Research and Statistics Study Guide, 5/25/2107, Dr. Karen E. Schetzina

Be familiar with different study designs and hierarchy/levels of evidence.

1. List one advantage and one disadvantage for the following study designs:

|  |  |  |
| --- | --- | --- |
| Design | Advantage | Disadvantage |
| Cross-Sectional |  |  |
| Case Control |  |  |
| Clinical Trial |  |  |
| Meta-analysis |  |  |

2. Explain the difference between incidence and prevalence.

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3. Explain the difference between external and internal validity

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4. An advertisement in a medical journal stated that "2000 subjects with sore throats were treated with our new medicine. Within four days, 94% were asymptomatic." the advertisement claims that the medicine was effective. Based on the evidence given, the claim:

1. Is correct
2. May be incorrect because the conclusion is not based on a rate.
3. May be incorrect because of failure to recognize a long-term cohort phenomenon.
4. May be incorrect because no test of statistical significance was used.
5. May be incorrect because no control or comparison group was involved.

5. The major purpose of random assignment in a clinical trial is to:

1. Help ensure that study subjects are representative of the general population
2. Facilitate double-blinding
3. Facilitate measurement of outcome variables
4. Try to have the study groups comparable on baseline characteristics
5. Reduce selection bias in allocation of treatment

6. Calculate the following statistics using the information below:

Suppose researchers conducted a study with 2000 people: 1000 took a new drug to prevent stroke for five years, and 1000 were given standard therapy. At the end of the trial, 2% of the people in the standard therapy group had experienced a stroke, compared to only 1% in the group taking the new drug.

Relative Risk Reduction (RRR) = Risk of disease for E+/Risk for disease for E- = [A/(A + B)]/[C/C+D)] =

Absolute Risk Reduction (ARR) = (Risk for E+) - (Risk for E-) = A/(A + B) - C/(C + D)

Number Needed to Treat (NNT) = 1/ARR =

7. A clinician-researcher wishes to answer the question “How many of my patients would need to receive this preventive intervention to prevent one of them from developing disease?

1. Number needed to treat (NNT)
2. Attributable risk (AR)
3. Population Impact Number (PIN)
4. Attributable Risk Reduction (ARR)
5. Population Attributable Risk (PAR%)

8. What is the purpose of using double-blinding in an RCT?

1. Achieve greater comparability of cases and controls
2. Avoid placebo effects
3. Avoid objective and subjective bias
4. Reduce the effects of sampling variation
5. Reduce the effects of loss to follow-up

9. A journal publishes results of an RCT that showed a statistically significant difference in outcomes between treatment and control groups. The editorial that accompanies the article argues however that the results were not clinically significant. Why may this be?

10. In many studies examining the association between estrogens and endometrial cancer of the uterus, a one-sided significance test was used. The underlying assumption justifying a one-sided rather than a two-sided test is:

1. The distribution of the proportion exposed followed a "normal" distribution.
2. The expectation prior to doing the study was that estrogens cause endometrial cancer of the uterus.
3. The pattern of association could be expressed by a straight line function.
4. The type II error was the. Most important potential error to avoid.
5. Only one control group was being used.

11. A randomized trial comparing the efficacy of two dugs showed a difference between the two (with a p value of <0.05). Assume that in reality, however, the two drugs do not differ. This is therefore an example of:

1. Type I error (alpha error)
2. Type II error (beta error)
3. 1-alpha
4. 1-beta
5. None of the above

12. What is the probability and odds of each of the following in Vegas?

|  | **Probability** | **Odds** |
| --- | --- | --- |
| Heads in a fair coin flip |  |  |
| Drawing a red card from a standard deck |  |  |
| Drawing a club card from a standard deck |  |  |

13. Calculate the following statistics using the two-by-two table below.

|  | **Disease +**  **Has CHD** | **Disease -**  **Does not have CHD** |
| --- | --- | --- |
| **Test +**  **BNP 80 or more** | **A 95** | **B 11** |
| **Test -**  **BNP<80** | **C 2** | **D 142** |

Sensitivity a/(a+c) =

Specificity d/(b+d)=

PPV a/(a+b) =

NPV = d/(c+d) =

LR+=sensitivity/(1 − specificity)=

LR-=(1-sensitivity)/specificity=

Pre-test odds=prevalence/(1 − prevalence)=

Post-test odds=pre-test odds×LR=

Post-test probability=post-test odds/(post-test odds+1)=

14. Two pediatricians want to investigate a new laboratory test that identifies streptococcal infections. Dr. Kidd uses the standard test, which has a sensitivity of 90% and a specificity of 96%. Dr. Childs uses the new test, which is 96% sensitive and 96% specific.

If 200 patients undergo both test which of the following is correct?

1. Dr. Kidd will correctly identify more people with streptococcal infection than Dr. Childs
2. Dr. Kidd will correctly identify fewer people with streptococcal infection than Dr. Childs
3. Dr. Kidd will correctly identify more people without streptococcal infection than Dr. Childs
4. The prevalence of streptococcal infection is needed to determine which pediatrician will correctly identify the larger number of people with disease