

Chapters 2-4

Which of the following is a condition which may occur during the incubation period?

Transmission of infection

Chicken pox is a highly communicable disease. It may be transmitted by direct contact with a person infected with the varicella-zoster virus (VZV). The typical incubation time is between 10 to 20 days. A boy started school 2 weeks after showing symptoms of chicken pox including mild fever, skin rash, & fluid-filled blisters. One month after the boy returned to school, none of his classmates had been infected by VZV. The main reason was:

Contact was after infectious period

The ability of a single person to remain free of clinical illness following exposure to an infectious agent is known as:

Immunity

Which of the following is characteristic of a single-exposure, common-vehicle outbreak?

The epidemic curve has a normal distribution when plotted against the logarithm of time

	Ate Ice Cream		Did Not Eat Ice Cream	
	Diarrhea	Total	Diarrhea	Total
Ate pizza	39	52	14	40
Did not eat pizza	11	15	9	30

What is the diarrhea attack rate in persons who ate both ice cream & pizza?

39/52

What is the overall attack rate in persons who did not eat ice cream?

33%

Which of the food items (or combination of items) is most likely to be the infective item(s)?

Ice cream only

Which of the following reasons can explain why a person who did not consume the infective food item got sick?

- They were directly exposed to persons who did eat the infective food item
- Diarrhea is a general symptom consistent with a number of illnesses
- There may have been an inaccurate recall of which foods were eaten (all of the above)

Residence	Number of Students	Number of Cases
Boys dormitory (all boys)	380	40
Girls dormitory (all girls)	343	12
Day students (live at home)	123 (46 boys, 77 girls)	5 (3 boys, 2 girls)
Total	846	57

An outbreak of gastroenteritis occurred at a boarding school with a student enrollment of 846. Fifty-seven students reported symptoms including vomiting, diarrhea, nausea, & low-grade fever between 10 p.m. on September 24 & 8 p.m. on September 25. The ill students lived in dormitories that housed 723 of the students. The table below provides information on the number of students per type of residence & the number reporting illnesses consistent with the described symptoms & onset time. Calculate the attack rate among all students at the boarding school.

The answer is found by dividing the total number of cases (57) by the total number of students (846). This equals 6.7%.

An outbreak of gastroenteritis occurred at a boarding school with a student enrollment of 846. Fifty-seven students reported symptoms including vomiting, diarrhea, nausea, & low-grade fever between 10 p.m. on September 24 & 8 p.m. on September 25. The ill students lived in dormitories that housed 723 of the students. The table below provides information on the number of students per type of residence & the number reporting illnesses consistent with the described symptoms & onset time. Calculate the attack rates for boys & girls separately.

For boys, the attack rate includes all cases (40 + 3) divided by the total number of students who are boys (380 + 46). The attack rate is 10.1%.

For girls, the attack rate includes all cases (12 + 2) divided by the total number of students who are girls (343 + 77). The attack rate is 3.3%.

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723 of the students. The table below provides information on the number of students per type of residence & the number reporting illnesses consistent with the described symptoms & onset time. What is the proportion of total cases occurring in boys?

The proportion of cases occurring in boys is equal to the number of cases in boys divided by the total number of cases (43/57). This equals 75.4%.

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The proportion of cases occurring in dormitory residents is equal to the number of cases in residents divided by the total number of cases (52/57). This equals 91.2%.

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Both proportions are useful. Dormitory residents account for over 90% of the cases indicating an outbreak of an infectious agent that was transmitted at the school. Furthermore, over 75% of the cases were boys indicating that the responsible agent was more likely to have been transmitted in the boys' dormitory.

A group of researchers are interested in conducting a clinical trial to determine whether a new cholesterol-lowering agent was useful in preventing coronary heart disease (CHD). They identified 12,327 potential participants for the trial. At the initial clinical exam, 309 were discovered to have CHD. The remaining subjects entered the trial & were divided equally into the treatment & placebo groups. Of those in the treatment group, 505 developed CHD after 5 years of follow-up while 477 developed CHD during the same period in the placebo group. What was the prevalence of CHD at the initial exam?

The prevalence of CHD at the initial exam was 309 cases of CHD divided by 12,327 participants. This equals a prevalence of 25.1 cases of CHD per 1,000 persons.

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The incidence rate reflects the number of new cases developing in the population at risk. Since prevalent CHD cases were excluded from the study, the population at risk was 12,018 (12,327 persons less 309 cases of CHD). During the 5-year study period, 982 incident cases of CHD developed. This equals an incidence rate of 81.7 cases of CHD per 1,000 persons.

Which of the following are examples of a population prevalence rate?

The number of persons with hypertension per 100,000 population

What would be the effect on age-specific incidence rates of uterine cancer if women with hysterectomies were excluded from the denominator of incidence calculations assuming that most women who have had hysterectomies are older than 50 years of age.

Rates would increase in women older than 50 years of age but may decrease in younger women as they get older.

Age Group	Percent of Persons with Hypertension
18–29 years	5
30–39 years	10
40–49 years	20
50–59 years	40
60–69 years	60
70 and older	55

A survey was conducted among 1,000 randomly sampled adult males in the United States in 2005. The results from this survey are shown below.

The researchers stated that there was a doubling of risk of hypertension in each age group younger than 60 years of age. You conclude that the researchers' interpretation:

Is incorrect because prevalence rates are estimated

Incidence and Prevalence Rates of Disease X in Children Aged 1 to 4 Years		
Year	Incidence Rate per 1,000 per Year	Prevalence Rate per 1,000 per Year
1975	33.2	23.8
1985	38.4	24.7
1995	41.8	24.5

The incidence & prevalence rates of a chronic childhood illness for a specific community are given below.

Based on the data, which of the following interpretations best describes disease X?

The duration of disease is becoming shorter.

A prevalence survey conducted from January 1 through December 31, 2003 identified 580 new cases of tuberculosis in a city of 2 million persons. The incidence rate of tuberculosis in this population has historically been 1 per 4,000 persons each year. What is the incident rate of tuberculosis per 100,000 persons in 2003?

The answer is 29 new cases of tuberculosis per 100,000 persons. This is found by dividing the new cases of tuberculosis by the total population at risk ($580/2,000,000$) & multiplying this rate by 100,000 to standardize the rate.

A prevalence survey conducted from January 1 through December 31, 2003 identified 580 new cases of tuberculosis in a city of 2 million persons. The incidence rate of tuberculosis in this population has historically been 1 per 4,000 persons each year. Has the risk of tuberculosis increased or decreased during 2003?

The risk of tuberculosis has increased over the historic incident rate. This comparison can be made by standardizing the historic rate to a rate per 100,000 persons. To do this, multiply the numerator & denominator by 25.

Which of the following is an advantage of active surveillance?

More accurate due to reduced reporting burden for health care providers

The population of a city on February 15, 2005, was 36,600. The city has a passive surveillance system that collects hospital & private physician reports of influenza cases every month. During the period between January 1 & April 1, 2005, 2,200 new cases of influenza occurred in the city. Of these cases, 775 persons were ill with influenza according to surveillance reports on April 1, 2005. The monthly incidence rate of active cases of influenza for the 3-month period was:

20 per 1,000 population

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775 persons were ill with influenza according to surveillance reports on April 1, 2005. The prevalence rate of active influenza as of April 1, 2005, was:

20 per 1,000 population

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The average duration of influenza is approximately 1 month

A study found that adults older than age 50 had a higher prevalence of pneumonia than those who were younger than age 50. Which of the following is consistent with this finding?

Incidence rates do not vary by age, but older adults have pneumonia for a longer duration compared to younger adults

Which of the following statements are true? More than one answer may be correct.

Prevalence rates are useful for public health planning

Incidence rates can be used to estimate prevalence when the mean duration of the disease is known

A disease has an incidence of 10 per 1,000 persons per year, & 80% of those affected will die within 1 year. Prior to the year 2000, only 50% of cases of the disease were detected by physician diagnosis prior to death. In the year 2000, a lab test was developed that identified 90% of cases an average of 6 months prior to symptom onset; however, the prognosis did not improve after diagnosis. Comparing the epidemiology of the disease prior to 2000 with the epidemiology of the disease after the development of the lab test, which statement is true concerning the disease in 2000?

Incidence is higher & prevalence is higher than in 1999

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months prior to symptom onset; however, the prognosis did not improve after diagnosis. Which statement is true concerning the duration of the disease after the development of the lab test?

Mean duration of a case of the disease is longer in 2000

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The mortality rate for the disease is the same in 2000

In a coastal area of a country in which a tsunami struck, there were 100,000 deaths in a population of 2.4 million for the year ending December 31, 2005. What was the all-cause crude mortality rate per 1,000 persons during 2005?

The answer is 41.7 per 1,000 persons. The rate is calculated by dividing 100,000 deaths by the population of 2,400,000 persons. To express as a rate per 1,000 persons, the rate is multiplied by 1,000.

In an industrialized nation, there were 192 deaths due to lung diseases in miners ages 20 to 64 years. The expected number of deaths in this occupational group, based on age-specific death rates for lung diseases in all males ages 20 to 64 years, was 238 during 1990. What was the standardized mortality ratio (SMR) for lung diseases in miners?

The answer is 81. The ratio is calculated by dividing 192 observed deaths by the 238 expected deaths for this age group. To express it as an SMR, the ratio is often multiplied by 100.

Age (yrs)	2000		2005	
	No. of MVA Deaths	Population	No. of MVA Deaths	Population
Under 7	44	3,500	20	4,000
7-18	105	21,000	80	32,000
19-49	105	57,750	240	60,000
50 or more	96	96,250	300	144,000
Total	350	178,500	640	240,000

In 2001, a state enacted a law that required the use of safety seats for all children under 7 years of age & mandatory seatbelt use for all persons. The table below lists the number of deaths due to motor vehicle accidents (MVAs) & the total population by age in 2000 (before the law) & in 2005 (4 years after the law was enacted).

What is the age-specific mortality rate due to MVAs for children ages 0 to 18 years in 2000?

6.1 per 1,000

In 2001, a state enacted a law that required the use of safety seats for all children under 7 years of age & mandatory seatbelt use for all persons. The table below lists the number of deaths due to motor vehicle accidents (MVAs) & the total population by age in 2000 (before the law) & in 2005 (4 years after the law was enacted).

Using the pooled total of the 2000 & 2005 populations as the standard rate, calculate the age-adjusted mortality rate due to MVAs in 2005.

The correct answer is 2.3 MVA deaths per 1,000 persons. The key to calculating the age-adjusted rate is to pool the observed numbers for both time periods & to calculate the expected numbers of deaths in the 2005 population assuming that a common rate applied to the population.

For example, for those under 7 years, the pooled rate equals $(44 + 20)$ divided by $(3,500 + 4,000)$. The pooled rate for this group is 8.5 per 1,000 persons. When this rate is multiplied by the 4,000 children under 7 years of age in 2005, the expected number of deaths is 34.13. Performing the same calculation for each age group results in 111.7 deaths in those 7 to 18 years of age, 175.8 deaths in those 19 to 49 years, & 237.35 deaths for those 50 years or more. The total number of deaths expected in 2005 based on this pooled rate is 558.98. Therefore, the age-adjusted overall rate for 2005 is 558.98 deaths divided by 240,000 persons.

In 2001, a state enacted a law that required the use of safety seats for all children under 7 years of age & mandatory seatbelt use for all persons. The table below lists the number of deaths due to motor vehicle accidents (MVAs) & the total population by age in 2000 (before the law) & in 2005 (4 years after the law was enacted).

Based on the information in the table, it was reported that there was an increased risk of death due to MVAs in the state after the law was passed. These conclusions are:

Correct, because both the total & the age-adjusted mortality rates are higher in 2005 than in 2000

For colorectal cancer diagnosed at an early stage, the disease can have 5-year survival rates of greater than 80%. Which answer best describes early stage colorectal cancer?

Incidence rates will be much higher than mortality rates

Year of Death	Age-specific Mortality Rates per 100,000 Population by Age Group				
	Age at Death (yrs)				
	0-4	5-9	10-14	15-19	20-24
1910-1914	2.9	3.7	2.8	2.0	0.6
1915-1919	2.4	2.8	1.7	1.5	0.4
1920-1924	1.7	3.3	2.2	2.4	0.3
1925-1929	1.3	2.7	2.0	1.1	0.5
1930-1934	0.8	1.8	1.3	0.6	0.2
1935-1939	0.5	1.7	0.9	0.2	0.1

The following table gives the mean annual age-specific mortality rates from measles during the first 25 years of life in successive 5-year periods. You may assume that the population is in a steady state (i.e., migrations out are equal to migrations in).

The age-specific mortality rates for the cohort born in 1915-1919 are:

2.4 3.3 2.0 0.6 0.1

The following table gives the mean annual age-specific mortality rates from measles during the first 25 years of life in successive 5-year periods. You may assume that the population is in a steady state (i.e., migrations out are equal to migrations in).

Based on the information above, one may conclude:

Children ages 5 to 9 had the highest rate of death in all periods

Which of the following characteristics indicate that mortality rates provide a reliable estimate of disease incidence? More than one answer may be correct.

The case-fatality rate is high
The duration of disease is short

Which of the following statements are true? More than one answer may be correct.

A mortality rate is an example of an incidence rate

Among those who are 25 years of age, those who have been driving less than 5 years had 13,700 motor vehicle accidents in 1 year, while those who had been driving for more than 5 years had 21,680 motor vehicle accidents during the same time period. It was concluded from these data that 25-year-

olds with more driving experience have increased accidents compared to those who started driving later. This conclusion is:

Incorrect because rates are not reported

For a disease such as liver cancer, which is highly fatal & of short duration, which of the following statements is true? Choose the best answer.

Incidence rates will be equal to mortality rates

The prevalence rate of a disease is two times greater in women than in men, but the incidence rates are the same in men & women. Which of the following statements may explain this situation?

The case-fatality rate is lower for women

	Total Deaths	Death from Plague	Sick from Plague
Community A	200	100	150
Community B	400	300	400
Community C	800	300	500
Community D	5,000	500	650

The table below describes the number of illnesses & deaths caused by plague in four communities.

The case-fatality rate associated with plague is lowest in which community?

Community C

The table below describes the number of illnesses & deaths caused by plague in four communities.

The proportionate mortality ratio associated with plague is lowest in which community?

Community D