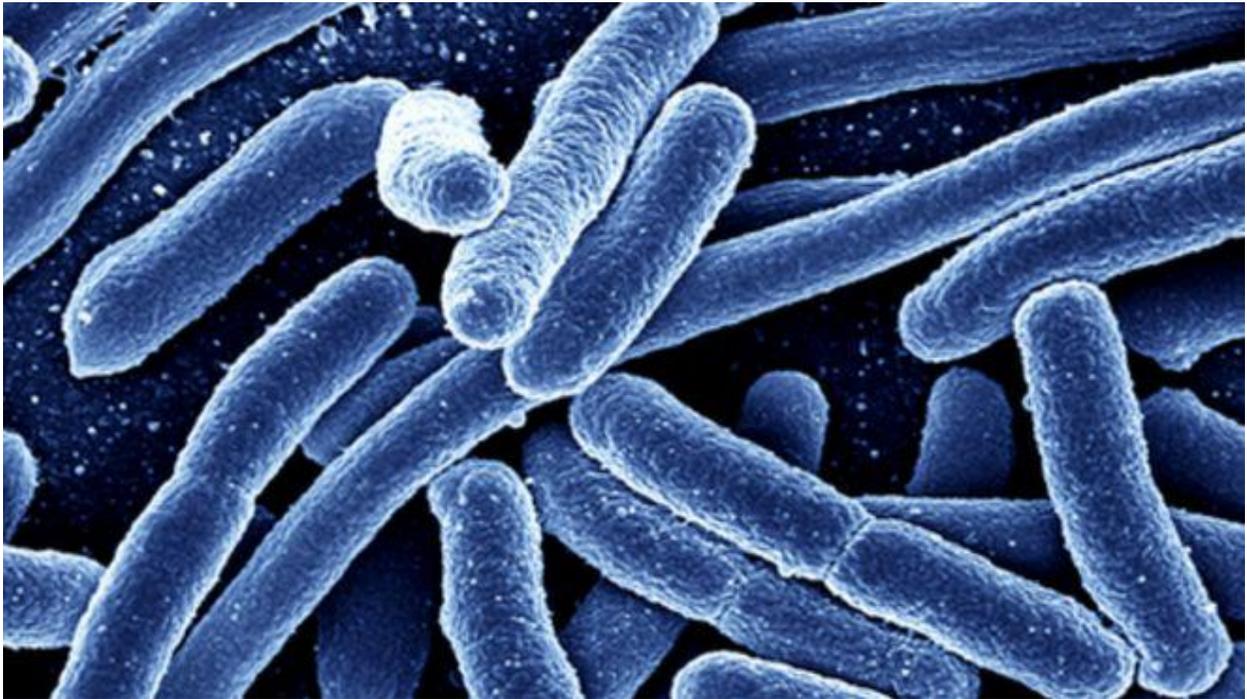


Ravenclaw1's Division B Disease Detectives Answer Key



SSSS 2017

Section 1: Vocabulary

Write the correct vocabulary word next to the definition.

1. When studied, some subjects may more easily recall specific habits related to a disease or condition than subjects not affected with the disease or condition.

Recall Bias

2. Cause of a disease

Agent

3. A widespread occurrence of an infectious disease in a community at a particular time

Epidemic

4. A measure of the frequency with which an event, such as a new case of illness occurs in a population over a period of time

Incidence Rate

5. The divergence due to chance alone, of an observation on sample from the true population value, leading to lack of precision in measurement of association.

Random Error

6. Death rate

Mortality

7. Birth rate

Natality

8. First case in an outbreak

Index Case

9. Occurs when the effects of two risk factors are mixed in the occurrence of the health-related event under study - when an extraneous factor is related to both disease and exposure

Confounding Bias

10. A surface a pathogen can survive on, and then infect another host

Fomite

11. The occurrence of cases of disease in excess of what would normally be expected

Outbreak

12. Disease that occurs infrequently and irregularly

Sporadic

13. Occurs when selection of participants for a study is affected by an unknown variable that is associated with the exposure and outcome being measure.

Selection Bias.

14. An aggregation of cases over a particular period closely group in time and space

Cluster

15. An organism that carries a pathogen to a new host but doesn't develop the disease

Vector

16. Systematic collection, analysis, interpretation, & spreading of health data to gain knowledge of the pattern of disease occurrence in order to control & prevent disease

Public Health Surveillance

17. Any error other than random error.

Systematic Error.

18. A surveillance system in which a prearranged sample of reporting sources agrees to report all cases of one or more notifiable conditions

Sentinel Surveillance

19. Site that harbors pathogenic organisms

Reservoir

20. Degree of pathogenicity

Virulence

21. Short-term immunization by the injection of antibodies

Passive Immunity

22. Error in an epidemiologic study that results in an incorrect estimation of the association between exposure and health-related event

Bias systematic error

Section 2: Acronyms

State what the following acronyms stand for

1. YPLL
Years of Potential Life Lost
2. CFSAN
Center for Food Safety and Applied Nutrition
3. DALYS
Disability-Adjusted Life Years
4. EIS
Epidemic Intelligence Service
5. HALE
Healthy Life Expectancy
6. WHO
World Health Organization

Section 3: Famous Scientists/History

1. Who was the founder of the Red Cross?
Clara Barton
2. Who's the director of the CDC?
Tom Frieden
3. Who proved smoking causes lung cancer?
Richard Doll
4. Who developed the vaccine that eradicated polio?
Jonas Salk

Section 4: Descriptions

Describe the listed terms

1. Classical Epidemiology - **population oriented, studies community origins of health problems related to nutrition, environment, human behavior, and the psychological, social, and spiritual state of a population.**
2. Clinical Epidemiology - **studies patients in healthcare settings in order to improve the diagnosis and treatment of various diseases and the prognosis for patients already affected by a disease.**
 - a. What two types can clinical epidemiology be divided into? **Infectious and Chronic disease epidemiology**
3. Frequency - **refers not only to the number of health events such as the number of cases of meningitis or diabetes in a population, but also to the relationship of that number to the size of the population. The resulting rate allows epidemiologists to compare disease occurrence across different populations.**
4. Pattern - **refers to the occurrence of health-related events by time, place, and person.**
5. Incidence - **# of new instances of disease in a population over a given time period.**
6. Prevalence - **# of affected persons in the population at any given point in time.**
7. Duration – **time during which the disease lasts**

Section 5: Scenario

1,200 people attend an astronomy convention. Of the 1,200 guests, 839 people came down with a case of staphylococcal food poisoning. The foods served were...

Foods	Symptoms	No Symptoms
Egg Salad	236	628
Potato Salad	240	135
Salad	290	460
Chicken	764	170
Hamburger	428	396
Pizza	532	419
Cream Pastries	69	53
Ice Cream	280	74

1. What are the symptoms of staphylococcal food poisoning?

Sudden and severe nausea and vomiting. Possible diarrhea and fever.

2. What is the duration of staphylococcal food poisoning?

24-48 hours

3. What organism causes staphylococcal food poisoning?

Staphylococcus aureus

4. What is the name of the criterion that is used to prove that a certain thing (not necessarily a microorganism) causes a disease?

Hill's Criteria

5. List all of the criteria from the above question.

Strength of association

Consistency

Specificity

Alternative Explanations

Temporality

Dose-Response Relationship

Biological Plausibility

Experimental Evidence

Coherence

6. What is the name of the criterion that is used to prove a certain microorganism causes a disease?

Koch's Postulates

7. What disease was the reason for the creation of the criteria mentioned in question 6?

Tuberculosis

8. What are the criteria mentioned in question 6?

Microorganism must be observed in every case of disease

Must be isolated and grown in pure culture

Organism must cause disease when introduced to healthy animal

Microorganism must be recovered from the diseased animal

9. What are the steps to investigating an outbreak?

1. Prepare for field work

2. Establish existence of an outbreak

3. Verify diagnosis

4. Define and identify cases

5. Describe and orient in terms of time, place, and person

6. Develop hypothesis

7. Evaluate hypothesis

8. Refine hypothesis and do more studies

9. Implement control and prevention measures

10. Communicate findings

10. What is the attack rate formula for people who are exposed?

$a/(a+b)$

11. Calculate the attack rate for the potato salad.

$240 / (240+135) =$

$240 / 375 = 64\%$

12. What food item likely caused the staphylococcal food poisoning?

Chicken

13. What is the attack rate for this item (round to the nearest tenth)?

$$764 / (764 + 170) =$$

$$764 / 934 = 81.8\%$$

14. What are three ways to reduce the risk of foodborne illness?

Cook meat, poultry, and eggs thoroughly

Don't cross-contaminate foods

Refrigerate leftover promptly

Clean-wash produce, hands, and cooking utensils

Report suspected foodborne illnesses to your local health department

Section 6: Short Answer

Thoroughly answer all the questions.

1. What are the three components to an epidemiology component? **Time, place, and person. Or agent, host environment**
2. Describe the types of descriptive studies.
Case report = detail report of a single patient from one or more doctors
Case series = characteristics of several patients
Correlative studies = correlates general characteristics of the population with health problem frequency with several groups during the same period of time
Time series analysis – correlate within the same population a different point in time
3. Describe the chain of infection using the words agent, host, reservoir, portal of exit, portal of entry, and mode of transmission. ***Agent leaves reservoir through portal of exit, conveyed by some mode of transmission, enters portal of entry to infect susceptible host.***
4. Name and describe the three characteristics of agents.
Infectivity capacity to cause infection in susceptible host.
Pathogenicity capacity to cause disease in a host.
Virulence severity of the disease that agent brings to host.
5. Name the lines of defense in the body and describe what they do.
Skin and secretions- acts as initial barrier, mucus catches pathogens enzyme kills pathogens
Inflammatory response- releases chemical signal, blood flow increases: heat, redness, pain, and swelling
Phagocytosis- ingests and kills microorganisms

Natural killer cells- kills infected cells and tumor cells
Interferon – the infected cells make proteins which they release into the bloodstream, interfering with the microorganism’s reproduction

Section 7: Calculations/Math

Answer all the questions below. Show all work!

500 people attend a dinner party. Soon afterwards, many of the attendants became sick with salmonella. The egg salad was the suspected culprit. Out of the 500 attendees, 379 ate the egg salad. Out of these 379, 334 became sick. Out of those people who didn’t eat the egg salad, 13 became sick.

1. What is the relative risk formula? $[a / (a+b)] / [c / (c+d)]$
2. Based on this information, calculate the relative risk. **4.4**

	Disease Yes	Disease No	Total
Exposed	330 a	45 b	375
Unexposed	25 c	100 d	125
Total	355	145	500

$(.88)/(.2)=4.4$

3. What does a relative risk greater than one indicate? **Increased risk**
4. What type of study design is relative risk used in? **Cohort**
5. What is the formula for odds ratio? **(ad/bc)**
6. What study design uses odds ratio? **Case control**
7. Describe the different study designs.

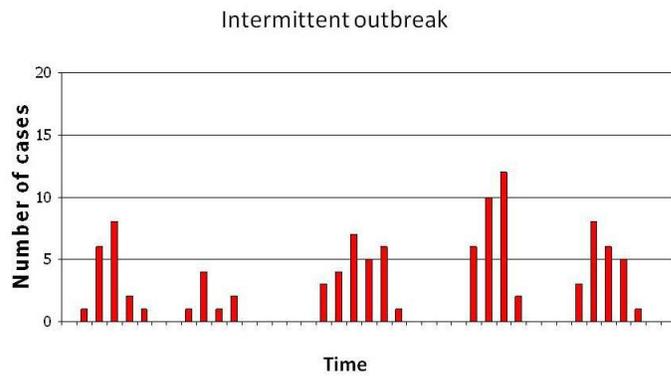
Study Design	Description	Strengths	Weaknesses
Case-Control	Works backward from effect to suspected cause. Case group and control group are checked for similar exposures	<ul style="list-style-type: none"> • Good for rare diseases • Long latency • Can examine multiple exposures from single outcome • Less expensive and faster than Cohort 	<ul style="list-style-type: none"> • Possible error in recalling past experiences (recall bias) • Possible time-order confusion

Cohort	Based upon exposure status whether or not they have illness. Works forward from exposure	<ul style="list-style-type: none"> • Can examine multiple outcomes for single exposure • Can examine rare exposures (not rare diseases) • Can calculate incidence of disease • Best technique for outbreak in small well-defined population • Most accurate observational study. 	<ul style="list-style-type: none"> • Bad for rare diseases • Costly in time and resources.
Cross-Sectional	A survey of a population where participants are selected irrespective of exposure of disease status	<ul style="list-style-type: none"> • Doesn't take long • Least expensive • Can study several outcomes. 	<ul style="list-style-type: none"> • May not be possible to distinguish whether exposure preceded or followed disease.

8. What is the following called?

Id #	Initials	Onset Date	Confirmed	How	Age	Sex	County	Physician	At Party
1	JD	3/17	Salmonella	Blood test	28	M	Banks	Johnson	Yes
2	VS	3/16	Salmonella	Stool test	34	F	Banks	Stevens	Yes
3	PQ	3/17	Probable Salmonella	Not Done	51	F	Dixon	Jackson	Yes
4	AR	3/18	Salmonella	Blood Test	31	M	Horace	Johnson	Yes

Line Listing



9. What do epidemiologists call this graph?

Epi curve

10. What are the three types of this graph? **Continuous common source, point source, propagated source**