**Chapter 3 Epidemiology – questions**

Self assessment

Question 1 of 26

Epidemiology seeks answers to which of the following questions?

1. How does the pattern of this disease vary over time in this population?
2. How does the place in which the population lives affect the disease?
3. How do the personal characteristics of people in the population affect the disease’s pattern?
4. How does the cost of an intervention compare to the benefits of investing in it?

None of the above questions

Question 2 of 26

Which of the following describes the ‘normal’ distribution of a variable?

1. The range of test results beyond which a specific disease is, with known probability, present or absent
2. It carries no additional risk of morbidity or mortality
3. The distribution of values is often described as bell-shaped
4. Variables lie within a preset percentile of previous diagnostic test results
5. None of the above

Question 3 of 26

The denominator for calculating incidence rate is:

1. Number of people in the defined population at the same moment in time
2. Number of people in the defined population over a period of time
3. Number of people in the population at the beginning of the period
4. Total person time at risk
5. None of the above

Question 4 of 26

In which of the following epidemiological study designs has the investigator control over the allotment of exposure?

1. Cross-sectional studies
2. Case control studies
3. Cohort studies
4. Controlled trials
5. None of the above Question 5 of 26

Various research methods/study designs are used by medical researchers to generate evidence for therapy, diagnosis and prognosis. Some of these research designs are listed below. Which design will provide the highest quality of evidence?

1. Case series
2. Case report
3. Cohort study
4. Randomised controlled trial
5. Case control study Question 6 of 26

Various research methods/designs are used by medical researchers to generate evidence for therapy, diagnosis and prognosis. Some of these research designs are listed below.

Which is the most appropriate design to generate evidence for prognosis?

1. Case series
2. Case report
3. Cohort study
4. Randomised controlled trial
5. Case control study

Question 7 of 26

A group of researchers wished to study the factors responsible for dysmenorrhoea in a group of school students. They interviewed the students using a questionnaire and collected information on the occurrence and severity of dysmenorrhoea and the various factors that had been found to be responsible for this condition in other studies. The research method that best describes the above study is:

1. Longitudinal study
2. Cross-sectional study
3. Experimental study
4. Randomised trial
5. None of the above Question 8 of 26

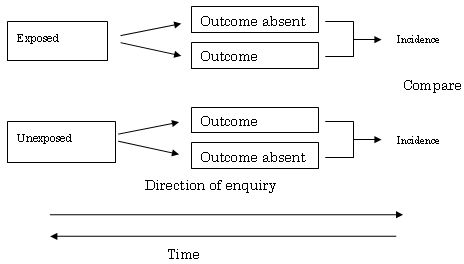
Relative risk can usually be derived from which of the following study designs?

1. Case series and ecological
2. Case control and cohort
3. Case control and randomised controlled trial
4. Cohort and randomised controlled trial
5. None of the above Question 9 of 26

In a randomised trial, the use of antibiotics was compared with no antibiotics in preterm labour and the outcome studied was foetal morbidity. 140 events occurred among 257 in the control group (control event rate (CER) 0.54) and 114 events among 238 in the antibiotic group (experimental event rate (EER) 0.48). The number needed to treat (NNT) was calculated from these figures and rounded up to a full number. What is the NNT for this trial?

1. 2
2. 5
3. 8
4. 17
5. 23

Question 10 of 26



Which of the following study designs is shown in the figure above?

1. Cross-sectional study
2. Case control study
3. Cohort study
4. Randomised controlled study
5. None of the above Question 11 of 26

A case control study of the association between an exposure and a disease is characterized by:

1. Follow-up of exposed and unexposed groups for future onset of the disease
2. Assessment of past exposure in groups with and without the disease
3. Exclusion of all individuals who currently have the disease
4. Exclusion of all individuals who have been exposed in the past
5. Assessment of the exposure and disease at the same point in time Question 12 of 26

A randomised controlled study can be described as:

1. A descriptive retrospective study
2. A prospective descriptive study
3. An observational prospective study
4. An experimental retrospective study
5. A prospective experimental study Question 13 of 26

In a randomised controlled trial, which of the following types of bias is reduced by randomisation?

1. Recall bias
2. Ascertainment bias
3. Publication bias
4. Selection bias
5. None of the above Question 14 of 26

Which of the following statements about retrospective and prospective studies is true?

1. In a prospective study the cohort originally selected consists of persons who are found to have the disease
2. A retrospective study involves a survey of the prevalence of the disease in different strata of the population
3. Prospective studies allow direct determination of incidence rates
4. The retrospective approach has the advantage that there is little or no bias in the assessment of exposure to the suspected factor
5. The prospective approach may be used to study the aetiology of a rare disease Question 15 of 26

Which of the following statements are true?

1. In a normal distribution the mean, mode and median coincide
2. The mode is the most frequently occurring value
3. The median has an equal number of values above and below it
4. The mode is the maximum point on a frequency distribution curve
5. About 95% of observations lie within two standard deviations of the mean Question 16 of 26

Which of the following statements are true?

1. Standard deviation gives a measure of the spread of values above and below it
2. The range is the difference between the highest and lowest values
3. Standard deviation is the square of the variance of the group
4. About 68% of observations lie within one standard deviation of the mean
5. 99% of observations lie within 2.6 standard deviations of the mean Question 17 of 26

Which of the following statements are true? The prevalence rate of a disease has the following characteristics:

1. It measures all of the current cases in the community
2. It is dependent on the duration of illness
3. It is dependent on the incidence of disease
4. It can be used to determine the health needs of a community
5. It can be estimated from a cross-sectional study Question 18 of 26

The weaknesses of retrospective studies of the role of a suspected factor in the aetiology of a disease, as compared with prospective studies, are that:

1. They are more costly and take longer
2. There may be bias in determining the presence or absence of a suspected factor
3. There may be bias in determining the presence or absence of the resulting disease
4. It is more difficult to obtain controls
5. It is more difficult to assure comparability of cases and controls Question 19 of 26

Controls are needed in a case-control retrospective study because:

1. They are matched to the cases for suspected aetiological factors
2. They may be followed to determine if they develop the disease in question
3. They increase the sample size, so that statistical significance may be achieved
4. They allow evaluation of whether or not the frequency of a characteristic or past exposure among the cases is different from that among comparable persons in the population who are free of the disease
5. They allow a comparison of disease rates across study groups Question 20 of 26

To be causally related to a disease an aetiological factor must satisfy the following conditions:

1. The factor is found more frequently among the diseased than the non-diseased
2. Exposure to the factor must precede the development of the disease
3. Elimination of the factor reduces the risk of the disease
4. The factor is found among all cases with the disease
5. The factor is not found among any persons without the disease Question 21 of 26

A case control study into the relationship between regular use of aspirin and colon cancer has found that the odds ratio for colon cancer among aspirin users is 0.6 with a 95% confidence interval of 0.4–9. Which of the following is the most accurate conclusion?

1. The attributable risk of colon cancer is 6 per 1,000 person years
2. The incidence of colon cancer is 6 per 1,000 person years
3. The probability of confounding bias is less than 5%
4. The risk of colon cancer is 40% lower among users than non-users of aspirin
5. The incidence of colon cancer among non-users is 6 per 1,000 person years

Question 22 of 26

The incidence rate of breast cancer in the year 2002 can be estimated by:

1. Number of new cases in 2002
2. Number of prevalent cases in 2002
3. Number of new cases in 2002 / population at risk in 2002
4. Number of prevalent cases / population at risk in 2002
5. Number of prevalent cases / duration of disease Question 23 of 26

A school health survey showed that 200 out of 2000 children had dental caries. This finding is referred to as:

1. Incidence rate
2. Attack rate
3. Relative risk
4. Prevalence
5. Ascertainment bias Question 24 of 26

A potential confounding variable is associated with:

1. Risk factor only
2. Risk factor and the disease
3. Disease only
4. Exposures in childhood
5. Prognosis of the disease Question 25 of 26

Which of the following study designs is most appropriate for examining the causal relationship between exposure and disease?

1. Case series
2. Case-control study
3. Cross-sectional survey
4. Ecological study
5. Migrant study Question 26 of 26

In which of the following study designs is random allocation of subjects done to control the effect of confounding?

1. Case-control studies
2. Cross-sectional surveys
3. Ecological studies
4. Prospective cohort studies
5. Clinical trials

Short answer questions

Question 1 of 9

Explain what is wrong with the following conclusions:

1. There is a positive association between coffee drinking and lung cancer. This shows that coffee drinking causes lung cancer.
2. A consultant neurologist gives a new treatment to the next 15 patients with MS whom he sees. A year later, 11 of the 15 people report feeling less fatigued. This shows that the treatment alleviates the symptoms of MS.
3. In 1999–2000 the number of recorded crimes in West Yorkshire was 260,237, in Hampshire was 135,174 and in Cambridgeshire was 68,722. Hence West Yorkshire is nearly 4 times as dangerous a place to live in as Cambridgeshire.
4. In a study of deafness among miners, a group of age-matched piano tuners is used as controls.

Question 2 of 9

Define the term ‘epidemiology’. Question 3 of 9

Name the characteristics of a good epidemiological variable. Question 4 of 9

Categorising and analysing the factors which may underlie an epidemiological variable.

List the differences between women and men which could explain their different patterns of disease. You may wish to focus your thinking using heart disease, which is more common in men than women. Can you put your differences into categories?

Question 5 of 9

What do you understand by the term ‘ecological fallacy’? Question 6 of 9

Assessing the impact of a risk factor in populations: epidemiological information needed to choose between priorities.

The following modifiable risk factors have been established as particularly important risk factors for coronary heart disease:

* High levels of some lipids in the blood, particularly low density lipoprotein (LDL) cholesterol;
* High blood pressure;
* Smoking;
* Low levels of physical activity;
* Obesity;
* Diabetes.

Imagine that there are insufficient resources to tackle all six of these risk factors. What epidemiological information would help us to choose between them to reduce coronary heart disease in a population?

Question 7 of 9

What are the three forms of systematic error in observational study designs? Question 8 of 9

What do you understand by the term ‘confidence interval’? Question 9 of 9

What are the criteria for assessing causality of an association between a disease and the hypothesised cause?

Interactive exercises

1. Read this abstract carefully and answer the questions

Objective: To determine whether circumcision decreases the risk of symptomatic urinary tract infection (UTI) in boys less than 5 years of age.

Study design: A case-control study (1993 to 1995) in the setting of a large ambulatory paediatric service. Case subjects and control subjects were drawn from the same population. 144 boys less than 5 years of age (median age, 5.8 months) who had a microbiologically proven symptomatic UTI (cases), were compared with 742 boys (median age, 21.0 months) who did not have a UTI (controls). The proportion of case and control subjects who were circumcised in each group was compared statistically using the chi- square test, with the strength of association between circumcision and UTI expressed in terms of an odds ratio.

Results: Of the 144 preschool boys with UTI, 2 (1.4%) were circumcised, compared with 47 (6.3%) of the 742 control subjects (chi-square value = 5.6; p = 0.02; odds ratio = 0.21; 95% confidence interval, 0.06 to 0.76). There was no evidence that age was a confounder or modified the protective effect of circumcision on the development of UTI.

Conclusions: Circumcision decreases the risk of symptomatic UTI in preschool boys. The protective effect is independent of age.

(*J Pediatr* 1996;128:23–7)

1. What study design have the authors adopted to test their hypothesis?
2. In this study who are the cases and controls?
3. What is the exposure under investigation?
4. What is the measure of association and how much is it?
5. How do you interpret the measure of association?
6. Read the abstract carefully and attempt to answer the questions.

A prospective population-based cohort study assessed the association between male circumcision and subsequent urinary tract infection (UTI) in children born in Ontario, Canada, in a 12-month period in 1993–94. Of the 69,100 eligible infants, 30,105 (43.6%) were circumcised in the first month of life. 29,217 uncircumcised boys were matched to circumcised boys by date of birth and followed for 24–36 months. Information on UTIs was extracted from the Canadian Institute for Health Information computerized database on hospital discharges.

There were 83 UTI cases in the circumcised cohort (1.88/1000 person-years of observation) and 247 in the uncircumcised group (7.02/1000 person-years) (p = 0.0001). The relative risk of UTI in uncircumcised compared to circumcised boys was 4.5 (95% confidence interval, 2.4–8.4) in the first month of life and 3.7 (95% confidence interval, 2.8–4.9) in the year after the procedure. Calculation of the attributable risk indicated 195 circumcisions would be necessary to prevent one admission for UTI in the first year of life.

Previous studies have recorded UTI rates 10–20 times higher in uncircumcised than circumcised boys. These findings support the hypothesis that circumcision protects boys from UTI, but the magnitude of this effect may be less than previously estimated.

(*Lancet* 1998;352:1813–6)

1. What do you understand by the term cohort?
2. What were the authors trying to achieve by matching the two cohorts?
3. What is the measure of association in a cohort study?
4. What are the numerator and denominator for calculating relative risk in a cohort study?
5. What are the key findings of this study?

Web based resources and further reading

Click on the links below to access the web resources - links open in a new window

* 1. An online statistical and epidemiological calculator <http://www.quantitativeskills.com/sisa/>
  2. Calculators for confidence intervals for relative risk <http://www.hutchon.net/ConfidRR.htm>
  3. Other useful calculators <http://www.hutchon.net/Calcmenu.htm>
  4. Variety of interactive tools including calculators and risk assessment <http://www.urmc.rochester.edu/encyclopedia/tools.aspx>