

Naval School of
Health Sciences

NAVEDTRA 13123-A

Nonresident
Training Course
(NRTC)



Principles of Epidemiology

Prepared by the
CENTER FOR DISEASE CONTROL
Approved by
BUREAU OF MEDICINE AND SURGERY

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PRINCIPLES OF EPIDEMIOLOGY

NAVEDTRA 13123-A

INTRODUCTION: This correspondence course is the Centers for Disease Control's Course 3030-G, Principles of Epidemiology (1988). It is designed to assist Medical Department Personnel in investigating, measuring, organizing, and reporting data associated with communicable diseases.

CUSTOMER SERVICE: The administration of the Navy Medical Department Correspondence Courses is now located at the Naval School of Health Sciences in Portsmouth, VA . All questions, answer sheets, comments and suggestions should be forwarded to the following address:

Commanding Officer
Naval School of Health Sciences
Code 10A
1001 Holcomb Road
Portsmouth, VA 23708-5200

MATERIALS: The course materials consist of six lessons and six accompanying manuals bound together in two separate texts. Answer sheets may be found on the page immediately following the assignments. Lesson six contains an optional an exercise entitled, "An Unusual Episode in Mudville, U.S.A.". The answers for the exercise are included. **YOU MAY KEEP ALL COURSE MATERIALS.**

Upon receipt of the course, please check the materials. Should any materials be missing, please call the Navy Medical Department Correspondence Course Division at (804) 398-7627 or fax you inquiry to (804) 398-5033.

You may find some of the course material has become obsolete since it has been written. In that case, select the best possible answer from the information in the Manuals' text.

ADMINISTRATION: To get the maximum benefit from the course, complete the assignments as quickly as possible. **YOU MUST SUBMIT AT LEAST ONE ASSIGNMENT EVERY MONTH.** Failure to submit assignments on a timely manner, will result in notification from the Division that you have been disenrolled and must return all material. If you require additional time, submit your request in writing with an anticipated completion date or you may telephone the Division. **ALL ANSWER SHEETS ARE TO BE RETURNED TO: COMMANDING OFFICER, CODE 10A, NAVAL SCHOOL OF HEALTH SCIENCES, 1001 HOLCOMB ROAD, PORTSMOUTH, VA 23708-5200.**

INSTRUCTIONS: All items are multiple choice questions. Answer

the questions on the basis of the assigned readings in the text, regardless of your personal opinion or experience. The questions are intended to direct your study and test your understanding. While working on this correspondence course, you may refer freely to the text. You may seek advice and instruction from others on problems arising in the course, but the solutions submitted must be the result of your own work and decisions. You are prohibited from referring to or copying the solutions of others, or giving completed solutions to anyone else taking the same course.

GRADING SYSTEM: The passing grade for this course, or for each creditable unit, is 3.4. You must resubmit failed assignments within 30 days, a maximum grade of 3.4 will be posted for that assignment. Should both the original and resubmitted assignment earn under 3.4, the higher grade will be posted.

COMPLETION LETTER: A course completion letter will be issued. Naval Reserve Officers should anticipate a delay of 4-6 weeks in delivery of certifications of course and unit completions, since these must be forwarded via Naval Reserve Personnel Center, New Orleans, LA 70149, for recording and endorsement. **IT IS IMPORTANT FOR YOU TO KEEP YOUR COMPLETION LETTER ON FILE FOR FUTURE REFERENCE.**

RESERVE RETIREMENT CREDITS: For purposes of Naval Reserve retirement, this course is evaluated at 18 points which will be credited upon satisfactory completion of each unit as shown below:

Unit 1	12 points	Assignments 1 through 4
Unit 2	6 points	Assignments 5 and 6

These points are creditable only to personnel eligible to receive them under current directives governing retirement of Naval Reserve personnel. The points will be credited by Chief, Naval Reserve Personnel.

PRINCIPLES OF EPIDEMIOLOGY

NAVEDTRA 13123-A

COURSE OBJECTIVES

Upon completion of this course and with 85% accuracy, you will be able to:

1. Identify the common terms of epidemiology, as well as the concepts and principles that are the basis of epidemiological practice.
2. Identify, recognize, and differentiate between the characteristics of the measures of central tendency and their utilization in epidemiological analysis.
3. Identify statistical terms used in reference to and in conjunction with central tendency measures.
4. When given sets of data, demonstrate competency in calculating measures of central tendency for individual data, for a simple frequency distribution, and for a class interval frequency distribution.
5. Identify, recognize, and differentiate between the characteristics of statistical measures used in epidemiology: incidence rate, attack rate, proportional distribution, mortality rate, and ratio.
6. Specify which of the five measures above is more appropriate when given a situation with the data for analysis; demonstrate competency in performing the appropriate calculations by first identifying the numerator and denominator; and interpret the resulting data.
7. Identify and recognize the characteristics and objectives of disease surveillance.
8. Investigate a given suspected disease outbreak using logical, orderly methods for confirming the existence of the outbreak, preparing epidemiologic reports, and identifying recommended control measures.

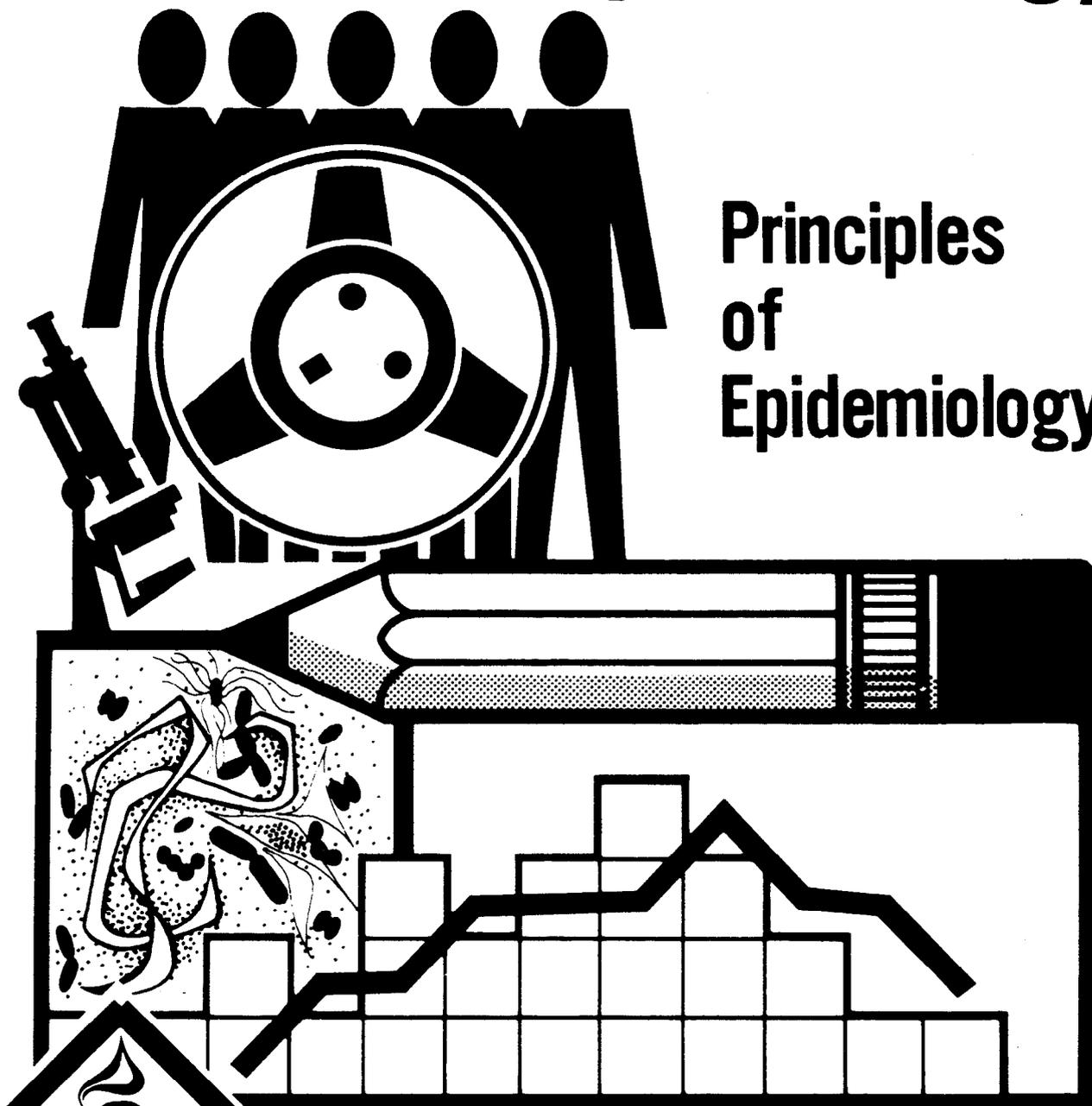


LESSON

1

SELF-STUDY COURSE 3030-G

Principles of Epidemiology



Principles of Epidemiology

SELF-STUDY

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

PUBLIC HEALTH SERVICE

Centers for Disease Control

Training and Laboratory Program Office

Division of Training

Atlanta, Georgia 30333

10/88:4R

PRINCIPLES OF EPIDEMIOLOGY

Self-Study Course 3030-G

LESSON 1: PRINCIPLES OF EPIDEMIOLOGY

I: LESSON CONSISTS OF:

Part I: 25 multiple choice questions
Part II: 25 multiple choice questions

II: REFERENCE:

Manual 1 - "Agent, Host, Environment"

NOTE: This manual is provided by CDC and should be included when you receive this lesson.

III: TOPICS AND READING ASSIGNMENTS:

	<u>Page</u>
A. Introduction	1
B. Evolution of Epidemiology	1
C. The Present Approach	5- 6
D. The Infectious Disease Process	6-12
E. Epidemiologic Variables	12-29
F. Current Epidemiologic Practice	30
G. Glossary	32

NOTE: The glossary is an important part of this lesson.
Many of the questions are based on the definitions used in this publication.

PRINCIPLES OF EPIDEMIOLOGY

Lesson 1

Objectives

Upon successful completion of Lesson 1, the student should be able to correctly:

- Identify the common terms of epidemiology.
 - Identify the inclusive and exclusive features of the definition of epidemiology given in the reference.
 - Identify and differentiate between the terms endemic, pandemic, and epidemic.
 - Identify, differentiate between, and recognize the characteristics of the various types of carriers (inapparent infections, incubatory, convalescent, chronic).
 - Identify, differentiate between, and recognize the characteristics of the six components of the "chain of infection": causative agent, reservoir of the agent, portal of exit of the agent from the host, portal of entry into the new host, mode of transmission, and host susceptibility.
 - Identify and classify the various mechanisms for specific acquired immunity as to natural or artificial, then as to active or passive.
- Identify the concepts and principles that are the basis of epidemiologic practice.
 - Identify the importance of temporal data regarding disease occurrence, and its use in epidemiological analysis.
 - Identify the rationale for analyzing epidemiologic data as to time, place and person.
 - Identify, differentiate between, and recognize the characteristics of the epidemiologic variables of person and place.
 - Identify the purposes of disease surveillance and the importance of morbidity reports.

PRINCIPLES OF EPIDEMIOLOGY

Lesson 1

PRINCIPLES OF EPIDEMIOLOGY

Part I: Multiple Choice

1. Which of the following statements best fits the definition of epidemiology, as used in this lesson?
 - A. The science dealing with the etiology, distribution, and treatment of communicable and non-communicable diseases in a population
 - B. The study of the distribution and determinants of disease in human populations
 - C. The study of measures to prevent or control epidemics
 - D. The science dealing with the physiological and psychological effects ascribed to a disease or condition whether or not the disease or condition be communicable or accidental, in a population

2. Which of the following statements is INCORRECT?
 - A. The science of epidemiology evolved from studies of epidemic infectious diseases.
 - B. Epidemiology is restricted to the study of zoonoses only when they occur among human populations.
 - C. The practice of epidemiology does not include studies of endemic diseases or conditions.
 - D. Studies of animal diseases which are not transmissible to humans are not included in the definition of epidemiology.

3. If a disease simultaneously affects persons of several countries, or of more than one continent, and affects them in numbers clearly in excess of normal expectancy, the disease is said to be:
 - A. Endemic.
 - B. Epidemic.
 - C. Pandemic.
 - D. Epizootic.

4. Endemic means that a disease is:
 - A. Occurring clearly in excess of the normal expectancy.
 - B. Constantly present.
 - C. Affecting a large number of countries simultaneously.
 - D. Exhibiting a seasonal pattern.

5. Before Pasteur and Koch announced certain of their discoveries, no one was able to adequately describe the chain of infection of certain epidemic diseases because there was no objective evidence for:
 - A. Host susceptibility.
 - B. Reservoirs.
 - C. Microbiologic agents.
 - D. Modes of transmission.

6. Which one of the following does not belong in any of the basic classes of agents that cause disease which were discussed in the text?
 - A. Bacteria and viruses
 - B. Pesticides and other chemicals
 - C. Vibration and heat
 - D. Psychological factors

7. Host factors are important since they affect which of the following?
 - A. Resistance or susceptibility to disease
 - B. The antigenic character of the agent
 - C. The risk of exposure
 - D. "A" and "C"

8. In the case of a particular infectious disease, which of the following cannot be specified with certainty unless the "chain of infection" is known?
 - A. Risk of exposure
 - B. Appropriate control measures
 - C. Pathogenicity of the agent
 - D. Host resistance

9. Which one of the following statements contradicts the text?
 - A. Rickettsia have some characteristics like those of bacteria; they also have some like those of viruses.
 - B. Bacteria in the environment usually grow and multiply.
 - C. Fungi usually have an environmental reservoir and are transmitted indirectly.
 - D. Viruses are usually transmitted indirectly.

10. Which one of the following contributes to a biological agent's ability to cause disease?
 - A. Ability to survive and remain infectious outside the host
 - B. Ability to multiply outside the host
 - C. Virulence
 - D. All of the above

11. The capacity of an infectious agent to cause disease in a susceptible host is termed:
 - A. Pathogenicity.
 - B. Invasiveness.
 - C. Infectivity.
 - D. Antigenicity.

12. Which of the following determines whether an infection is apparent or inapparent?
 - A. A rise or fall in antibody titers
 - B. Degree of infectivity of the person
 - C. Presence or absence of clinical signs and symptoms
 - D. Mild or severe clinical signs and symptoms

13. Which of the following statements concerning infectious diseases is NOT CORRECT?
 - A. A wide variety of biological agents can produce similar clinical syndromes.
 - B. Many biological agents cause illness in only a fraction of persons who become infected.
 - C. The laboratory is exceedingly important in establishing the etiology of an infection.
 - D. All individuals exposed to an infectious agent in the same way will become infected.

14. The natural habitat in which an infectious agent lives, grows, and multiplies, is called a:
 - A. Vehicle.
 - B. Reservoir.
 - C. Source of infection.
 - D. Fomite.

15. From the statements in the text, which one of the following do you conclude is never a reservoir for infectious agents?
 - A. Animals
 - B. Soil
 - C. Air
 - D. Water

16. Carriers are defined in the text as those persons who:
- A. Are immune to disease because of a previously acquired infection.
 - B. Have passive immunity due to natural or artificial mechanisms.
 - C. Harbor specific infectious agents in the absence of discernible clinical disease and serve as potential sources of infection.
 - D. Are acutely ill and serve as potential sources of infection for susceptibles.
17. Which one of the following is NOT characteristic of human carriers?
- A. They shed infectious agents even before signs and symptoms of illness appear.
 - B. They are infected, and though they manifest no signs or symptoms, they are capable of being sources of infection.
 - C. They are infected and manifest clinical signs and symptoms.
 - D. They harbor infectious agents for a year or longer and are capable of being sources of infection.
18. Which one of the following is NOT considered a portal of exit for infectious agents, according to the reference?
- A. Cardiovascular system
 - B. Skin
 - C. Respiratory tract
 - D. Genitourinary tract
19. Which of the following statements about portals of exit is NOT CORRECT?
- A. The path by which an infectious agent leaves its host is commonly referred to as the portal of exit.
 - B. Infections transmitted by means of saliva represent exit by the alimentary portal.
 - C. The transplacental portal of exit is quite important in that the placenta is generally ineffective in protecting the fetus against maternal infections.
 - D. The percutaneous mechanism of exit by way of the skin includes bites of arthropods and penetrating objects such as needles.
20. Which of the following portals of exit is generally the most important as well as the most difficult to control?
- A. Respiratory tract
 - B. Alimentary tract
 - C. Genitourinary tract
 - D. Placenta

21. The direct (i.e., person-to-person) mode of transmission is characterized by:
- A. A particular portal of exit from the reservoir.
 - B. The severity of the disease.
 - C. The presence of a vehicle or vector.
 - D. An immediate transmission between portals of exit and entry.
22. Which comment(s) about the transmission of staphylococcal food poisoning is in accord with the text?
- A. The agent is transmitted directly by droplet nuclei.
 - B. The agent is mechanically transmitted by vectors.
 - C. The agent is transmitted indirectly by inanimate means.
 - D. Both "A" and "C" are correct.
23. Which one of the following modes of transmission is "direct?"
- A. Vectorborne
 - B. Droplet spread
 - C. Fomites
 - D. Droplet nuclei
24. Which one of the following is NOT a natural factor of resistance to infection?
- A. The gastric acid
 - B. The cilia in the respiratory tract
 - C. The antitoxins
 - C. The mucous membranes
25. Susceptibility to infection is increased by which of the following conditions?
- A. Malnutrition
 - B. Pre-existing ill health
 - C. Artificially depressed immunologic response mechanisms
 - D. All of the above

Part II: Multiple Choice

Host resistance to disease is influenced to the greatest extent by specific acquired immunity which may be obtained naturally or artificially. Questions 26-50 are based on situations leading to acquired immunity.

26. Toxoid confers which kind of immunity?
- A. Natural active
 - B. Artificial active
 - C. Natural passive
 - D. Artificial passive
27. Passage of maternal antibodies to the fetus confers which kind of immunity?
- A. Natural active
 - B. Artificial active
 - C. Natural passive
 - D. Artificial passive
28. Immune serum globulin (ISG) confers which kind of immunity?
- A. Natural active
 - B. Artificial active
 - C. Natural passive
 - D. Artificial passive
29. A vaccine confers which kind of immunity?
- A. Natural active
 - B. Artificial active
 - C. Natural passive
 - D. Artificial passive
30. An infection confers which kind of immunity?
- A. Natural active
 - B. Artificial active
 - C. Natural passive
 - D. Artificial passive
31. An antitoxin confers which kind of immunity?
- A. Natural active
 - B. Artificial active
 - C. Natural passive
 - D. Artificial passive

32. The administration of convalescent serum confers which kind of immunity?
- A. Natural active
 - B. Artificial active
 - C. Natural passive
 - D. Artificial passive
33. Associations that can be established either between a disease and the personal characteristics of patients and/or factors in the patients' environment are:
- A. Of little practical use in epidemiology.
 - B. Useful in identifying sources and modes of transmission.
 - C. Conclusive evidence for cause and effect relationships.
 - D. Of greatest use in the investigation of foodborne disease.
34. All but which one of the following are "epidemiologic variables?"
- A. Characteristics of persons exposed to infection
 - B. Environmental factors
 - C. Disease investigations
 - D. The period of time during which cases were exposed, infected, and developed illness
35. Epidemiologic variables can often either determine or suggest which of the following?
- A. Individuals who are at the greatest risk of illness
 - B. The etiology of specific diseases
 - C. Possible future epidemiologic behavior of the disease
 - D. All of the above
36. Epidemiologic data is analyzed according to the variables of time, place, and person to:
- A. Increase the statistical validity of the data.
 - B. Satisfy the requirements of scientific rigor.
 - C. Provide a basis for formulating and testing hypotheses.
 - D. Identify food-specific attack rates.
37. With reference to the temporal information related to morbidity reports submitted to health departments by reporting physicians, which one of the following would be most useful from the epidemiologic standpoint in attempting to identify possible sources of infection?
- A. Date and time of first visit to the physician
 - B. Date and time of onset of symptoms
 - C. Date and time of the diagnosis
 - D. Date and time of receipt of the morbidity reports

38. Of the following statements regarding analysis of the distribution of cases of a disease by time, which one is NOT CORRECT?
- A. Using the incubation period in conjunction with the temporal distribution of the cases, the probable period of exposure can be identified.
 - B. Knowing the diagnosis, and therefore the incubation period, reasonable hypotheses may be made concerning the general nature of the source(s) and modes of transmission that may be involved.
 - C. Analysis of epidemic curves graphed by the time of onset of illness will identify the place of exposure of the cases.
 - D. In the absence of an established diagnosis, comparison of the temporal distribution of cases in the current outbreak with distributions of known diseases may provide clues as to the etiology of the current epidemic.
39. Seasonal patterns in disease occurrence are usually the result of variations in:
- A. Reporting efficacy.
 - B. Risk of exposure to sources of infection.
 - C. Virulence of the etiologic agent.
 - D. Quantities of susceptibles.
40. Factors affecting the risk of acquiring an infection from a contaminated object or vehicle include all but which one of the following?
- A. The presence of a suitable reservoir
 - B. The presence and concentration of the etiologic agent
 - C. The presence of an appropriate means of transmission and portal of entry
 - D. Variations in host susceptibility
41. In the absence of knowledge of the etiology of a disease, the best method of estimating the probable frequency of occurrence of that disease in a specified population during the next few years is to extrapolate from:
- A. The current reporting period's morbidity reports.
 - B. The previous year's seasonal pattern.
 - C. Epidemic curves of recent outbreaks.
 - D. Annual incidence during previous years.
42. Variables of "person" include:
- A. The individual's activities.
 - B. The individual's sex.
 - C. The individual's immunity levels.
 - D. All of the above.

- 43 Disease frequency within a population usually varies most with which one of the following "person" variables?
- A. Sex
 - B. Age
 - C. Ethnic group
 - D. Blood type
- 44 In the initial analysis of the cases of a disease, the age groups selected:
- A. Are of little significance in the formulation of hypotheses.
 - B. Should be small in order to identify differences in risk.
 - C. Should be large because time is of the essence.
 - D. Should not have a span greater than 2 years.
- 45 Usually, differences in sex-specific morbidity rates can best be attributed to:
- A. Different risk of exposure.
 - B. Different levels of immunity or resistance.
 - C. Differences in utilization of medical care.
 - D. An artifact of the reporting system.
- 46 The association of a disease with a place implies that important etiologic factors are:
- A. Present in affected inhabitants of the area.
 - B. Randomly distributed by person.
 - C. Present in the environment of the cases.
 - D. Both "A" and "C" above.
- 47 Diseases are usually transmitted more rapidly in urban areas than in rural areas because of:
- A. Differences in availability and utilization of medical care.
 - B. Greater mobility in urban areas.
 - C. Differences in frequency of exposure to sources of infection.
 - D. Differences in levels of immunity.
- 48 Diseases that occur more frequently in rural areas than in urban areas usually belong to:
- A. The zoonoses.
 - B. The parasitic diseases.
 - C. The contact diseases.
 - D. The respiratory diseases.

49. The purpose of disease surveillance is:
- A. To prevent or control diseases.
 - B. To collect and analyze health data.
 - C. To identify causal factors.
 - D. All of the above.
50. The importance of morbidity reports is that they:
- A. Help to discover the source of infection.
 - B. Help to establish endemic levels.
 - C. Help to discover additional unreported cases.
 - D. All of the above.

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69	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
70	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
71	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
72	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
73	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
74	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
75	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____