**Preview Assessment: Post-class Quiz #8 - Case-Control Studies**

| Question 1 | 5 points |
|---|---|

How does the strategy for a case-control study differ from that of a cohort study? (Select the one best answer.)

○ A. Case-control studies are retrospective, while cohort studies are always prospective.

○ B. Randomization can be used in a cohort study, but can't be used in a case-control study.

○ C. In case-control studies subjects are selected and grouped based on their disease status, but in cohort studies subjects are selected and grouped based on exposure status.

○ D. The goal of cohort studies is to test an association, but case-control studies just document the frequency of risk factors.

| Question 2 | 5 points |
|---|---|

In a case-control study one can calculate either a risk ratio or an odds ratio.

○ True

○ False

| Question 3 | 5 points |
|---|---|

What is the main reason why it is important to use precise, specific criteria for what constitutes a "case," i.e. in defining the outcome? (Select the best answer.)

○ A. To avoid misclassification with respect to the outcome.

○ B. To limit the number of subjects in the study.

○ C. To avoid selection bias.

○ D. To avoid interviewer bias.

| Question 4 | 5 points |
|---|---|

Which of the following is are legitimate sources of cases for a case-control study? (Select all that apply).

☐ A. Disease registries, e.g. cancer registries.

☐ B. Hospitals.

☐ C. Members of the general population responding to an advertisement seeking subject with a particular condition.

☐ D. Patients at an outpatient clinic.

**Question 5**                                                                                          **5 points**

The primary principle to be followed in identifying an appropriate control group is that controls should be a sample of the population that gave rise to the cases, and if a member of the control group had had the disease being studied, they would have been identified as a potential case for the study.

○ True

○ False

**Question 6**                                                                                          **5 points**

An advantage of using hospital-based controls is that they are more likely to cooperate and are likely to remember past exposures with the same accuracy as the cases.

○ True

○ False

**Question 7**                                                                                          **5 points**

One possible drawback of using hospital controls is that they may have diseases that have the same or similar risk factors as the disease that the cases have.

○ True

○ False

**Question 8**                                                                                          **5 points**

Which of the following are advantages to case-control studies? (Select all that apply).

☐ A. They tend to be less expensive and more efficient than prospective cohort studies.

☐ B. They are feasible for rare diseases.

☐ C. They allow you to study multiple outcomes of a single risk factor.

☐ D. They are good for diseases that have a long latency period (i.e., a long time between exposure and manifestation of disease.)

**Question 9**                                                                                          **5 points**

A case-control study was conducted to evaluate the relationship between artificial sweeteners and bladder cancer. 3,000 cases and 3,000 controls were enrolled in the study. Amongst the cases, 1,293 had used artificial sweeteners in the past, while 1,707 had never used artificial sweeteners. Among the controls, 855 had used sweeteners and 2,145 had not. Compute the appropriate measure of association, and round off the answer to the nearest tenth (one decimal place). Enter the number answer.

[                    ]

## Question 10                                                                          5 points

Suppose a study looking at the association between smoking and bladder cancer found an odds ratio = 2.4. What would be the best way to interpret this? (Select one answer.)

- ○ A. Smokers are 140% times as likely to develop bladder cancer compared to non-smokers.
- ○ B. People with bladder cancer are about 40% more likely to be smokers compared to people who don't have bladder cancer.
- ○ C. Smokers have a 2.4 % more risk of bladder cancer compared to non-smokers.
- ○ D. Smokers have 2.4 times the risk of developing bladder cancer compared to non-smokers.

## Question 11                                                                          5 points

A study was conducted in men aged 40-70 in order to determine whether exercising for 2 or more hours per week decreases the likelihood of heart attack. The cases were 1,000 men who had recently had a heart attack; of these, 236 reported that they had regularly exercised for two or more hours per week prior to their heart attack. 1,000 controls were also selected for the study; of these, 379 reported that they exercised regularly. Calculate the magnitude of association between regular exercise and heart attack. What does your calculation suggest? (Select one answer.)

- ○ A. People who exercise regularly have about 0.5 times the risk of having a heart attack compared to people who don't exercise.
- ○ B. People who exercise regularly have about 2.0 times the risk of having a heart attack compared to people who don't exercise.
- ○ C. People who exercise regularly have about a 50% chance of having a heart attack.

## Question 12                                                                          5 points

D'Souza et al. conducted a study on the association between human papillomavirus and oropharyngeal cancer (N Engl J Med 2007;356:1944-56). They identified 100 patients with newly diagnosed squamous-cell carcinomas of the head and neck in Baltimore from 2000 through 2005. The comparison group consisted of 200 patients without a history of cancer who were seen for benign conditions between 2000 and 2005 in the same clinic. All patients completed a computer-assisted self-administered interview that recorded information about demographic characteristics, past oral hygiene, medical history, family history of cancer, lifetime sexual behaviors, and lifetime history of marijuana, tobacco, and alcohol use. Part of their results focused on the association between oral hygiene and oropharyngeal cancer. Among the 100 subjects with oropharyngeal cancer 62 reported no tooth loss,16 reported some tooth loss, and 22 reported complete tooth loss. Among the 200 subjects without oropharyngeal cancer 163 reported no tooth loss, 20 reported some tooth loss, and 17 reported complete tooth loss. What is the odds ratio for complete tooth loss compared to no tooth loss? Compute the odds ratio and round it off to the nearest tenth (one decimal place), and enter

your numeric answer.

[        ]

## Question 13                                                       5 points

In the previous problem what was the 95% confidence interval for the odds ratio? (Use Epi_Tools.XLS).

- ○ A. 1.02-4.32
- ○ B. 1.58-4.63
- ○ C. 1.69-6.83
- ○ D. 0.15-0.59
- ○ E. 0.22-0.63

## Question 14                                                       5 points

For the previous two questions was the difference statistically significant? (Select one answer.)

- ○ A. No, because the confidence interval did not contain the null.
- ○ B. Yes, because the confidence interval did not contain the null.
- ○ C. No, because the confidence interval contained the odds ratio.
- ○ D. Yes, because the confidence interval contained the odds ratio.

## Question 15                                                       5 points

The table below summarizes the results of a study by Shulman et al. that was published in the New England Journal of Medicine. The purpose of the study was to determine whether cardiologists were less likely to refer black patients for cardiac catheterization if they had symptoms suggestive of coronary heart disease.

|  | Referred for Catheterization | Not Referred |  |
|---|---|---|---|
| Black | 305 | 55 | 360 |
| White | 326 | 34 | 360 |
|  |  |  |  |

Briefly, they had black and white actors portray patients with symptoms suggestive of possible heart disease. For each set of symptoms and circumstances, they had a black actor and a white actor of the same age and gender, and the two actors described their symptoms with exactly the same words and gestures. The investigators videotaped the actors describing their symptoms. They then showed the videos to cardiologists and asked them if they would refer the patient for cardiac catheterization to determine whether the patient had coronary heart disease. The outcome of interest, then, is whether the physician decided to refer the subject for cardiac catheterization or not. The study was a cohort type study, so one can compute either a risk

ratio or an odds ratio. Use the Case-Control worksheet in Epi_Tools.XLS to calculate the odds ratio, the p-value, and the 95% confidence interval for this association.

What do your calculations indicate? (Select the one best answer.)

- ○ A. The odds ratio was 0.58, and the difference was statistically significant.
- ○ B. The odds ratio was 0.58, and the difference was NOT statistically significant.
- ○ C. The odds ratio was 1.72, and the difference was statistically significant.
- ○ D. The odds ratio was 1.72, and the difference was NOT statistically significant.

**Question 16**                                                                5 points

Shulman et al. (in the study described in the previous question) calculated odds ratios, but they could have also calculated a risk ratio. Use the same data, but now use the Cohort Studies worksheet in Epi_Tools.XLS to calculate the risk ratio, the 95% confidence interval for the risk ratio, and the p-value for the association between Black race and referral for catheterization.

How would you interpret these results based on the computation of the risk ratio? (Select one answer.)

- ○ A. Blacks are 0.58 times as likely to be referred for cardiac catheterization compared to whites.
- ○ B. Blacks are 0.94 times as likely to be referred for cardiac catheterization compared to whites.
- ○ C. Blacks are referred for cardiac catheterization 94% of the time.
- ○ D. Whites are referred for cardiac catheterization 94% of the time.

**Question 17**                                                                5 points

Which statement best describes how the odds ratio and the relative risk compare when both measures are calculated for the data above? (Select the one best answer.)

- ○ A. The odds ratio and the risk ratio are the same.
- ○ B. The odds ratio and risk ratio are quite different, and the odds ratio is a more appropriate measure of association in this case.
- ○ C. The odds ratio and risk ratio are quite different, and the relative risk is a more appropriate measure of association in this case.
- ○ D. The odds ratio and risk ratio are quite different, and both measures of association provide an accurate summary of the strength of association in this case.

## Question 18                                                      5 points

Now analyze the data from the Shulman study from the perspective of NON-REFERRAL as the outcome of interest. In other words switch the outcome columns so that the outcome of interest is "Not being referred for cardiac catheterization." If you switch the two outcome columns, what is the risk ratio? The frequency of the outcome should go down, since most actor-patients were referred. (Select the one best answer.)

○ A. 0.58

○ B. 0.94

○ C. 1.62

○ D. 1.73

## Question 19                                                      5 points

With the outcome columns switched (as you did in the previous question) what is the odds ratio?

○ A. 0.58

○ B. 0.94

○ C. 1.62

○ D. 1.73

## Question 20                                                      5 points

Which of the following most accurately summarize your results for questions 15-19 above regarding the Shulman study? (Select all that apply.)

☐ A. Regardless of whether you consider the outcome of interest to be referral for cardiac catheterization or non-referral, you get the same answer.

☐ B. The Risk Ratio and Odds Ratio are quite different when one looks at the data from the perspective of REFERRAL for catheterization as the outcome of interest. However, the risk ratio and odds ratio are more similar when one switches the outcome of interest to NON-REFERRAL. The reason for this is that REFERRAL was very common, while NON-REFERRAL was not, and the odds ratio was distorted with a common outcome.

☐ C. Looking at the data from the perspective of REFERRAL gave an odds ratio that exaggerated the association (falsely low odds ratio) because the outcome was common when looked at from this perspective.

☐ D. In this situation the odds ratio would more accurately summarize the association.

☐ E. In this situation the risk ratio would more accurately summarize the association.

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