IIHMR UNIVERSITY

MBA Hospital & Health Management

II Year (Hospital Management)

Clinical Epidemiology

Term Examination

Time: 2 Hours **Maximum Marks - 70**

Important Note:

1. **Attempt all questions from Section A and Section B.**
2. **Read the complete question and all options and answer carefully.**
3. **Encircle one right answer for each question in MCQs.**
4. **Any overwriting in the answers (MCQs) will be amount to Zero Marks.**
5. **Answers to the questions will be written in this paper. No separate copy will be provided.**

Roll Number | | | | |

Date | | | **2017** |

Signature of Invigilator_____

Marks obtained |

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Section A (0.5 mark each question)

Please indicate whether these statements are True (T) or False (F). Encircle the one Right answer.

1. T/F Relative Risk is a measure of strength of association.
2. T/F The proportional mortality rate is used to measure the proportion of age related mortality.
3. T/F Person years of treatment can not be used as denominator to measure treatment effectiveness.
4. T/F A reliable diagnostic test is not necessarily a valid test.
5. T/F Validity of a diagnostic test is assessed by precision.
6. T/F Sensitivity of a diagnostic test is affected by true positive results.
7. T/F Increase in prevalence of disease test increases PPV of a diagnostic test.
8. T/F Risk factors of disease may also be Prognostic factors.
9. T/F Prognosis of a disease can be predicted by survival analysis.
10. T/F Survival Rates measure treatment effectiveness.
11. T/F In Randomized Clinical Trial, the study subjects are allocated to treatment and placebo groups randomly to avoid information recall bias..
12. T/F In Randomized Control Trials, comparability of the characteristics of the study and the placebo group is essential to control the effect of confounding factors.
13. T/F A relative risk greater than 1 indicates reduction in risk of disease due to the causal factor under study.
14. T/F Null Hypothesis indicates no difference in the study and control group.
15. T/F Hospital based surveillance is necessary for understanding the patterns and trends nosocomial infections.
16. T/F Prevalence of nosocomial infections is a function of incidence and duration of the disease.
17. T/F High incidence of nosocomial infections would reduce hospital efficiency
18. T/F Relative Risk and Odds Ratio are measures of risk to determine the cause and effect relationship.
19. T/F Type II Error occurs when in the reality the two groups do not differ and your study results statistically significant difference in the study and control groups
20. T/F Power of study sample probability of rejecting Null Hypothesis if it is not true.

Section B (1.5 mark each question)

In Multiple Choice Questions (MCQ), there is only one right answer.

1. An epidemiologist performed a double-blind, randomized, placebo-controlled trial to examine the effect of fish oil supplementation on memory complaints. In the group that received fish oil, 19% of the participants forgot to take their daily supplements during the study whereas this was only 3% in the placebo group. Is this a problem?
   a) Yes, because this affects the external validity of the study.
   b) Yes, because the study outcome can be biased.
   c) No, because participants and investigators were blinded towards the type of treatment in both groups
   d) No, because all confounders were equally distributed over both groups due to randomization

2. An epidemiologist wants to assess the effect of tea drinking on blood pressure. He decides to do an intervention study. Which of the following measures does *not* increase the internal validity of the study?
   a) Careful monitoring of blood pressure during the study
   b) Inclusion of a control group
   c) Randomization
   d) Random selection of participants from the general population

3. The main advantage of a randomized controlled trial (RTC) compared to all other epidemiology study designs is that the RCT:
   a) Equally distributes characteristics that may be independent risk factors for the outcome of interest over the study arms.
   b) Is prospective thereby eliminating the need for historical data.
   c) Is less expensive.
   d) Guarantees that confounding bias will not occur.

4. A pharmaceutical company showed the following in an article: "1500 subjects with a cold were treated with our new medicine. Within three days, 95% were asymptomatic and this result was statistically significant." The company claims the new medicine was effective. Is this conclusion justified?
   a) Yes, because the effect was very large (95% of the subjects benefitted from treatment).
   b) No, because statistical significance indicates that the null hypothesis ("no effect") was correct.
   c) No, because no control group was involved in the study.
   d) Yes, because the effect of treatment could not be explained by chance.

5. The problem of confounding can be solved by...
   a) Choosing a prospective design.
   b) Increasing the precision of the measurements.
   c) Stratification during data analysis.
   d) This cannot be solved.

6. Accuracy of a Diagnostic Test is indicated by:
   a) Validity
   b) Reliability
   c) Statistical Significance
   d) Mean value and confidence interval

7. A patient was found to have high blood pressure by a physician in the OPD. The patient visited the same OPD next day and had his blood pressure measured. This time his blood pressure was recorded in normal limits. The blood pressure was measured by three more doctors and every time there were wide variations in Blood Pressure measurement. What could be the most appropriate possible reason:
   a) The patient has different Blood Pressure at different times
   b) The instrument may misrepresent the true blood pressure
   c) Physician used different techniques of measurement
   d) Blood Pressure varies among patients

8. A patient with acute myocardial infarction was admitted in your hospital. Following are the prognostic factors for poor outcomes, except;
   a) Severity of illness
   b) Time elapsed between attack and hospitalization
   c) Absence of history of smoking
   d) Arrhythmia

9. All are measures of Treatment Effectiveness, except;
   a) 5-Year Survival Rate
   b) Case Fatality Rate
   c) Mortality Rate
   d) Absolute Risk

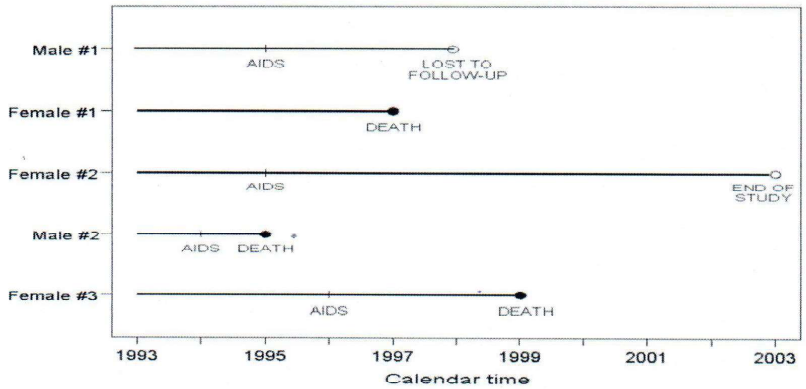
10. A disease should be included for surveillance in hospital if it has
    a) Potential of outbreak of epidemic proportion
    b) High mortality
    c) An effective control measure is available
    d) All of the above

11. Evaluation of Effectiveness of a surveillance system in hospitals includes all, except
    a) Timely reporting
    b) Zero reporting
    c) Following the standard protocol for sample collection
    d) Measuring Incidence Rate of disease

12. Outbreak may be suspected to occur in a hospital when following are present, except
    a) Sudden increase in work load
    b) Large number of cases
    c) Disease or infection is regularly present the hospital
    d) Cases are beyond threshold

13. Risk of Nosocomial Infections in hospitals increases by all, except:
    a) Use of Invasive devices
    b) Increased number of new admissions
    c) Immunocompromised patient
    d) Improper Hospital environment

14. The figure below depicts a hypothetical cohort study. The study enrolled five HIV-infected, AIDS-free individuals (2 men, 3 women) on January 1, 1993. The end of follow-up was January 1, 2003. The primary outcome of interest was death. The first diagnosis of AIDS for each individual is also indicated on the figure. Assume all events occur on January 1.



Which single term best describes the status at end of follow-up for female #2 as of January 1, 2003?

a) Administratively censored
b) Lost to follow-up
c) Unexposed
d) Member of the sub-cohort

15. An outbreak can occur if the hospital has
a) Health staff suffer from similar infection
b) If patients of a similar disease come to the hospital
c) If the laboratory test do not show hospital induced bacteria
d) All of the above
e) None of the above

16. Which type of research studies provide Level I scientific evidence
a) Case Control Studies
b) Cohort Studies
c) Randomized double blind placebo controlled clinical trials
d) Randomized quasi experimental placebo controlled clinical trials.

17. The summary statistics (effect size) that are usually used to measure treatment effect include
a) Odds ratios (OR)
b) Relative risks (RR)
c) Risk differences
d) All of above

18. Which of the following statements which you believe to be true. A systematic review:
a) Is an integral part of evidence based medicine.
b) Is a particular form of meta-analysis
c) Is a formalized and stringent process of refereeing papers for submission to scientific journals.
d) Produces results which are less reliable that those of a single study because of the loss of power associated with quality differences between studies included in the review.

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19. Meta-analysis is an approach that is used to produce scientific evidence and its consistency. What approach does it use?

    a) Pooling of data and results from similar studies
    b) Narrative review of literature
    c) Brainstorming with experts
    d) Opinion of experienced persons.

20. A Randomized Double Blind Placebo Controlled Clinical Trial was conducted to evaluate whether a drug 'Statin' reduces the risk of Acute Coronary Heart Disease. 1000 eligible subjects were allocated to treatment group, and 1000 to placebo group. The Incidence of Acute Coronary Heart Disease was 50 per 1000 in the treatment group and 200 per 1000 in Placebo group. The estimated Relative Risk is:
    a) 0.25
    b) 4.0
    c) 2.0
    d) None of the above

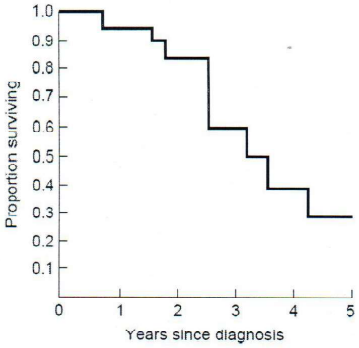
21. Incidence Rate is a measure of:
    a) Frequency of old cases of disease
    b) Case fatality
    c) Absolute risk
    d) Attributable risk
    e) None of the above

22. Five years after the introduction of a vigorous detection and treatment program, the prevalence of diabetes mellitus was found to be greater than in the year prior to the introduction of the program. Which of the following are possible reasons?
    a) An increase in previously undetected cases
    b) A reduction in the risk factors predisposing to diabetes
    c) A decrease in case fatality rate of diabetes
    d) An increase in the proportionate mortality of diabetes
    e) None of the above

23. Case fatality rate for a given disease refers to
    a) The crude mortality rate per 100,000 population
    b) Cause-specific mortality rate due to the disease
    c) A fatal outcome of any disease
    d) The percentage of deaths among cases of the disease
    e) The proportion of deaths due to the disease among all deaths from all causes

24. A hospital has a catchment area of 100,000 population. A total 100 deaths occurred in this hospital in one year. Of these, 50 patients died of CHD, 10 due to Cancer, 10 due to Cerebral Haemorrhage, 15 due to diarrhoea, 10 due to Tuberculosis and 5 died due to unknown reasons. What is the proportional mortality due to Cancer?
    a) 10%
    b) 15 per 1000 population
    c) 10 per 1000 population
    d) Can't be calculated

25. Consider the following survival curve for women diagnosed with disease XYZ. This curve suggests that the three-year survival rate is



Answer:
a) 60%
b) 20%
c) 30%
d) 40%
e) 50%

26. Data from the Deaconess Hospital and Harvard Medical School in Boston show that since the widespread introduction of screening mammography in the mid 1970's, the mean diameter of breast tumors at the time of diagnosis has decreased markedly from approximately 3 cm to less than 2 cm. From many other studies, we know that smaller tumor size is significantly associated with improved survival. These data provide:
a) Reliable evidence of the effectiveness of screening mammography
b) Evidence of the effectiveness of screening mammography that is at a higher "level" than data from randomized trials where women may have not Complied with their treatment as assigned
c) Unreliable evidence of the effectiveness of mammography because we have no data on mortality for individual patients
d) Unreliable evidence of the effectiveness of mammography because patients with smaller tumors may be different from patients with larger tumors in other ways that might affect their mortality

27. Clinical trials are prospective cohort studies which often have some special wrinkles added that cannot be used in ordinary cohort research. With one exception, the following features are used in many clinical trials but are unavailable in usual cohort research. Which is the exception?
a) Randomization
b) matching
c) placebo control
d) blinding the subject
e) blinding the treating clinician

28. The introduction of a screening test for the early detection of an untreatable disease would result in
a) an apparent temporary increase in incidence and an apparent permanent increase in prevalence.
b) an apparent temporary decrease in incidence and an apparent permanent increase in prevalence.
c) an apparent temporary increase in incidence and an apparent permanent decrease in prevalence.
d) an apparent temporary decrease in incidence and an apparent permanent decrease in prevalence.
e) None of the above.

29. Patients in the control groups of randomized clinical trials seem to follow a better clinical course than their counterparts not involved in research. With one exception, the following choices may contribute to this phenomenon. Which is the exception?
    a) Placebo effect
    b) Selection criteria for clinical trials may screen out the sickest patients
    c) More knowledgeable clinicians
    d) Protocol-directed, monitored therapy
    e) Intention-to-treat analysis

Answer the questions 31-33 from below mentioned paragraph:

Table given below shows results obtained in a new screening test for diabetes. 10,000 people were screened. The cut-off level employed was 180 mg of blood glucose per 100 ml. Everyone scoring above this level was classified as positive for diabetes. Everyone scoring below this level was classified as negative for diabetes. These results were compared to a "gold standard" test for diabetes that is considered to be completely valid.

	"Gold-Standard" Test		
Screening	Disease	No Disease	Total
Positive	125	25	150
Negative	375	9475	9850
Total	500	9500	10000

Compute and interpret briefly (2-3 senteces) the following measures of the new screening test.

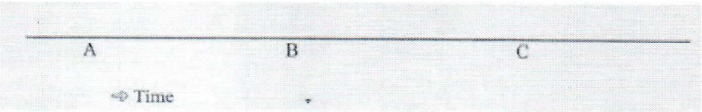
30. Sensitivity:

31. Specificity

32. Positive Predictive Value

Answer the questions 33-37 from below mentioned paragraph:

Match the situation description with the study design. Place appropriate design code in parenthesis next to situation description ***(Design codes: 1. Prospective cohort; 2. Clinical trial; 3. Case-control; 4. Cross-sectional; 5: Retrospective cohort).*** Questions refer to timeline below, such that time A precedes time B which precedes time C.



Design Situation description

33. (.....) Investigator at time C selects study group with exposure at time A.
34. (.....) Investigator selects study groups at time B according to disease status and asks participants about exposure at time A
35. (.....) Investigator at time A selects study groups according to exposure Status and follows them to time C
36. (.....) Investigator assigns exposure at time A and follows participants to time C
37. (.....) Investigator measures exposure and disease simultaneously at time C

38. Researchers have gathered the following data regarding Disease X.

City	Subjects With Disease X	Subjects at Risk for Disease X
College A	100	5,000
College B	50	5,000
College C	200	10,000
College D	100	2,500

a) The predictive value positive will be higher in College A than College C
b) The predictive value negative will be higher in College B than College D
c) The predictive value negative will be higher in College A than College B
d) The predictive value positive will be higher in College C than College A
e) The predictive value positive should be the same at all four colleges.

39. Suppose researchers investigating the relationship between suicide and use of a particular antidepressant medication using a case-control study report an observed odds-ratio of 1.8 and a 90% confidence interval for the true odds-ratio as 0.8-4.05. The appropriate interpretation is that

a) Use of the antidepressant was more common among the suicides than among controls, and the association is statistically significant at a=.10.
b) Use of the antidepressant was more common among the suicides than among controls, and the association is statistically significant at a=.05.

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c) Use of the antidepressant was more common among the suicides than among controls, but the association is not statistically significant at a=.10.
d) We can be 90% confident that the suicide rate among users of the antidepressant medication is 80% to 405% higher than among non-users.
e) The statistical power of the case-control study was less than 90%.

40. Two independent studies report estimates and 95% confidence intervals for the same relative risk as 1.0 (CI 0.5-2.0) and 1.5 (CI 1.2-2.0). Which is the best interpretation?

a) The results are contradictory because one study gives a statistically significant relative risk while the other does not.
b) The results are consistent because both confidence intervals exclude zero.
c) The results are contradictory because one interval is compatible only with an elevated risk, while the other is compatible with either an elevated or a decreased risk.
d) The results are contradictory because no increase in risk was observed in one study while a 50% increase in risk was observed in the other.
e) The results are consistent because results of both studies are compatible with an increase of from 20% to 100% in risk.

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