DISEASE DETECTIVES – PRACTICE ACTIVITIES

PART 1 PRACTICE: BACKGROUND AND SURVEILLENCE

Practice Activity - Background Information

Task: Match the Basic Term in Column A with the Meaning of the Term in Column B

	Column A	Column B
____	**1. Outbreak**	**A.** compare people with and without exposures to see what happens to each
____	**2. Surveillance**	**B.** 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*
____	**3. Pandemic**	**C.** compare people with and without disease to find common exposures
____	**4. Vector**	**D.** a person or animal that harbors the infectious agent for a disease and can transmit it to others, but does not demonstrate signs of the disease
___	**5. Cohort**	**E.** large numbers of people over a wide geographical area affected
____	**6. Risk**	**F.** the probability that an individual will be affected by, or die from, an illness or injury within a stated time or age span.
____	**7. Cluster**	**G.** 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
____	**8. Carrier**	**H.** the systematic and ongoing collection, analysis, interpretation, and dissemination of health data
____	**9. Epidemic**	**I.** an *epidemic* occurring over several countries or continents and affected a large *proportion* of the population
____	**10. Case-control**	**J.** an animal that transmits disease

Task: What types of information should be acquired by a doctor in order to diagnose an illness in an individual and how does it compare to what disease detectives must acquire in order to identify an outbreak?

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Task: What types of information should be acquired by a doctor in order to diagnose an illness in an individual and how does it compare to what disease detectives must acquire in order to identify an outbreak?

For both an individual (case) and each case in an outbreak, it is important to examine the medical history of each individual, the symptoms of the illness, a time frame of when the symptoms began, the type of exposure the individual experienced, and some basic tests as temperature, blood pressure, respiration rate in attempting to make a diagnosis. Further tests as blood tests or cultures may be also needed.

Practice Activity – History

Task: Match the individual in **Column A** with their contribution to epidemiology in **Column B**

	Column A	Column B
____	**1. Pasteur**	**A.** Father of Epidemiology – tested hypothesis about cholera in London 1840-54
___	**2. Hippocrates**	**B.** Published first epi test with systematic focus on study design 1960
____	**3. Mantel & Haenszel**	**C.** Published a descriptive field study showing origin of pellagra 1920
_____	**4. Edward Jenner**	**D.** Published a landmark analysis of mortality data in 1662
____	**5. John Snow**	**E.** Formalized Standards (postulates) to Identify organisms with Infectious Diseases
____	**6. James Lind**	**F.** Designed study using control group in studying scurvy. Found that limes Prevent scurvy – British sailors used limes and became "limey's"
_____	**7. MacMahon**	**G.** Recognized bacterial cause & developed vaccine for anthrax
____	**8. John Graunt**	**H.** Attempted to explain disease as natural rather than supernatural About 400 BC
____	**9. Robert Koch**	**I.** Developed statistical procedure for stratified analysis of case-control studies
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Practice Activity – Infectious Disease Agents

Infectious diseases are caused by members of many different groups of pathogens including prions, viruses, bacteria, protistans, fungi and animalia. Archae and plants are the only two major taxonomic groups that do not include representatives that infect humans.

The below table lists a number of characteristics of the above groups. Note: There may be more than one group that has each characteristic.

In the space provided, give the first three letters of name of the group(s) that has that characteristic.

For example use PRI for "Prions" and PRO for "Protistans".

Group	Characteristic
	Single celled
	Non-living
	Multicellular
	Prokaryotes
	Eukaryotes
	Reproduce only in living cells
	Contain two types of nucleic acid

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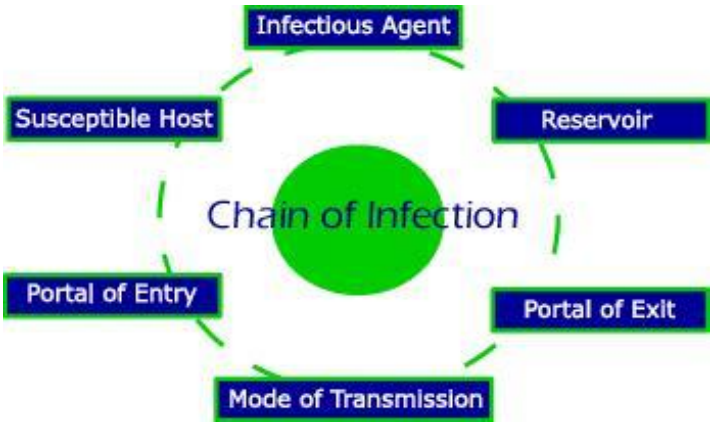
Group	Characteristic
Bacteria, Protistans	Single celled
Prions, Viruses	Non-living
Fungi, Animalia	Multicellular
Bacteria	Prokaryotes
Protistans, Fungi, Animalia	Eukaryotes
Viruses	Reproduce only in living cells
Bacteria, Protistans, Fungi, Animalia	Contain two types of nucleic acid

Practice Activity - Chain of Infection – Each link in the circle must be present and in sequence for an infection to occur.



Task: Match the Component of the Chain of Infection in Column A with the Explanation of the Component in Column B.

	Column A – Components	Column B – Explanations
_____	**1. Agent**	**A.** a place of exit providing a way for an agent to leave the reservoir
_____	**2. Reservoir**	**B.** method of transfer by which the organism moves or is carried from one place to another
_____	**3. Portal of exit**	**C**. a person who cannot resist an microorganism invading the body, multiplying and resulting in infection.
_____	**4. Mode of transmission**	**D.** a microbial organism with the ability to cause disease
_____	**5. Portal of Entry**	**E.** an opening allowing the microorganism to enter the host
_____	**6. Susceptible host**	**F.** a place where agents can thrive and reproduce

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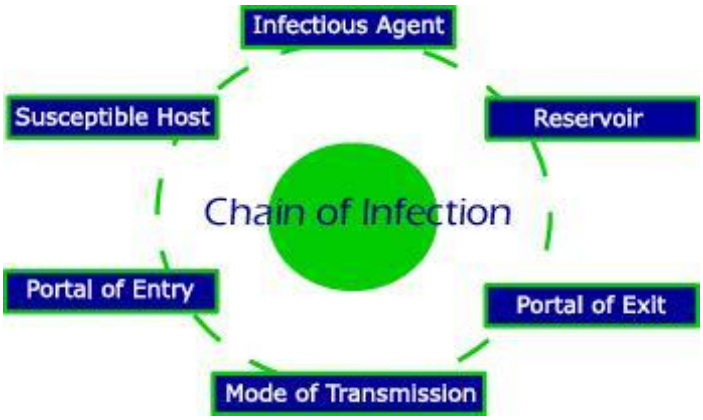

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Practice Activity – Surveillance

1. Public health surveillance is a key activity in monitoring health trends and disease patterns in the face of population growth. Which of the following definitions applies to public health surveillance?
   A. Monitoring of a person who might have been exposed to an infectious, chemical, radiologic, or other potentially causal agent, for the purpose of detecting early symptoms.
   B. The ongoing, systematic collection, analysis, and interpretation of health-related data essential to planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those responsible for prevention and control.
   C. The study of the distribution and determinants of health conditions or events among populations and the application of that study to control health problems
   D. None of the above.

For Questions 2-5, choose ALL correct answers for each question.

2. As described in this lesson, public health surveillance includes which activities?
   A. Data collection.
   B. Data analysis.
   C. Data interpretation.
   D. Data dissemination.
   E. Disease control.
3. Current public health surveillance targets which of the following?
   A. Chronic diseases.
   B. Communicable diseases.
   C. Health-related behaviors.
   D. Occupational hazards.
   E. Presence of viruses in mosquitoes.
4. Public health surveillance can be described primarily as which of the following?
   A. A method to monitor occurrences of public health problems.
   B. A program to control disease outbreaks.
   C. A system for collecting health-related information.
   D. A system for monitoring persons who have been exposed to a communicable disease.
5. Public health surveillance is only conducted by public health agencies.
   A. True.
   B. False.
6. Type in the name of the Type of Surveillance System for each set of characteristics (Active, Passive, Sentinel or Syndromic)

_____ Surveillance

- diseases are reported to health care providers and is simple and inexpensive
- limited by incompleteness of reporting and variability of quality

_____ Surveillance

- reporting of health events by health professionals who are selected to represent a geographic area or a specific reporting group and can be active or passive

_____ Surveillance

- health agencies contact health providers seeking reports
- ensures more complete reporting of conditions
- used in conjunction with specific epidemiologic investigation

_____ Surveillance

- focuses on one or more symptoms rather than a physician-diagnosed or laboratory-confirmed disease

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Passive Surveillance
- diseases are reported to health care providers and is simple and inexpensive
- limited by incompleteness of reporting and variability of quality

Sentinel Surveillance
- reporting of health events by health professionals who are selected to represent a geographic area or a specific reporting group and can be active or passive

Active Surveillance
- health agencies contact health providers seeking reports
- ensures more complete reporting of conditions
- used in conjunction with specific epidemiologic investigation

Syndromic Surveillance
- focuses on one or more symptoms rather than a physician-diagnosed or laboratory-confirmed disease

PART 2 PRACTICE: OUTBREAK INVESTIGATION

Practice Activity – Case Definition

An outbreak is defined in terms of the Time/Place/Person Triad

TIME - Epidemic Curve or Epi curve (Begin early & update often) – a histogram showing the course of the disease or outbreak to identify the source of the exposure (x axis=units of time equal to 1/4 to 1/3 incubation time and y axis = # of cases) Note: a single point or source will have only one peak, a plateau will show a continuous common source, several uniform peaks will indicate a propagated outbreak spread from person to person

PLACE – geographic extent plus spot map of cases to identify groups specific to a location or environmental factors

PERSON–identify the affected population by type of person or by exposures as age, sex, high risk exposure as with AIDS – can be done with organized by using a **line listing**.

CASE DEFINITION - has 4 components and summarizes the time/place/person triad

1. clinical information about the disease,
2. characteristics about the people who are affected,
3. information about the location or place, and
4. a specification of time during which the outbreak occurred

Task: Using the information provided about an outbreak, compose a case definition.

400 people attended a special awards dinner in Acme on June 29, 2001. A half of the people who attended the dinner became ill. The individuals had symptoms including nausea, vomiting, cramps, and diarrhea. Many of the ill individuals were hospitalized overnight.

Case Definition:

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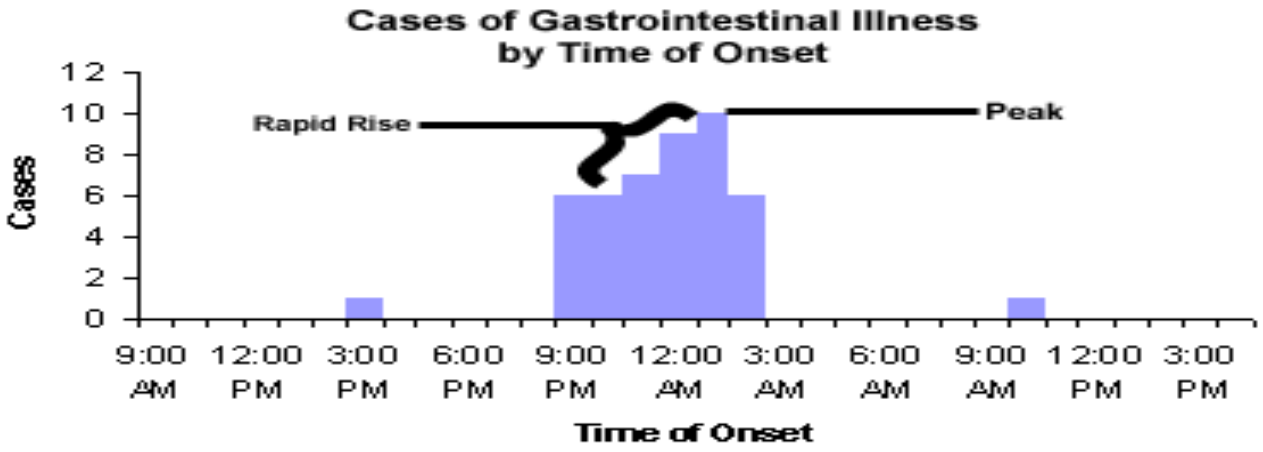
Case Definition: the onset of some combination gastrointestinal symptoms (e.g.,nausea, vomiting, diarrhea, and cramps) in a person attending the Awards Dinner in Acme on June 29, 2010.

Practice Activity - Epi Curve - An epi-curve is a histogram that shows the course of an outbreak by plotting the number of cases of a condition according to the time of onset.

Types of Epi Curves:

1. **Point source** epidemics occur when persons are exposed to the same exposure over a limited, well define period of time. The shape of the curve commonly rises rapidly and contains a definite peak, followed by a gradual decline.
2. **Continuous common source** epidemics occur when the exposure to the source is prolonged over an extended period of time and may occur over more than one incubation period. The down slope of the curve may be very sharp if the common source is removed or gradual if the outbreak is allowed to exhaust itself.
3. **Propagated (progressive source)** epidemics occur when a case of disease serves later as a source of infection for subsequent cases and those subsequent cases, in turn, serve as sources for later cases. The shape of this curve usually contains a series of successively larger peaks, reflective of the increasing number of cases caused by person-to-person contact, until the pool of those susceptible is exhausted or control measures are implemented.

Task – Examine the following epi curve and answer the questions.



1. What is the independent Variable? How is it measured?

2. What is the dependent Variable? How is it measured?

3. How many cases were present at the peak?

4. When was the onset of the first case?

5. What type of Epi Curve does this Epi Curve Represent? Why?

Practice Activity - Epi Curve - An epidemic curve or epi-curve is a histogram that shows the course of an outbreak by plotting the number of cases of a condition according to the time of onset.

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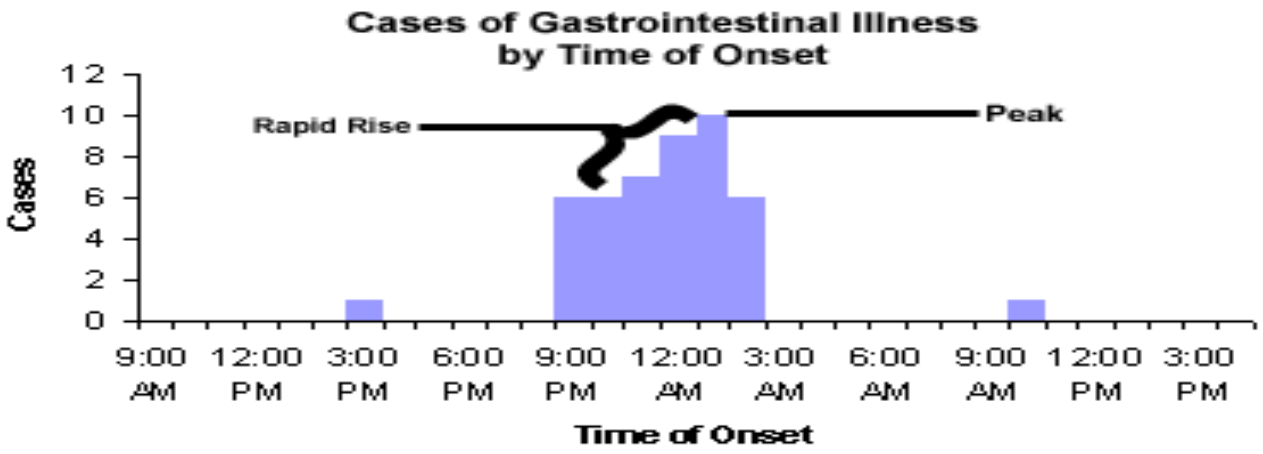

1. What is the independent Variable? How is it measured?
   Time of onset **by the hour**
2. What is the dependent Variable? How is it measured
   Cases **number of cases**
3. How many cases were present at the peak?
   10 cases
4. When was the onset of the first case?
   3 PM
5. What type of Epi Curve does this Epi Curve Represent? Why?
   Point Source – rapid ruse and only one peak

Practice Activity - Line Listing

Case Definition for Trichinosis **– A disease caused by ingestion of *Trichinella* larvae usually caused by ingesting undercooked contaminated pork.**

Acute onset of at least three of the following four features: myalgia (muscle pain), fever, facial edema, or eosinophil count greater than 500/mm3

ID#	Name	Myalgias	Fever	Edema	Eosinophil Count	Diagnosis	Confirmation	Case Classification
1	Anderson	yes	yes	no	495	trichinosis	yes	
2	Jones	yes	yes	yes	pending	possible	pending	
3	Kelly	yes	yes	no	1,100	possible	pending	
4	Smith	yes	yes	no	1,500	possible	pending	
5	Long	no	yes	no	Not done	Not done	None done	

Case classification

Suspected (Possible): Any febrile illness (with a fever) accompanied by rash
Probable: A case that meets the clinical case definition, has noncontributory or no serologic or virologic testing, and is not epidemiologically linked to a confirmed case
Confirmed: A case that is laboratory confirmed or that meets the clinical case definition and is epidemiologically linked to a confirmed case. (A laboratory-confirmed case does not need to meet the clinical case definition.)

Task – for each individual on the line listing, indicate how the case should be classified.

1. Anderson
2. Jones -
3. Kelly -
4. Smith -
5. Long –

Task - Analysis of information.

1. What type of organism is ***Trichinella*** and how does it get into the pork?

2. What can be done to prevent this type of outbreak?

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1. Anderson – **Confirmed**
2. Jones - **Probable**
3. Kelly - **Probable**
4. Smith - **Probable**
5. Long – **Possible**

Task - Analysis of information.

1. What type of organism is ***Trichinella*** and how does it get into the pork?

It is a parasitic round worm that was ingested by the pig and the larva are in the pig's muscles which we eat as pork.

2. What can be done to prevent this type of outbreak?

Thoroughly cook the pork to kill any larva that might be present.

Practice Activity - Defining the Hypothesis:

Agent/Host/Environment Triad consists of:

An external agent
A susceptible host
An environment that brings the host and agent together so that disease occurs.

Task Questions:

1. What type of organisms can act as an external agent to cause infection?

2. What are the characteristics of a susceptible host?

3. What type of environments can bring the host and agent together?

4. What types of organisms can act as vectors for infectious microbes?

5. What things could be done to stop the disease from occurring?

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Task Questions:

1. What type of organisms can act as an external agent to cause infection?
   bacteria, viruses, parasites as parasitic worms, protozoa, natural toxins, and other pathogenic agents as prions

2. What are the characteristics of a susceptible host?

   a person who cannot resist an microorganism invading the body, multiplying and resulting in infection. The young, the elderly, and people with weakened immune systems may be more susceptible and the normal individual.

3. What type of environments can bring the host and agent together?
   An environment that brings the host and agent together, so that disease occurs. It might involve such things as contaminated food that is ingested, an environment that allow a vector to introduce the agent into the host as a mosquito bite, air that allow an agent to be inhaled by a host or agents spread by contact between two people.

4. What types of organisms can act as vectors for infectious microbes?
   Insects or other arthropods such as mosquitos, ticks, fleas, tsetse flies, and sand flies.

5. What things could be done to stop the disease from occurring?
   The task is to break the triad and keep the agent from getting to the host and destroy the agent if it is already in the host.

   Some of the approaches might include:
   - **Eliminating the agent by such things as antibiotic or other medications**
   - **Strengthening the immune system of the host by immunizations**
   - **Eliminating the possible vectors – as reducing the mosquito populations**
   - **Preventing contamination as by proper cooking handling, cooking, and storage of food**
   - **Isolating infectious individuals**

- **Healthy habits as hand washing, proper sleep, diet, and exercise**

Practice Activity – Cohort Study

Experimental and Control Groups are needed for all studies used to test a hypothesis.

Cohort Study – Based upon ***exposure status*** whether or not they have outcome (illness); used with a small well-defined population and moves forward from exposure. Both groups have a known exposure and are checked for future outcomes or illness.

2 X 2 Table

	Disease Yes	Disease No
Exposed	a	b
Unexposed	c	d

Attack rate – the rate that a group experienced an outcome or illness

Attack Rate = number sick ÷ total in that group (usually expressed as a percent)

exposed = a ÷ (a+b)

unexposed = c ÷ (c + d)

Relative risk = [a ÷ (a+b)] / [c ÷ (c+d)]

Task: Examine the following case and answer the questions.

Cyclosporiasis is an infection with the protozoan *Cyclospora cayetanensis*, a pathogen transmitted by feces or feces-contaminated fresh produce and water.

Within 10 days after attending a June wedding, an outbreak of cyclosporiasis occurred among attendees. Of the 83 guests and wedding party members, 79 were interviewed; 54 of the 79 met the case definition. The following two-by-two table shows consumption of wedding cake (that had raspberry filling) and illness status.

	Disease Yes	Disease No	Totals
Exposed –ate cake	(a) 50	(b) 3	53
Unexposed - did not eat cake	(c) 4	(d) 52	26
Totals	54	25	79

Source: Ho AY, Lopez AS, Eberhart MG, et al. Outbreak of cyclosporiasis associated with imported raspberries, Philadelphia, Pennsylvania, 2000. Emerg Infect Dis 2002;l8:783–6.

1. Which group is the experimental group for this outbreak?

2. What is the control group for this outbreak?

3. Determine the Attack Rate for the Exposed Group who ate the wedding cake.

4. Determine the Attack Rate for the Unexposed group who did not eat the wedding cake.

5. Determine the Relative Risk for this outbreak.

6. Interpretation of Results: - Explain what the Relative Risk means?

7. What caused the contamination of the wedding cake?

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Source: Ho AY, Lopez AS, Eberhart MG, et al. Outbreak of cyclosporiasis associated with imported raspberries, Philadelphia, Pennsylvania, 2000. Emerg Infect Dis 2002;l8:783–6.

1. Which group is the experimental group for this outbreak?
   Those that ate the wedding cake – exposed group
2. What is the control group for this outbreak?
   Those that did not eat the wedding cake – unexposed group
3. Determine the Attack Rate for the Exposed Group who ate the wedding cake.
   Attack Rate for the Exposed Group = a ÷ (a+b) = 50/53 = 94%
4. Determine the Attack Rate for the Unexposed group who did not eat the wedding cake.
   Attack Rate for the Unexposed Group = c ÷ (c + d) = 4/26 = 15%
5. Determine the Relative Risk for this outbreak.
   Relative Risk = [a ÷ (a+b)] / [c ÷ (c+d)] = 6
6. Interpretation of Results: - Explain what the Relative Risk means?
   A person who ate the wedding cake was 6 times more likely to develop cyclosporiasis than one that did not eat the cake.
7. What caused the contamination of the wedding cake?
   Contamination of the imported raspberries in the cake's filling

Practice Activity - Case-Control Study

It works ***backward from effect or illness*** to suspected cause. The Control group is a selected group who has similar characteristics to the sick group but is not ill. They are then checked for similar exposures.

2 X 2 Table

	Case Patients	Control Patients
Yes	a	b
No	c	d

Odds Ratio is calculated to evaluate the possible agents & vehicles of transmission.

$$\textit{Odds Ratio} = \frac{\text{Odds of exposure in cases}}{\text{Odds of exposure in controls}} = \frac{a/c}{b/d} = \frac{ad}{bc}$$

Task: Examine the following case and answer the questions.

Problem: An outbreak of aflatoxin poisoning related to maize or corn in Africa. Aflatoxin is a toxin produced by the **fungus *Aspergillus*** which can contaminate food. Investigators conducted a case-control study with 40 case-patients and 80 controls. Among the 40 poisoning victims, 32 reported storing their maize inside rather than outside. Among the 80 controls, 20 stored their maize inside.

2 X 2 Table

	Case Patients	Control Patients	Total
Yes	(a) 32	(b) 20	52
No	(c) 8	(d) 60	68
Totals	40	80	120

1. Determine the Odds Ratio for this Outbreak.

2. Interpretation of Results: Explain what the odds ratio means.

3. Possible Explanation: What might account for the reason contamination is more likely in the maize stored inside?

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	Case Patients	Control Patients	Total
Yes	(a) 32	(b) 20	52
No	(c) 8	(d) 60	68
Totals	40	80	120

1. Determine the Odds Ratio for this Outbreak.

   The odds ratio is calculated as ad/bc, or (32 x 60) / (8 x 20), which equals 1,920 / 160 or 12.0.

2. Interpretation of Results: Explain what the odds ratio means.

   A person who stores their maize inside is 12 times more likely to develop aflatoxin poisoning than a person who stores their maize outside.

3. Possible Explanation: What might account for the reason contamination is more likely in the maize stored inside?

   The environment inside may be more moist and more conducive to mold growth.

Practice Activity – Validation of Results and Drawing Conclusions

Validation of Results

Task: Attack Rate or Odds Ratio will tell you the strength of association for the cause/effect relationship, but what else is needed to validate a hypothesis?

Why is it so important to begin treatment as soon as adequate information is available even if the results have not yet been validated?

Drawing Conclusions

Task: List the criteria disease detectives use for **determining causality** when conducting investigations- which is also the criteria for drawing conclusions.

Practice Activity – Validation of Results and Drawing Conclusions

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LAB VERIFICATION NEEDED TO VALIDATE A HYPOTHESIS,

Why is it so important to begin treatment as soon as adequate information is available even if the result have not yet been validated?

People are ill and need to be treated as soon as possible. As with your visit to the doctor, treatment is started as soon as possible even though it may have to be altered or modified as new evidence is collected.

Drawing Conclusions

Task: List the criteria disease detectives use for **determining causality** when conducting investigations. - which is also the criteria for drawing conclusions.

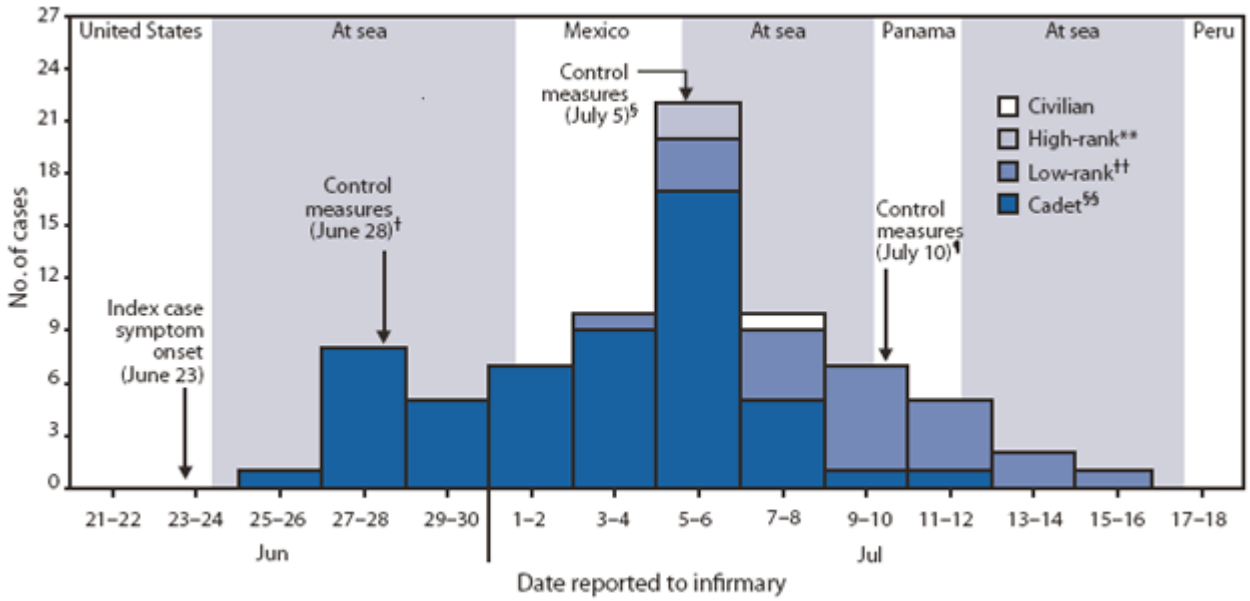
1. **Temporality – cause/exposure must precede effect/outcome**
2. **Consistency – observation of association must be repeatable in different populations at different times**
3. **Coherence, 1-1 relationship – exposure is always associated with outcome/ outcome is always caused by the specific exposure**
4. **Strength of association – relationship is clear and risk estimate is high**
5. **Biological plausibility – biological explanation makes sense**
6. **Dose/response (biologic gradient) – increasing risk is associated with increasing exposure**
7. **Specificity – a single cause produces a single effect**
8. **Experimental evidence to prove the hypothesis**
9. **Alternate Explanations – consideration of multiple hypotheses before making conclusions about whether association is causal or not**

PART 3 PRACTICE: PATTERNS, CONTROL AND PREVENTION

Practice Activity – Graph Analysis

The following figure is a graph of the outbreak aboard the navy ship taken from a recent MMWR article.

FIGURE. Number of confirmed cases of 2009 pandemic influenza A (H1N1) virus infection (N = 78), * by rank and date patient reported to the ship's infirmary, during an outbreak on a Peruvian Navy ship; June–July 2009.



1. What is the independent variable of the graph?

2. What is the dependent variable of the graph?

3. Which group of navy ship personnel had the most sick people?

4. According to the graph, when did the most Navy personnel report sick?

5. It takes about seven days from the time someone is exposed to the H1N1 influenza virus until they get sick. Suppose a cadet gets sick on July 6. When was the cadet most likely exposed?

6. Where was the ship when the cadet was exposed (cadet described in question 44)?

7. Approximately how many cadets had confirmed H1N1 influenza during the peak of the outbreak (July 5–6)?

8. Approximately how many high-ranking officials had confirmed H1N1 influenza during July 5–6? (1 point)

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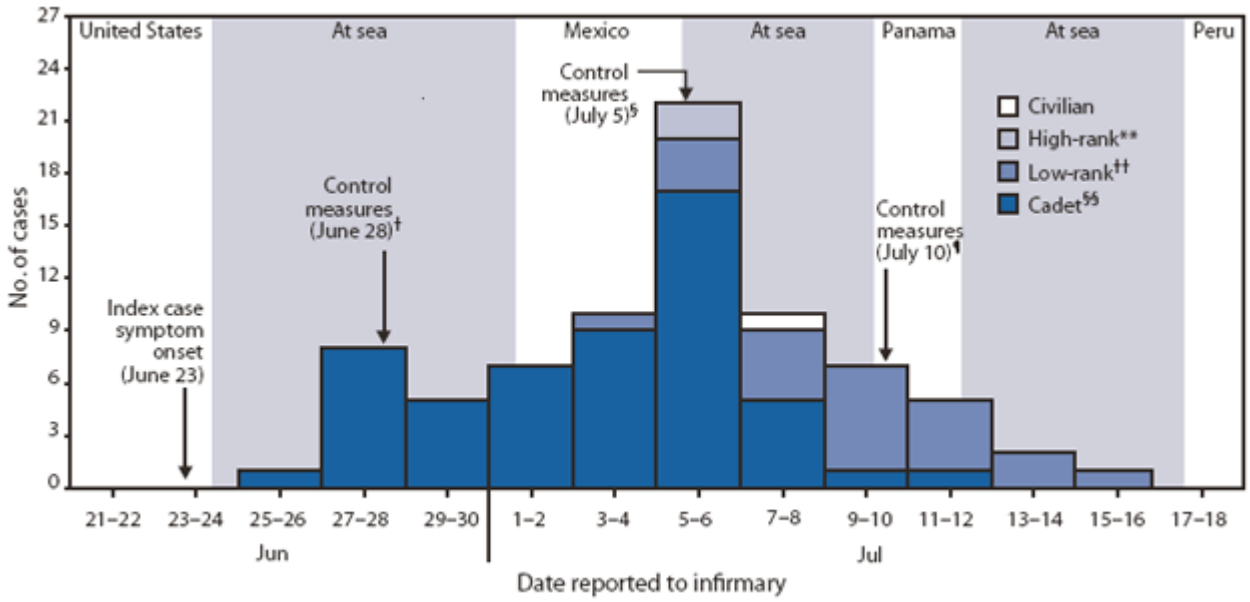

1. What is the independent variable of the graph?
   Date reported to infirmary

2. What is the dependent variable of the graph?
   Number of cases

3. Which group of navy ship personnel had the most sick people?
   Cadets

4. According to the graph, when did the most Navy personnel report sick?
   July 5–6

5. It takes about seven days from the time someone is exposed to the H1N1 influenza virus until they get sick. Suppose a cadet gets sick on July 6. When was the cadet most likely exposed?
   June 29-30

6. Where was the ship when the cadet was exposed (cadet described in question 44)?
   At sea

7. Approximately how many cadets had confirmed H1N1 influenza during the peak of the outbreak (July 5–6)? **17**

8. Approximately how many high-ranking officials had confirmed H1N1 influenza during July 5–6? (1 point) **3**

Practice Activity – Data Interpretation

The below table shows the mortality rates for unintentional poisoning in the United States for 1999 and 2004 by age group.

Table 1: Unintentional poisoning mortality rates (per 100,000 population) by age — United States, 1999 and 2004.

Age Group (yrs)	1999	2004	Rate Change (%)
0-14	0.1	0.1	0.0
15-24	2.5	5.3	113.3
25-34	5.9	9.1	54.8
35-44	10.1	14.5	43.8
45-54	7.8	14.5	87.0
55-64	2.8	5.4	91.1
65-74	1.6	2.3	39.3
≥75	2.5	2.7	7.2

The above table (Table 1) shows mortality rates for unintentional poisoning by age group for 1999 and 2004.

1) Circle the correct formula for determining the mortality rate

   a) (Number of persons who died due to unintentional poisoning/population at risk) X 100,000 = Mortality Rate
   b) (Number of persons who were unintentional poisoned/population at risk) X 100,000 = Mortality Rate

2) Which of the above age groups had the highest mortality rate in 1999? _____

3) There were approximately 60,253,000 children less than 15 years of age in the United States in 1999. How many of them died from unintentional poisoning in 1999? (show your calculations)

4) There were approximately 39,183,000 persons between the ages of 15 and 24 in the United States during the period covered by Table 1. How many more unintentional poisoning deaths occurred in this age group during 2004 than in 1999? (show your calculations)

5) List three types of poisons that might be found in your home.

6) List three things you can do to prevent unintentional poisoning in your home.

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   35-44 yrs.

3) There were approximately 60,253,000 children less than 15 years of age in the United States in 1999. How many of them died from unintentional poisoning in 1999? (show your calculations)

   Number who died in 1999 = 60,253,000 * (0.1/100,000) = 60.253

4) There were approximately 39,183,000 persons between the ages of 15 and 24 in the United States during the period covered by Table 1. How many more unintentional poisoning deaths occurred in this age group during 2004 than in 1999? (show your calculations)

   Number who died in 1999 = 39,183,000 * (2.5/100,000) = 98
   Number who died in 2004 = 39,183,000 * (5.3/100,000) = 207
   Difference = 207-98 = 109

5) List three types of poisons that might be found in your home.

   Insecticides. Pesticides, Cleaning Products, Paint Thinners, Topical Medicines

6) List three things you can do to prevent unintentional poisoning in your home.

   Make sure all products are clearly labeled
   Products are stored out of the reach of children
   Store products away from materials used to prepare food
   Use according to instructions on labels

Practice Activity – Calculating rates, ratios, and probability

Data from John Snow's classic investigation of cholera in London are shown in Table 1. Two different water companies, the Southwark and Vauxhall Water Company and the Lambeth Water Company, supplied households in the affected area with water. Table 1 shows the number of persons in households supplied by each company and the number of cholera deaths in each household.

Table 1. Mortality from cholera in London related to the water supply of individual houses in districts served by both the Southwark and Vauxhall Company and the Lambeth Company, July 9-August 16, 1854

Water supply of individual house	Population (1851 Census)	Number of deaths from cholera
Southwark and Vauxhall only	98862	419
Lambeth only	154615	80

Source: Principles of Epidemiology in Public Health Practice 3rd edition.

1. What is the mortality rate per 10000 for households supplied only by Southwark and Vauxhall (Show your work. Remember to include the formula, the formula with the correct values entered, and the answer with units)?

2. What is the mortality rate per 10000 for households supplied only by Lambeth (Show your work. Remember to include the formula, the formula with the correct values entered, and the answer with units)?

3. How much more likely were Southwark and Vauxhall users to die from cholera as compared with Lambeth users (Show your work. Remember to include the formula, the formula with the correct values entered, and the answer with units)?

4. Which company was most likely the source of the outbreak?

5. What study design was used?

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   Mortality rate = Number of deaths ÷ Population
   = 419 ÷ 98862
   = 42.4 per 10,000

2. What is the mortality rate per 10000 for households supplied only by Lambeth (Show your work. Remember to include the formula, the formula with the correct values entered, and the answer with units)?

   Mortality rate = Number of deaths ÷ Population
   = 80 ÷ 154615
   = 5.2 per 10,000
   0.00052 for partial credit

3. How much more likely were Southwark and Vauxhall users to die from cholera as compared with Lambeth users (Show your work. Remember to include the formula, the formula with the correct values entered, and the answer with units)?

   Risk ratio = Risk among Southwark and Vauxhall users ÷ Risk among Lambeth users
   = (419 ÷ 98862) ÷ (80 ÷ 154615)
   = 42.4 ÷5.2
   = 8.2

4. Which company was most likely the source of the outbreak?

   Southwark and Vauxhall

5. What study design was used?

   Cohort study

Practice Activity – Disease Factors and Control

1. Immunizations have dramatically reduced death rates in young children in both developed and developing countries and contributed to population growth. List 4 immunizations that are routinely recommended for children less than 5 years of age.

2. Although there have been significant reductions in cigarette smoking in the United States, it is still a major problem in many parts of the world. Which of the below diseases are linked with cigarette smoking? (circle the letters for all that apply)
    a. Lung cancer
    b. Ebola
    c. Asthma
    d. Whooping cough
    e. Hemophilia
    f. Type 2 diabetes
    g. Periodontal disease
    h. Skin cancer
    i. Esophageal cancer
    j. Stroke

1. While more than 54,000 people (e.g., drivers, passengers and pedestrians) died in motor vehicle-related incidents in the U.S. in 1972, the number has decreased over the years and 33, 561 died in 2012. Give 2 specific changes in automobile design that have contributed to this (note – safer cars is not a specific change).

2. Fresh water is necessary for life and population growth puts increases the demand for potable water. At the same time, waste disposal becomes more difficult. Fecal contamination of drinking water supplies has caused widespread outbreaks of infectious diseases.

    a. Name two infectious diseases that are spread by contaminated water.

    b. Boiling can make water safe for drinking. Name two other general methods to make coliform-containing water safe to drink.

Practice Activity – Disease Factors and Control

1. Immunizations have dramatically reduced death rates in young children in both developed and developing countries and contributed to population growth. List 4 immunizations that are routinely recommended for children less than 5 years of age.
   Any of the following: Polio, Measles, Mumps, Rubella, Diphtheria, Tetanus, Whooping cough (Pertussis), Haemophilus influenza type b, Hepatitis A, Hepatitis B, Pneumococcus, Influenza, Varicella (chickenpox) and Meningococcal

2. Although there have been significant reductions in cigarette smoking in the United States, it is still a major problem in many parts of the world. Which of the below diseases are linked with cigarette smoking? (circle the letters for all that apply)
   a. Lung cancer
   b. Ebola
   c. Asthma
   d. Whooping cough
   e. Hemophilia
   f. Type 2 diabetes
   g. Periodontal disease
   h. Skin cancer
   i. Esophageal cancer
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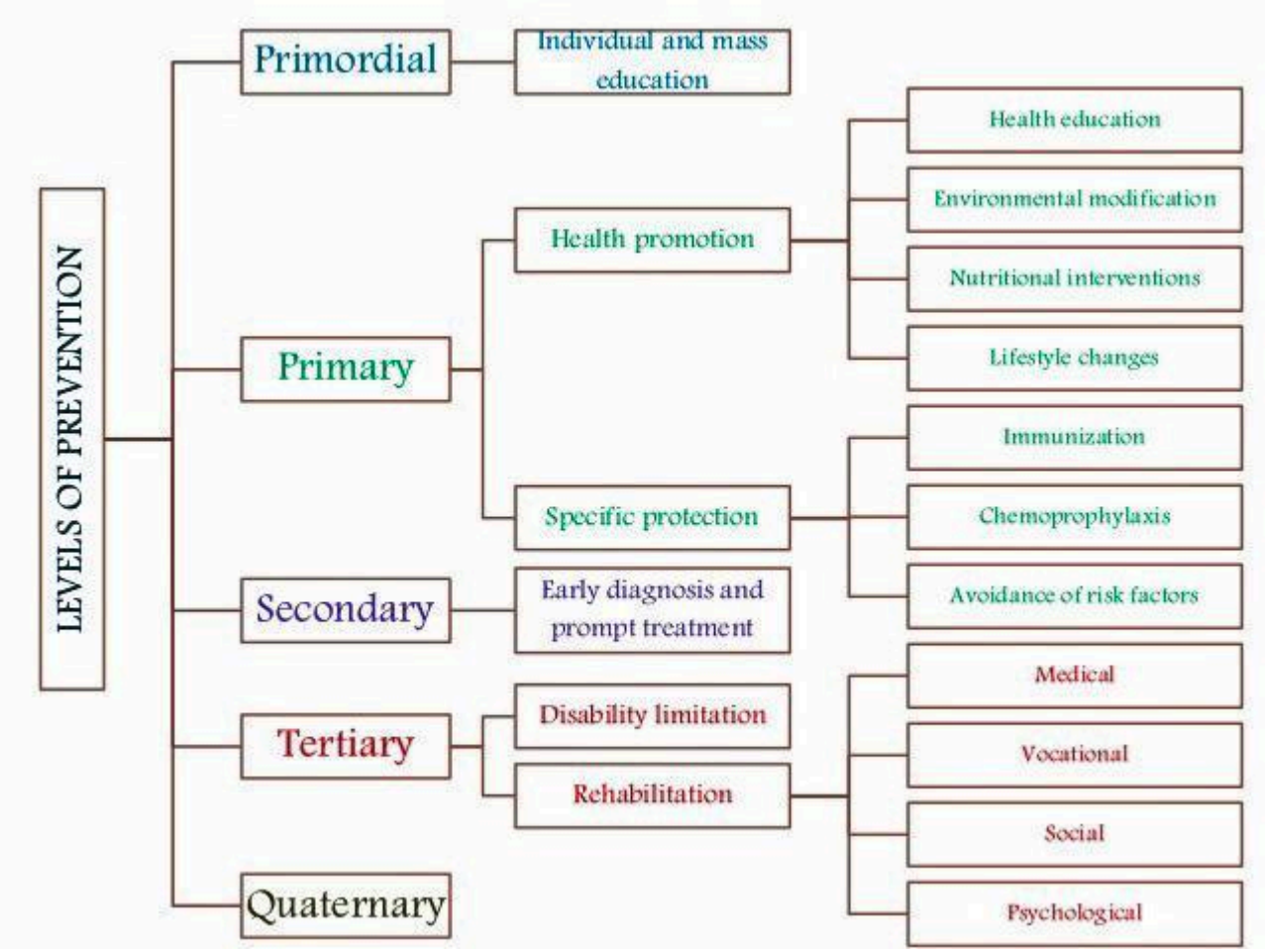
   seat belts, shoulder harnesses, air bags, collapsible steering wheels, antilock brakes, padded dashboards, bumper shocks, or generally any non-duplicative, reasonably specific answer

4. Fresh water is necessary for life and population growth puts increases the demand for potable water. At the same time, waste disposal becomes more difficult. Fecal contamination of drinking water supplies has caused widespread outbreaks of infectious diseases.

   a. Name two infectious diseases that are spread by contaminated water.
      Any two of the following: Hepatitis A, Norovirus, Aseptic meningitis, E. coli O157:H7, Salmonella, Salmonella, typhi, Shigella, Campylobacter, Vibrio cholerae, Pseudomonas, Cryptosporidiosis, Giardiasis, Schistosomiasis

   b. Boiling can make water safe for drinking. Name two other general methods to make coliform-containing water safe to drink.
      Filtration and Chemicals or chlorine and ozone

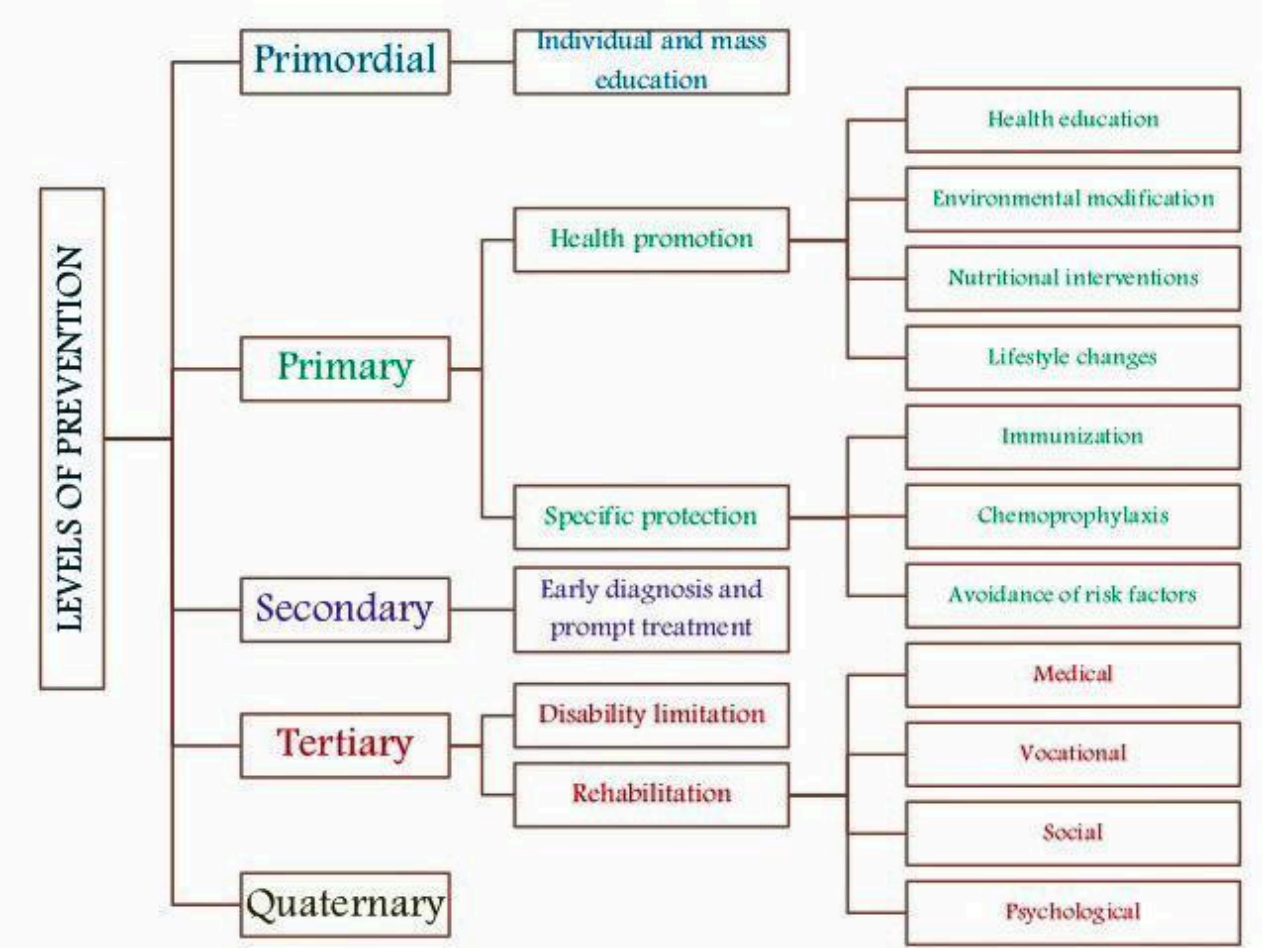
Practice Activity – Prevention



For each of the following activities, indicate which Level of Prevention it represents placing the following **number**: **1**-Primordial, **2**-Primary **3**- Secondary **4**- Tertiary **5**- Quaternary at the beginning of the statement.

_ Preventing exposure to hazards that cause disease or injury such as seat belts, safety helmets
__Vocational rehabilitation programs to retrain workers for new jobs after recovery
__Changing childhood life style to prevent adult health problems as obesity and hypertension
_ Detecting and treating disease or injury that has already occurred through regular exams & screening
__Handwashing and regular dental cleaning & care
__A healthy lifestyle, including diet and exercise
__Changing the socio-economic status of society and public attitudes to improve life style patterns and make healthy life style models socially acceptable
__Immunization against infectious diseases
_ Support groups that allow members to share strategies for living with limitations
__Suitable modified work so injured or ill workers can return safely to their jobs
__Cardiac or stroke rehabilitation programs, chronic disease management programs
_Individual programs to change individual life style to promote health and safety
__Daily, low-dose aspirins and/or diet & exercise to prevent further heart attacks or stroke

Practice Activity – Prevention



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2 Preventing exposure to hazards that cause disease or injury such as seat belts, safety helmets
4 Vocational rehabilitation programs to retrain workers for new jobs after recovery
1 Changing childhood life style to prevent adult health problems as obesity and hypertension
3 Detecting and treating disease or injury that has already occurred through regular exams & screening
2 Handwashing and regular dental cleaning & care
5 A healthy lifestyle, including diet and exercise
1 Changing the socio-economic status of society and public attitudes to improve life style patterns and make healthy life style models socially acceptable
2 Immunization against infectious diseases
4 Support groups that allow members to share strategies for living with limitations
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