



islip science olympiad invitational

Disease Detectives

Do not open this booklet until instructed to do so.

You are allowed to separate the packet and work in any order. The packet must be returned to the event supervisor stapled and in the correct order.

Instructions

You have 50 minutes to complete this exam. Answer all questions completely and thoroughly. You may use one two-sided note sheet and a non-programmable, non-graphing calculator. If you separate this test, write your team name on all sheets.

Team Name _____

Team Number _____

Student Names _____

RAW SCORE

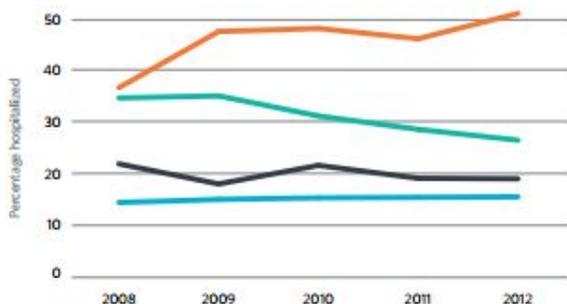
**Disease Detectives Exam
Islip Invitational Div. C 2016-2017**

1. What is the incubation period for *Bacillus cereus*?

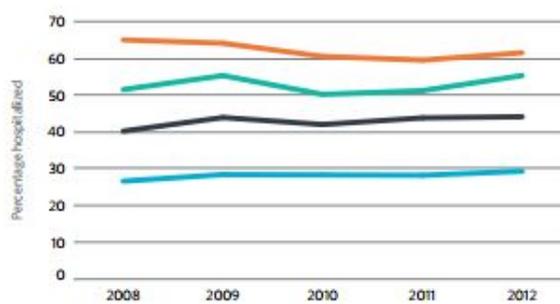
2. Name three modes of disease transmission.

3. Below is the known cases of foodborne illness that exist in different age groups:

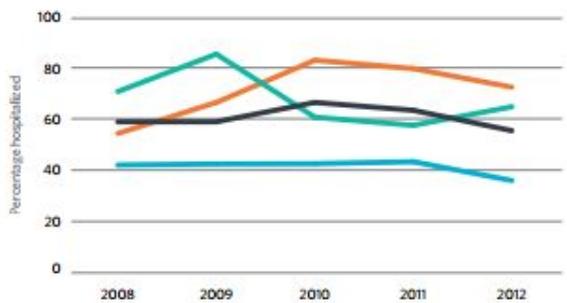
Campylobacter



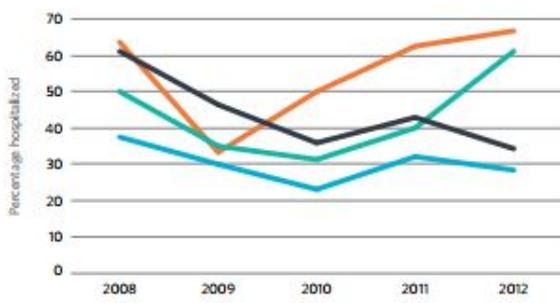
Salmonella



E. coli O157:H7



Vibrio



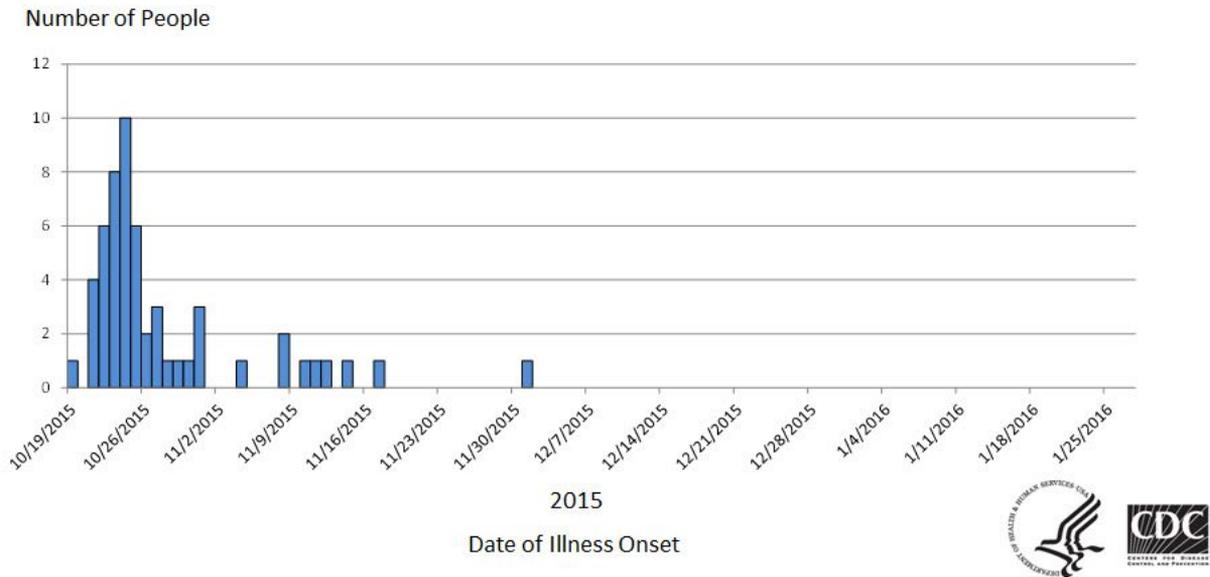
60 to 69
 70 to 79
 ≥80
 All ages

- a. For *E. coli*, what age group has the highest number of people who have been hospitalized in 2011?

- b. For Vibrio, what age group has the lowest number of people who has been hospitalized in 2008?

- c. Approximately what percent of people between 70 and 79 years of age were hospitalized as a result of Salmonella infection in the year 2010?

4. Below is a graph of the E Coli illness onset in 2015.



The average incubation period for E. Coli is 4 days.
 The maximum incubation period for E. coli is 10 days.
 The minimum incubation period for E. coli is 2 days.

Based on the Epi Curve and information above,

- a. Calculate the average incubation period for this outbreak of E Coli.

- b. Calculate the period of exposure for this outbreak of E. Coli.

Names: _____

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5.

	Gastroenteritis	No Gastroenteritis
Ate salad	48	12
Did not eat	18	22

- a. Calculate the attack rate for the exposed group.

- b. Calculate the attack rate for the unexposed group.

- c. Calculate relative risk for this data set.

- d. Interpret the results from part c.

- e. What type of study is this?

- f. Name three symptoms of gastroenteritis.

6.

		Case Patients	Controls
Ate Chipotle?	Yes	a = 25	b = 32
Ate Chipotle?	No	c = 14	d = 63

- a. Calculate the odds ratio for this data set.

b. Interpret the results from part a.

c. What type of study is this?

d. Is this a retrospective or prospective study?

e. What test would you use if data from multiple age groups had been provided?

Epidemiologists created the following case definition for an outbreak of Hepatitis A:

Discrete onset of symptoms (nausea, and presence of jaundice)

This table shows the characteristics of several patients suspected to have acute Hep A following their admittance to a hospital.

Patient#	Date of Report	Date of Onset	nausea	vomiting	anorexia	fever	dark urine	jaundice	IgM HAV
P1	2/5/2010	2/3/2010	0	1	0	1	1	1	+
P2	2/19/2010	2/14/2010	1	0	1	1	1	1	+
P3	2/7/2010	2/2/2010	0	1	0	1	1	1	+
P4	2/5/2010	2/1/2010	1	1	1	0	0	0	+
P5	2/28/2010	2/23/2010	1	1	0	1	1	1	+
P6	2/18/2010	2/14/2010	0	1	1	0	1	0	+

7. What is this type of chart called?

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8. Using the original case definition, state how many cases of acute Hep A there are.
9. Based on the chart, create a revised case definition for Hep A.
10. Using this revised case definition, state how many confirmed cases of acute Hep A there are.
11. What does IgM mean?
12. What is IgM HAV?

Questions 13-18 relate to the following case, taken from Korff, Taback and Beard, "A Coordinated Investigation of a Food Poisoning Outbreak," *Ps* 69:9 909-913 Sept. 1952.

On July 11th, 1951, public health officials in Baltimore received news of a suspected outbreak of food poisoning at a local resort. The previous day, a local insurance company had held a company picnic for 278 employees and their guests. A buffet dinner was served at 6:00 P.M. The food items offered included sliced cooked ham, fried crab cakes, potato salad, sliced tomatoes, heated baked beans, sliced bread, ice cream, cake and hot coffee, served on paper plates. On July 12th, the food service manager at the resort informed the officials that all of the leftover food had been thrown away and the garbage had been removed. One of the resort's two refrigerators was in use but not functioning, with a measured interior temperature of 68 °F. In addition, the work-table surface was cracked, the meat grinder had putrefied meat adhering to it, and there were no convenient hand washing facilities. The water that was used was from the resort's own well, which tested negative for coliform bacteria. The crab cakes were formed by the cook with his hands and were fried in deep fat at approximately 355 °F shortly before they were served. The potato salad had been mixed by the cook with his hands approximately four hours before the salad was served. Information about the picnickers' symptoms and food consumption was

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collected via a questionnaire which was distributed to all of the attendees who could be reached. 261 individuals responded, 97 of whom reported becoming ill, primarily with nausea and vomiting.

13. a) Why was the temperature of the fridge taken?

b) Why was the temperature of the fat taken?

For questions 14-16, name 3 risk factors present in the hotel on the day of the picnic and explain why each might contribute to the spread of disease.

14.

15.

16.

17. What does a coliform test measure? What does it indicate?

18. What is the major fecal coliform species that a coliform test may detect is present?

19. Data from the patients surveyed, including the total number of patients that ate each food and the number of patients that ate each food and also fell ill, were collected. What type of study does this represent?

20. Of the employees the responded to the survey, what is the incidence of food poisoning?

Names: _____

Team: _____

Names: _____

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Matching:

- | | |
|---|----------------------------|
| A. a protein particle that lacks nucleic acid | 1. Fomite ____ |
| B. a cell that lack a cellular membrane that encloses DNA | 2. Prion ____ |
| C. bacteria that have a thicker layer of peptidoglycan outside the cell membrane | 3. Cross Contamination |
| _____ | |
| D. how food is handled to prevent foodborne illness | 4. Pathogen ____ |
| E. pathogen found in untreated water | 5. Cluster ____ |
| F. comes in different sizes: spherical, rod and spiral | 6. Chronic ____ |
| G. The number of new cases of foodborne illness in a given population during a specified period | 7. Specificity ____ |
| H. Insects and ticks, for example | 8. Food Safety ____ |
| I. A comb contaminated with lice, for example | 9. Norovirus ____ |
| J. Transfer of harmful substance to food by hands, food contact | 10. Incidence ____ |
| K. the ability of a test to correctly identify people who do not actually have a disease | 11. Vector ____ |
| L. the ability of a test to correctly identify people who actually have a disease | 12. Epidemic ____ |
| M. an occurrence of cases of a disease that affects a large number of people over a wide geographic area | 13. Bacteria ____ |
| N. an occurrence of cases of a disease that affects a large proportion of the population across several countries or continents | 14. Sensitivity ____ |
| O. the occurrence of cases of disease in excess of what would normally be expected in a defined community, geographical area or time period | 15. Infectivity ____ |
| P. a number of cases closely grouped over a particular time period regardless of whether there are more cases than expected | 16. Virulence ____ |
| Q. describes a condition that is long lasting or recurrent condition | 17. Nosocomial ____ |
| R. describes a disease that originates in a hospital | 18. Gram positive bacteria |
| _____ | |
| S. ability of a pathogen to infect a susceptible host | 19. Prokaryotes ____ |
| T. a measure of the degree of a disease that a pathogen causes | 20. Pandemic ____ |
| U. ability of an organism to cause disease | 21. Outbreak ____ |
| V. an agent that causes disease, especially a microorganism | 22. Pathogenicity ____ |

Names: _____

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Tie Breakers:

1. List and define two types of error in data collection other than bias.

2. List and define the two main types of bias, and give an example of each type.

3. List whether the given disease is fungal or bacterial.

Clostridium perfringens: _____

Mucor circinelloides: _____

Shigellosis: _____

Listeriosis: _____

Aspergillosis: _____

Candidiasis: _____