2020 - SSSS

Disease Detectives

SCIOLY SUMMER STUDY SESSION

School Name: _____   Team Number: _____

Competitor(s): _____

_____

Directions:

● Please DO NOT open this exam until given direction to do so.

Part I: Matching

1. A person or animal that harbors the infectious agent for a disease and may transmit it to others, but does not show signs of the disease. ( )	a. Agent
2. An infectious disease that is transmissible from animals to humans. ( )	b. Carrier
3. An infection that is acquired in a hospital. ( )	c. Cluster
4. An animate intermediary in the indirect transmission of an agent that carries the agent from a reservoir to a susceptible host. ( )	d. Epidemic
5. A measure of association used in comparative studies to quantify the relationship between an exposure and health outcome(the cross product ratio). ( )	e. Herd immunity
6. Transfer of an agent from a reservoir to a host either by being suspended in air particles, carried by an inanimate intermediary, carried by an animate intermediary. ( )	f. Latency period
7. An aggregation of cases of a disease or other health condition that are closely grouped in time and place(The number of cases may or may not exceed the number expected, and frequently the expected number is not known). ( )	g. Morbidity
8. The proportion of people who are infected by an agent and then develop clinical disease. ( )	h. Mortality rate
9. An epidemic occurring over a very wide area (several countries or continents) and usually affecting a large proportion of the population. ( )	i. Nosocomial disease
10. A factor that is essential for a disease, chronic conditions, or injury to occur. Examples include microorganisms, chemical substances, forms of radiation, and, in the case of injury, physical force. ( )	j. Observational study
11. The number or proportion of cases or events or conditions in a given population. ( )	k. Odds ratio
12. The systematic, ongoing collection, analysis, interpretation, and dissemination of health data. ( )	l. Outbreak (point source)
13. A measure of the frequency of occurrence of death in a defined population during a specified time interval. ( )	m. Pandemic
14. Disease: any departure from a state of physiological or psychological health and well-being. ( )	n. Pathogenicity
15. A common source outbreak in which the exposure period is relatively brief so that all cases occur within one incubation period. ( )	o. Prevalence
16. The period following exposure, when pathologic changes are not apparent, and ending with the onset of symptoms of a chronic disease. ( )	p. Public health surveillance
17. The habitat in which an infectious agent normally lives, grows, and multiplies. Humans, animals, and the environment can serve as reservoirs. ( )	q. Reservoir
18. An epidemiologic study in which there is no intervention, and nature is allowed to take its course. Changes or differences in one characteristic are studied in relation to changes or differences in others. ( )	r. Transmission (indirect)
19. The resistance of a group to an infectious agent. This group resistance exists because a high proportion of people in the group are immune to the agent. ( )	s. Vector
20. The occurrence of more cases of a particular type of disease, chronic condition, or injury than expected in a given area, or among a specific group of people, over a particular period of time. ( )	t. Zoonosis

Part II: Case Studies

On March 21st at a local high school, grades 9-12
Two individuals were sent home with symptoms of vomiting, diarrhea, nausea, and fever. Throughout the next week, several more individuals were sent home with similar symptoms. It was observed that all the individuals had lunch during period 7. They were then interviewed to find out what they had eaten. Below is a table of what people had eaten:

Food eaten	Infected number	Non infected number
Pizza	5	16
Bagels	9	33
Turkey wraps	26	40
Jello	13	28
Total	53	117

1. Write a case definition for this.

2. Calculate the attack rate for each of the food items.

3. What type of surveillance was used in this investigation?

4. What kind of outbreak is this?

5. The Jello was the suspected culprit. Based on your calculations, is this correct?

6. Which of the food items was likely what caused the disease? Why?(If it was the Jello, you do not have to write the jello, just explain why)

7. What could have caused the disease in the food item you named?(In other words, how could this food item have been contaminated?)

8. After further testing, it was deduced that the students had salmonella. Would you use antibiotics or antivirals to treat these individuals?

9. Explain your choice.

10. What could be done to prevent this from happening in the future? List two things.

11. Write another case definition now that you have found the cause.

Part III: Multiple choice/short response

1. Jim was conducting a study on a recent illness that broke out. He created an online page for volunteers to sign up. When all the volunteers arrived, Jim asked whether they had previous experience with this illness. Almost all the volunteers had experience with the illness or had it before. What type of bias is this?
   a. Random error
   b. Selection bias
   c. Information bias
   d. There is no bias

2. In a lab study, it was found that by increasing the exposure of toxic gas, there was higher risk that the subjects fell ill. Which of Hill's criteria is this?
   a. Specificity
   b. Temporality
   c. Dose-response relationship
   d. Coherence

3. Which of the following is a drawback of passive surveillance?
   a. Too expensive
   b. Difficult to ensure completeness of data
   c. May not be effective for rare diseases
   d. None of these

4. Which of the following is an example of temporality?
   a. A scientist checks previous studies to make sure his information matches.
   b. A scientist considers multiple different possibilities before making a conclusion
   c. An individual who had contracted salmonella began showing symptoms 36 hours after he contracted the disease from undercooked meat he ate for lunch
   d. None of these

5. Bill recently recovered from a virus. However, recently after he recovered, his sister began showing symptoms of the same virus. Bill's sister Belle believes she should not have contracted the virus from Bill since she only shared food with Bill after he recovered. However, it is likely Bill passed the virus to his sister. What type of carrier could Bill be?
   a. Vector
   b. Fomite
   c. Chronic
   d. Convalescent

6. Recently, a man went to the hospital to receive a surgery for his heart disease. This type of prevention is known as:
   a. Primordial prevention
   b. Primary prevention
   c. Secondary prevention
   d. Tertiary prevention

7. John Snow is regarded as the father of epidemiology. He conducted research on which disease?
   a. Cholera
   b. Polio
   c. Smallpox
   d. Pellagra

8. Recently, a study was conducted on patients where a group that had a disease was observed, and so was a group of people who did not have a disease. This kind of study is a:
   a. Cohort study
   b. Cross sectional study
   c. Ecological study
   d. None of these

9. At a local fast food restaurant last week, one of the employees who was preparing raw foods did not wash their hands after using the bathroom. Many of the people who reported eating at that restaurant that day fell ill with the same disease. This type of outbreak is known as:
   a. Point source outbreak
   b. Continuous common source outbreak
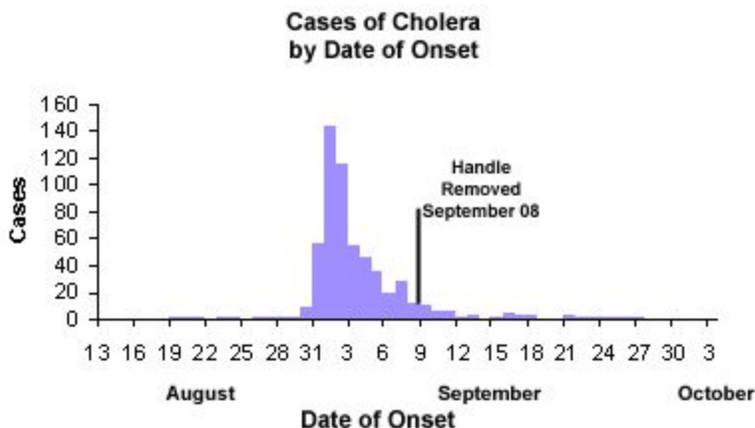   c. Propagated outbreak
   d. Intermittent common source outbreak

10. Which foodborne illness can result in respiratory failure and death?
   a. Clostridium botulinum
   b. Hepatitis A
   c. Salmonella
   d. Clostridium perfringens

11. Hyperendemic means the disease is:
   a. Constantly present at low levels
   b. Constantly present at high levels
   c. Almost everyone in the population has it
   d. Almost nobody in the population has it

12. Below is a graph of an outbreak. Identify the type of outbreak and explain why.

Cases of Cholera by Date of Onset

Y-axis: Cases (0, 20, 40, 60, 80, 100, 120, 140, 160)
Annotation: Handle Removed September 08
X-axis: Date of Onset — 13 16 19 22 25 28 31 | 3 6 9 12 15 18 21 24 27 30 | 3
August — September — October

13. What does the acronym YLL stand for?

_____

14. List each of Hill's criteria and provide an explanation for each. (letters a-h, i is optional)

15. Construct a chain of infection for a common cold.

16. In a country, it was found that there were 5,000,000 people at risk for a certain disease, and there were 50,000 new cases in one year. Calculate the incidence rate per 1000 people in one year.

17. Provide a scenario for:
   a. A point source outbreak

   b. A propagated outbreak

18. Identify the type of outbreak shown below.
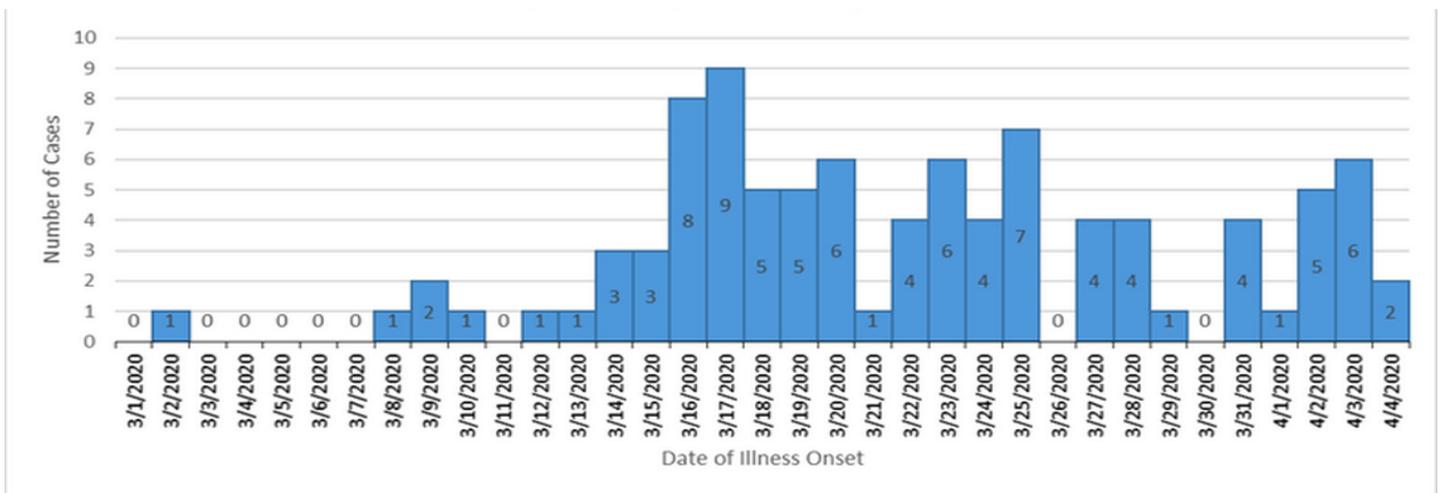
19. This outbreak is not likely to spread by:
   a. Indirect transmission
   b. Direct transmission
   c. Airborne transmission
   d. Waterborne transmission
   e. They are all equally likely

20. Explain your choice to number 19.