Agent, host, environment
 - Time, place, person
 - Source, mode of transmission, susceptible host
 - John Snow, Robert Koch, Kenneth Rothman
20. For each of the following, identify the appropriate letter from the time line in Figure 1.27 representing the natural history of disease.
- _____ Onset of symptoms
- _____ Usual time of diagnosis
- _____ Exposure

Figure 1.27 Natural History of Disease Timeline



21. A reservoir of an infectious agent can be:
- An asymptomatic human
 - A symptomatic human
 - An animal
 - The environment

22. Indirect transmission includes which of the following?
- A. Droplet spread
 - B. Mosquito-borne
 - C. Foodborne
 - D. Doorknobs or toilet seats
23. Disease control measures are generally directed at which of the following?
- A. Eliminating the reservoir
 - B. Eliminating the vector
 - C. Eliminating the host
 - D. Interrupting mode of transmission
 - E. Reducing host susceptibility
24. Which term best describes the pattern of occurrence of the three diseases noted below in a single area?
- A. Endemic
 - B. Outbreak
 - C. Pandemic
 - D. Sporadic
- _____ Disease 1: usually 40–50 cases per week; last week, 48 cases
- _____ Disease 2: fewer than 10 cases per year; last week, 1 case
- _____ Disease 3: usually no more than 2–4 cases per week; last week, 13 cases
25. A propagated epidemic is usually the result of what type of exposure?
- A. Point source
 - B. Continuous common source
 - C. Intermittent common source
 - D. Person-to-person

Answers to Self-Assessment Quiz

1. A, B, C. In the definition of epidemiology, "distribution" refers to descriptive epidemiology, while "determinants" refers to analytic epidemiology. So "distribution" covers time (when), place (where), and person (who), whereas "determinants" covers causes, risk factors, modes of transmission (why and how).
2. A, B, D, E. In the definition of epidemiology, "determinants" generally includes the causes (including agents), risk factors (including exposure to sources), and modes of transmission, but does not include the resulting public health action.
3. A, C, D. Epidemiology includes assessment of the distribution (including describing demographic characteristics of an affected population), determinants (including a study of possible risk factors), and the application to control health problems (such as closing a restaurant). It does not generally include the actual treatment of individuals, which is the responsibility of health-care providers.
4. A, B, D, E. John Snow's investigation of cholera is considered a model for epidemiologic field investigations because it included a biologically plausible (but not popular at the time) hypothesis that cholera was water-borne, a spot map, a comparison of a health outcome (death) among exposed and unexposed groups, and a recommendation for public health action. Snow's elegant work predated multivariate analysis by 100 years.
5. B, C, D. Public health surveillance includes collection (B), analysis (C), and dissemination (D) of public health information to help guide public health decision making and action, but it does not include individual clinical diagnosis, nor does it include the actual public health actions that are developed based on the information.
6. A. The hallmark feature of an analytic epidemiologic study is use of an appropriate comparison group.
7. A. A case definition for a field investigation should include clinical criteria, plus specification of time, place, and person. The case definition should be independent of the exposure you wish to evaluate. Depending on the availability of laboratory confirmation, certainty of diagnosis, and other factors, a case definition may or may not be developed for suspect cases. The nationally agreed standard case definition for disease reporting is usually quite specific, and usually does not include suspect or possible cases.
8. A, D. A *specific* or *tight* case definition is one that is likely to include only (or mostly) true cases, but at the expense of excluding milder or atypical cases.
9. C. Rates assess risk. Numbers are generally preferred for identifying individual cases and for resource planning.
10. B. An epidemic curve, with date or time of onset on its x-axis and number of cases on the y-axis, is the classic graph for displaying the time course of an epidemic.
11. A, B, C. "Place" includes location of actual or suspected exposure as well as location of residence, work, school, and the like.

12. A, C. "Person" refers to demographic characteristics. It generally does not include clinical features characteristics or exposures.
13. D. Epidemiologists tailor descriptive epidemiology to best describe the data they have. Because different diseases have different age distributions, epidemiologists use different age breakdowns appropriate for the disease of interest.
14. A, E. A study in which subjects are randomized into two intervention groups and monitored to identify health outcomes is a clinical trial, which is type of experimental study. It is not a cohort study, because that term is limited to observational studies.
15. B, C. A study that assesses (but does not dictate) exposure and follows to document subsequent occurrence of disease is an observational cohort study.
16. B, D. A study in which subjects are enrolled on the basis of having or not having a health outcome is an observational case-control study.
Source: Smeeth L, Cook C, Fombonne E, Heavey L, Rodrigues LC, Smith PG, Hall AJ. MMR vaccination and pervasive developmental disorders. Lancet 2004;364:963-9.
17. A. The key difference between a cohort and case-control study is that, in a cohort study, subjects are enrolled on the basis of their exposure, whereas in a case-control study subjects are enrolled on the basis of whether they have the disease of interest or not. Both types of studies assess exposure and disease status. While some cohort studies have been conducted over several years, others, particularly those that are outbreak-related, have been conducted in days. Either type of study can be used to study a wide array of health problems, including infectious and non-infectious.
18. A, C, D. A cross-sectional study or survey provides a snapshot of the health of a population, so it assesses prevalence rather than incidence. As a result, it is not as useful as a cohort or case-control study for analytic epidemiology. However, a cross-sectional study can easily measure prevalence of exposures and outcomes.
19. A. The epidemiologic triad of disease causation refers to agent-host-environment.
20. C. Onset of symptoms
 D. Usual time of diagnosis
 A. Exposure
21. A, B, C, D. A reservoir of an infectious agent is the habitat in which an agent normally lives, grows, and multiplies, which may include humans, animals, and the environment.
22. B, C, D. Indirect transmission refers to the transmission of an infectious agent by suspended airborne particles, inanimate objects (vehicles, food, water) or living intermediaries (vectors such as mosquitoes). Droplet spread is generally considered short-distance direct transmission.
23. A, B, D, E. Disease control measures are generally directed at eliminating the reservoir or vector, interrupting transmission, or protecting (but not eliminating!) the host.

24. A. Disease 1: usually 40–50 cases per week; last week, 48 cases
D. Disease 2: fewer than 10 cases per year; last week, 1 case
B. Disease 3: usually no more than 2–4 cases per week; last week, 13 cases
25. D. A propagated epidemic is one in which infection spreads from person to person.