TEST YOURSELF: Multiple Choice 2
ANSWERS TO QUESTIONS

1. In the investigation of an epidemic of a fatal disease such as SARS, the most appropriate measure to describe the frequency of death from the disease is the:

   Ans = B. ***Case-fatality rate*** *(also called the case-fatality ratio): is the proportion of people with a given disease/condition who die from it in a given period. It is a common measure of the short-term severity of an acute disease. (See Chapter 2 pg 55)*

   A. ***Mortality rate****: this also measures the rate at which people die from a disease but it is usually calculated over a period of one year and so is less appropriate for an epidemic of a rapidly fatal disease. It also tells us nothing about how many people are getting the disease and so nothing about how fatal it is.*
   C. ***Attack rate****: tells us how quickly people are developing the disease but nothing about how many are dying from it.*
   C. ***Standardised mortality ratio****: this tells us how much likely someone is to die of disease in one population compared to a reference population.*
   E. ***Incidence rate****: measures the rate at which people in the population are getting the disease.*

2. If the age-adjusted incidence rate of breast cancer among the grandchildren of Japanese immigrants to the USA is much closer to that of American women (high rates) than Japanese women (low rates) what does this tell us?

   Ans = B. *The most important causes of breast cancer are environmental (i.e. not genetic).*

   A. *If breast cancer rates among the Japanese immigrant population have gone from low to high in two generations this suggests that the main causes are not genetic (because a genetic change cannot happen this quickly).*

   C, D, E *It tells us nothing about the accuracy of diagnosis or about the women who move to the USA.*

3. Which of the following is/are true in the context of interpreting the results of a case-control study compared to a cohort study? (select all that are true)

   Ans = *A and D are both true*

   In a case-control study the exposure information is collected after the development of disease and thus is often less accurate than in a cohort study when it is collected before people develop disease. For example, it is possible that an individual's exposure status may have changed with the onset of early disease (e.g. they have lost weight or changed their diet), or that they will recall past information differently because they know they have disease (recall bias).

   B. *Confounding is a problem in all observational research and so is just as much a*
   D. *problem in cohort studies as it is in case-control studies (See Chapter 8 pg 204).*

   C. *In a case-control study it is usually possible to verify the diagnosis of all cases so diagnosis is at least as accurate, if not more accurate than in a cohort study.*

4. The strength of an association between exposure and disease is best measured by the:

   Ans = E. ***Relative risk****: this tells us how many times more likely it is that someone who is exposed to something will develop a certain disease or experience a particular health outcome than someone who is not exposed. It provides information about the strength of association between exposure and outcome.(See Chapter 5 pages 141-2).*

A. *The **incidence rate** measures the amount of disease in a single group, on its own it tells us nothing about the strength of association between exposure and disease.*

B. *The **attributable risk** tells us how much more disease is occurring in an exposed*

C. *group than in an unexposed group and **the attributable fraction** tells us the proportion of disease in an exposed group that can be attributed to the exposure, if we think the association is causal. Neither tells us directly about the strength of the association between exposure and disease.*

D. *The **population attributable risk** tells us how much more disease is occurring in a population that would be expected if no-one in the population was exposed to the factor of interest.*

5. In the first 12 years of follow-up of the Framingham Heart Study, the observed number of cases of angina was 1.6 times higher than the number expected based on population rates. What type of measure is this?

***Ans** = E. It is a standardised incidence (or morbidity) ratio. The key here is the fact that the **observed** number of cases was compared to the number of cases **expected** to have occurred if the Framingham cohort had had the same incidence of angina as the general population. (See Chapter 2 pages 52-3).*

6. In a study of alcohol and oral cancer the relative risk is 2.0 for men and 2.0 for women but 4.0 for both sexes combined. This suggests that:

***Ans** = D. There is confounding by sex in these data: The crude relative risk (RR) is 4.0 but when we stratify by sex the RR is 2.0 for both men and women. When the stratum-specific estimates differ from the crude estimate this is evidence of confounding. (See Chapter 8 pages 213-5). Note that the estimates are the same in men and women so there is no evidence of effect modification by sex.*

7. The following table shows data from an epidemiological study. What type of study was this most likely to be?

		Number of episodes	Person-years (py) at risk
Exposure	Present	700	1950
	Absent	300	2250
	Total	1000	4200

***Ans** = B. As the results are presented in terms of the number of episodes of disease in relation to the number of person-years at risk of disease, this is most likely to have been a cohort study.*

8. What is the incidence rate among those who are exposed to the factor under study?

***Ans** = A. The incidence rate = 700 ÷ 1950 py = 0.359 = 35.9 per 100 py*

9. What is the rate difference?

***Ans** = A.* Rate difference = Incidence rate in the exposed group – Incidence rate in unexposed
IR (exposed) = 35.9 per 100 py
IR (unexposed) = 300 ÷ 2250 py = 13.3 per 100 py
Rate difference = 35.9 per 100 py - 13.3 per 100 py = 22.6 per 100 py

10. What is the population attributable risk?

Ans *= E.* PAR = Incidence rate in the whole population - Incidence rate in the unexposed
IR (population) = 1000 ÷ 4200 py = 23.8 per 100 py
IR (unexposed) = 13.3 per 100 py
PAR = 23.8 per 100 py - 13.3 per 100 py = 10.5 per 100 py

11. Which two of the following methods cannot be used to prevent confounding from occurring in a study?

Ans *= C and E.*

Stratification and multivariable modelling techniques can be used to control confounding in the data analysis, but do not prevent confounding from occurring during the study. (See Chapter 8 pages 208-15).

12. A randomized, placebo-controlled trial was conducted in Indonesia to study the effects of Vitamin A in preventing deaths among children with measles. The investigators reported a relative risk of 0.60 for the intervention versus control group. This means that:

Ans *= A. Children receiving Vitamin A were 40% less likely to die from measles than children receiving the placebo.*

13. The defining characteristic of an active surveillance programme is that:

Ans *= B. The organisation conducting the surveillance contacts the healthcare providers to collect information about the condition of interest. Active surveillance is based on specific collection of data from healthcare providers or institutions, both as need arises and in the longer term. It is used during outbreaks when healthcare providers are contacted and asked to provide details of any cases they have seen. It compares to passive surveillance which relies on healthcare providers remembering to report events. (See Chapter 13 pages 313-4).*

14. To assess the association between Kawasaki syndrome (KS) and carpet shampoo, investigators conducted a case-control study with 100 cases (children with KS) and 100 controls (children without KS). Among the children with KS, 50 had a history of recent exposure to carpet shampoo. Among the controls, the number with a recent history of exposure to carpet shampoo was 25. For this study, the odds ratio was:

Ans *= C.*

	Cases	*Controls*	
Exposed to shampoo	*50*	*25*	*Odds ratio =*
Not exposed	*50*	*75*	$\frac{50 \times 75}{50 \times 25} = 3.0$
Total	*100*	*100*	

15. Which of the following measures traditionally use(s) the same denominator as the neonatal mortality rate?

Ans = D. *The neonatal mortality rate, infant mortality rate and maternal mortality rate all typically use the number of live births in the same year for the denominator. Although, technically the maternal mortality rate should use the total number of women who were pregnant during the year for the denominator, this is rarely possible in practice. (See Chapter 2, page 57).*

C. *The stillbirth or fetal mortality rate uses the total number of live and stillbirths during the year for the denominator.*

16. A screening test of known sensitivity and specificity is applied to two populations. The prevalence of the disease being screened for is 10% in population A and 1% in population B. Which of the following is true?

Ans = A. *the percentage of all positive tests that are false positives will be lower in population A than in population B. The prevalence of disease is higher in population A thus there will be more true positive results and a lower proportion of false positive results.*

B. *Because there are more people with disease in population A there may also be more false negative results*

C. *Specificity and sensitivity are properties of the test and do not vary with the*
D. *prevalence of disease.*

17. A controversy occurred between the proponents of drug therapy vs remedial reading for patients with dyslexia. To support their position, one group wrote: "Of 111 patients with dyslexia, 91 showed improvement following remedial reading courses." Their inference that in patients with dyslexia, remedial reading is the therapy of choice is:

Ans = C. *Incorrect because there is no comparison group. We do not know how many children would have shown improvement if they had been given drug therapy.*

18. A new treatment is developed that prevents death but does not produce recovery from disease. Which of the following will occur?

Ans = A. *Prevalence will increase. The incidence will not change because of a new treatment however if people are now living longer with the disease the prevalence will increase.*

19. In a cross-sectional study of peptic ulcer in the community, 80 in every 100,000 men aged 35 to 49 years and 90 in every 100,000 women aged 35 to 49 years met the criteria for having a peptic ulcer. The conclusion that, in this age group, women are more likely to develop peptic ulcer than men is:

Ans = B. *Incorrect because of the failure to distinguish between incidence and prevalence. Just because more women than men have an ulcer in this age group (prevalence) it does not mean that the incidence is higher in this group. The women could have developed their ulcer at a younger age.*

20. When comparing randomized controlled trials (RCT) to cohort studies, which of the following is generally true?

Ans = D. *A, B and C are all true. RCTs and cohort studies are both prospective because they start with people who have not experienced the outcome of interest and follow them forwards in time to see who does develop the outcome. The process of randomisation in a RCT will help ensure the study groups are balanced in terms of known and unknown confounders so confounding is less likely to be an issue than in a cohort study. However RCTs are often conducted in very select groups which may mean the results are less generalisable.*