YUSO 2017
Disease Detectives
Exam Booklet

*Do NOT write in this booklet. Fill in all your answers in the accompanying answer sheet.

YUSO 2017 Disease Detectives Examination

Questions 1-13 are worth 1 point each.

1. Deaths related to foodborne illnesses are primarily caused by:

   a. immunosuppression

   b. dehydration

   c. high core temperature

   d. central nervous system impairment

   e. lack of accessible care

2. Incubation period can be defined as the time between:

   a. when symptoms appear and when symptoms are no longer evident

   b. when initial contact with a pathogen is made and the patient is infectious

   c. when initial contact with a pathogen is made and when symptoms appear

   d. when initial contact with a pathogen is made and viral load is maximized

   e. when the symptoms are not evident and the patient is infections

3. Which experimental design is not retrospective?

   a. case control

   b. cohort study

   c. longitudinal study

   d. cross-sectional study

   e. double-blind study

4. The test results and pathology of a certain test are given below. Calculate the false negative rate.

	Test is positive	Test is negative
Patient is infected	3	7
Patient is not infected	10	9990

   a. 7%

b. 42%

c. 0.07%

d. 1%

e. 23%

5. Based on Koch's postulates, which would not be a criterion for establishing causation of an illness?

    a. in healthy individuals microbe is absent, but present in all infected individuals

    b. microbe able to be isolated and cultured

    c. microbe able to infect a healthy individual when cultured

    d. individual is asymptomatic after some treatment

    e. cultured microbe is identical to the original microbe causing infection

6. What type of bias may be introduced when selecting patients for a study?

    a. congruence bias

    b. confirmation bias

    c. reporting bias

    d. attrition bias

    e. recall bias

7. An individual with travelers' diarrhea drank water out of a cup, then left it unattended. Another healthy individual became infected after drinking from the same cup. In this case, the cup is a

    a. fomite

    b. vector

    c. pathogen

    d. contact initiator

    e. point source

8. The spread of cyclosporiasis is preventable through

    a. vaccination

    b. practicing safe sex

    c. avoiding outdoor sources of water

    d. avoiding sharing personal items

    e. sanitizing food surfaces

9. Cyclosporiasis is caused by a:

    a. virus

    b. bacteria

    c. fungus

    d. chemical toxin

    e. protozoan

10. Late-stage botulism poisoning is characterized by:

    a. chills

    b. paralysis

    c. diarrhea

    d. delirium

    e. tonic-clonic seizures

11. Why should an investigator who has no clinical background nonetheless talk to a patient or two as an early step in the outbreak investigation?

    a. To advise the patient about common risk factors and the usual course of the illness, after reviewing such information in appropriate reference material

    b. To develop hypotheses about the cause of the outbreak

    c. To learn more about the clinical manifestations of the disease

    d. To verify the clinical findings as part of verifying the diagnosis

    e. To verify the laboratory findings as part of verifying the diagnosis

12.
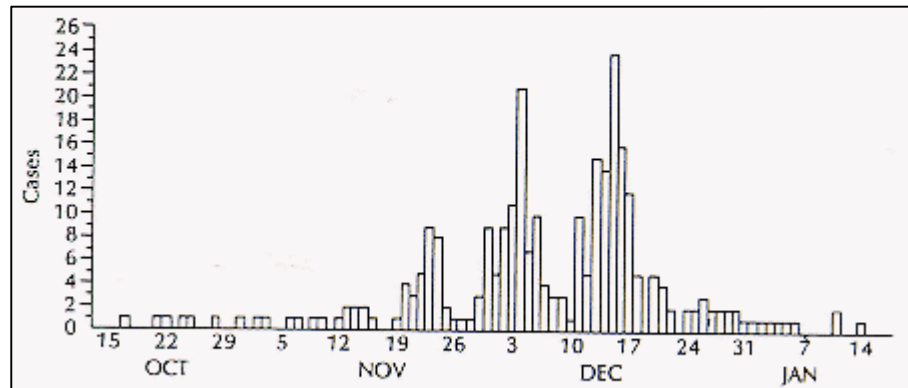
An epidemic curve is shown above. Based on trends of the curve, this most likely represents:

a. perfringens infections during the holiday season

b. the prevalence of the common cold in a high school

c. an *E. coli* outbreak that propagated as foreign travelers returned home

d. a shigella outbreak that infected several people at one time, then ended

e. staphylococcal infections after a company picnic

13. Which of the following is an epidemiological triad?

a. time/person/symptoms

b. agent/host/place

c. agent/host/environment

d. person/place/pathogen

e. pathogen/symptoms/agent

Questions 14-17 are worth 3 points each.

14. Define the difference between morbidity and mortality.
15. List 4 conditions contributing to a poor health environment leading to increased risk for food-borne illnesses.
16. Give a definition for cohort study.
17. Compare relative risk to attributable risk.

Questions 18-21 refer to the following case study.

In the late fall of 2014, an outbreak of listeriosis occurred in the United States. 35 illnesses were reported from across the United States, along with 2 reported in Canada. All cases were ultimately linked to an apple-packing facility in Bakersfield, California. The apples packed from this facility were produced into candy apples, which were then sold.

18. Identify up to 3 distinct population groups at risk for listeriosis [3 pts]
19. Identify up to 3 categories of food that often become contaminated with listeria [3 pts]

20. Below is the epidemic curve for this particular outbreak of listeriosis.
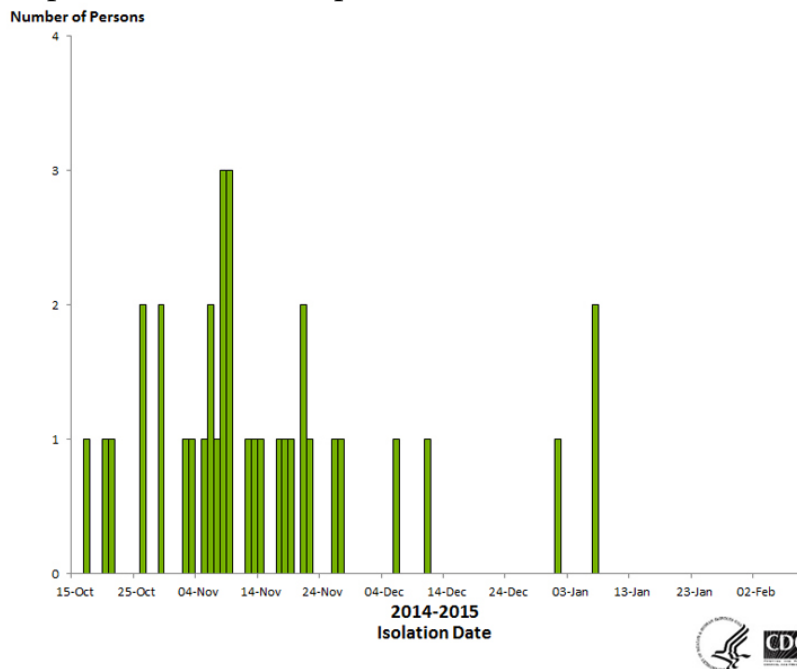
Using this data, estimate the incubation period for this particular strain of listeria [2 pts]

21. Many patients infected with listeriosis sought treatment only after severe symptoms occurred. Listeriosis often has a variable incubation period, but several mild symptoms can occur within hours after infection. Name some general signs symptoms of food-borne illnesses [3 pts]

∗ Tiebreaker: Give the complete scientific name of the pathogen primarily responsible for listeriosis infections. [2 pts]

Questions 22-26 refer to the following case study.

In early March, several cases of food poisoning were reported in and around New Haven. In one given day, three patients reported to the emergency room with vomiting and diarrhea. Over the days following, the number of patients with these symptoms continued to grow. The patients answered several questions about their circumstances, with the following information:

Out of 25 patients, 15 had eaten at Yorkside Pizza in the past week. Of the 40 uninfected family members of the 25 patients, 20 had eaten at Yorkside and 20 people had not eaten at Yorkside.

Out of 25 patients, 5 had eaten at Salsa Fresca in the past week. Of the 40 uninfected family members of the 25 patients, 12 had eaten at Salsa Fresca, and 28 had not.

22. Construct two different contingency tables for the cases at Yorkside and at Salsa Fresca. [8 pts]
23. Calculate the odds ratios for getting food poisoning at Yorkside and at Salsa Fresca. Determine which establishment is likely responsible for the outbreak. [3 pts]
24. Why may these odds ratios be inaccurate? [2 pts]
25. List five other pieces of information to obtain from the establishments to help determine the origin of the outbreak [5 pts]

26. Further examination of the patients concluded that the infections were caused by norovirus. Give two case definitions to differentiate how the ill patients were exposed. [2 pts]

✴ Tiebreaker [3 pts]: Describe one test for specific diagnosis of norovirus, and the process and methods behind the technique.

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∗ Tiebreaker [6 points]:

Match the following infections with their short descriptions.

1. Listeria	a. viral infection with 24-48 hour incubation period
2. Norovirus	b. bacterial infection tested by stool sample
3. Shigellosis	c. possibly fatal to fetuses
4. Botulism	d. Sometimes called bacillary dysentery
5. Salmonella	e. "four-inch law" passed to regulate outbreaks
6. *E. coli*	f. toxin poisoning caused by improper canning