Disease Detectives Exam

Part 1

1. For each study design in the table below, put the letter corresponding to the outcome that can be calculated with that study design, benefit of that study design, and weakness of the study design:

Study Design	Outcome	Benefit of Design	Weakness of Design
Cross Sectional Study			
Cohort Study			
Case control study			

Outcome:
A. Can calculate the odds of a disease given the presence of a particular characteristic or exposure
B. Can calculate the prevalence of a disease
C. Can calculate the relative risk of a disease given the presence a particular characteristic or exposure

Benefit of study design:
A. Fast
B. Good for rare exposures
C. Good for rare diseases/events

Weakness of study design:
A. Expensive
B. Least confidence in findings
C. Subject to recall bias

Question 2: Please list the type of error occurring in the following studies of a new weight loss medication:

A. All participants are weighed at their own doctor's offices. The weight data are collected from the medical records by a researcher who does not know if the person is taking the study medicine or not. _____
B. The decision about who is given the medicine is made by how much participants exercise: those who do not exercise are given the medicine while those who do exercise are not given the medicine. _____
C. Those who receive the medication get weighed in the research office when they pick up their pills; those who do not get the pills weigh themselves at home and report the results to the researchers. _____

Question 3: Below is the chain of transmission diagram:

1

2

6

3

5

4
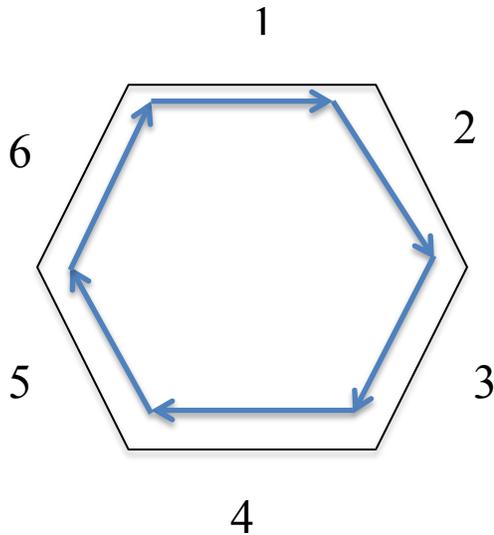
Match the number on the diagram with the corresponding part of the chain of transmission listed below (for example, put "1" next to the first step in the chain, "2" next to the 2nd part of the chain, etc):

Portals of entry   _____
Reservoir   _____
Modes of transmission   _____
Infectious agent   _____
Susceptible host   _____
Portals of exit   _____

For each part of the chain of transmission, list 2 examples:

A. Infectious agent: _____

B. Reservoir: _____

C. Portals of exit: _____

D. Mode of transmission: _____

E. Portal of Entry: _____

F. Susceptible Host: _____

Question 4: Place the letter of the definition that matches each term

Morbidity _____

Zoonosis_____

Endemic Disease _____

Fomite_____

Latent Period _____

Epidemic _____

Cluster _____

Incubation Period _____

Pandemic _____

Index Case _____

Vector _____

Mortality _____

Outbreak _____

A. An aggregation of cases over a particular period closely grouped in time and space, regardless of whether the number is more than the expected number.

B. Present at a continuous level throughout a population/geographic area.

C. Large numbers of people over a wide geographical area are affected.

D. A physical object that serves to transmit an infectious agent from person to person.

E. Time in between when a person comes into contact with a pathogen and when they first show symptoms or signs of disease.

F. First patient in an epidemiological study.

G. Time in between when a person comes into contact with a pathogen and when they become infected.

H. Rate of disease in a population.

I. Rate of death in a population.

J. More cases of a particular disease than expected in a given area or among a specialized group of people over a particular period of time.

K. An epidemic occurring over several countries or continents and affecting a large proportion of the population.

L. An animal that transmits disease.

M. An infectious disease that is transmissible from animals to humans.

Question 5: Match the following types of food borne illness vectors with the most relevant piece of advice for controlling the spread:

Bacteria _____

Viruses_____

Parasites _____

Natural Toxins _____

Prions _____

A. Avoid meat from cows fed non-vegetarian diets

B. Avoid consuming food picked from the wild unless the exact species can be precisely determined

C. Avoid food fertilized with human waste

D. Wash your hands after using the bathroom.

E. Food handlers should not report to work when they are experiencing flu-like symptoms

Part 2

On a recent Thanksgiving, a local emergency room calls the department of health due to 5 patients with severe nausea, diarrhea, and vomiting; the attending physician suspects an outbreak of food poisoning.

6. Which of the following questions is least help in determining if there is a true outbreak?
a. How many total patients are in the emergency room?
b. Have the patient's eaten foods from similar places?
c. How many cases of food poisoning are normally seen on Thanksgiving?
d. Do any of the patients have a history of similar symptoms not caused by food poisoning?

In response to your questions, you get the following answers: There are 30 patients in the ER, and the department normally sees 2-3 cases of food poisoning on Thanksgiving. The physician notes that 2 of the patients mentioned eating at a nearby restaurant earlier in the day, despite arriving separately to the ER. 1 of the patients ate only home cooked meals recently, 1 patient reports eating reheated takeout for breakfast, and 1 patient has a chronic gastrointestinal disease that may be contributing to their symptoms.

7. What piece of information in the above paragraph is most suspicious for a possible outbreak?

8. Is the <u>number</u> of cases currently in the ER sufficient to confirm an outbreak at this time? Why or why not?

9. Why is reheated food associated with food borne illness? Circle all that apply.
a. It is often over cooked.
b. It is often insufficiently reheated.
c. The storage temperature is often too low.
d. It is often kept too long before eating.

10. What advice would you give the patient who ate only home cooked meals? Circle all that apply.
a. Wash hands thoroughly before cooking.
b. Use one cooking surface, for easy clean up.
c. Use a thermometer when cooking meat.
d. Thaw frozen food on counter for 3 hours prior to cooking.
You decide to investigate further, and learn that 3 other people reported to local emergency rooms with nausea, vomiting, and stomach cramps after eating at the same restaurant mentioned above. The restaurant held a Thanksgiving buffet for exactly 150 people. The restaurant has never received a complaint of possible food poisoning before. You decide to begin a formal investigation.

11. Provide a case definition for this outbreak:

You call all 150 people and ask them what they ate and whether or not they feel ill. Your results are listed below.

	Persons who ate specified food				Persons who did not eat specified food			
	Ill	Not Ill	Total	Attack rate	Ill	Not Ill	Total	Attack rate
Turkey and Gravy	45	95	140	0.32	3	7	10	0.30
Stuffing	35	65	100	0.35	15	35	50	0.30
Green Bean Casserole	80	80	120	0.33	10	20	30	0.33
Cheesy Potatoes	25	55	90	0.39	15	45	60	0.33
Pumpkin Pie	15	85	100	0.15	20	30	50	0.40
Cream Puffs	45	15	60	0.75	5	85	90	0.06

12. Circle the most appropriate definition of attack rate:
a. Number of cases among those exposed to previously affected individuals
b. Number of new cases per specified period of time (day, hour, ect.)
c. Number of total cases in the population at a particular moment in time.
d. Number of new cases of disease since the outbreak began, divided by the population affected by the outbreak.

13. Of the 150 people who went to the buffet, 50 felt ill. What is the overall attack rate? Please show your work.

14. What is the most likely culprit for the outbreak? Explain your reasoning.

15. Give an explanation for the low attack rate among those who ate pumpkin pie.

16. Give an explanation for the 5 people with symptoms who did not eat the suspect food.

After following up with the patients and their physicians, you discover that some were found to have food poisoning due to toxins released by the bacterium *Staphlococcus aureus*. In the other patients, no precise causative agent was found. Roughly 25% of the population carries *S. aureus* in their nose, and they typically experience no symptoms. However, it can colonize in the skin and open wounds. Food poisoning typically emerges in 1-6 hours after eating tainted food and ends in 1-2 days.

17. Given this information, who would you expect to be affected by a second wave of infection?

a) Those in close contact with original patients.
b) Those who ate food later prepared by the same staff who prepared the buffet.
c) Those who used the same utensils as those who became ill.
d) There will be no second wave.

18. Given all the information you have, update your previous case definition:

19. Which pieces of food handling advice are most relevant to this case? Select all that apply.
a) Do not eat food that smells 'off'
b) Cover all cuts and scrapes while cooking
c) Wash hands prior to cooking
d) Cover your nose and mouth with your hand when sneezing.