PH 250B Week 4, Tab 1 Ungraded quiz - ANSWERS
Topic: Measures of Association

Problem 1

Your colleague insists that the only appropriate measure of association in a case-control study is an odds ratio. Please explain why this is not true.

While traditionally epidemiologists have estimated odds ratios in case-control studies, the choice of odds ratios was made out of mathematical convenience -- because these studies sampled based on disease status. In reality, the true quantity of interest is usually a risk ratio or risk difference. Today, epidemiologists are taught to view case-control studies as taking place within a cohort, even if the cohort is theoretical. Depending on how controls are sampled, the relative risk can be validly estimated in some case-control studies (but not all).

Grading:
1 pt for discussing traditional vs. modern view of case-control
1 pt for stating that RRs can be estimated in some case-control studies

Problem 2

The incidence of attention deficit disorder is 2 per 1000. A case-control study collected the following data about the association between lead exposure and attention deficit disorder (disease).

	Disease	No Disease
Exposed	34	1200
Unexposed	10	1500

a. Does the odds ratio approximate the relative risk in this study?

The incidence is 2 per 1000. Typically a disease with incidence < 5% (or 5 per 100) is considered rare. In this case, the OR should approximate the RR.

b. Calculate and interpret the odds ratio.

OR = (a/c) / (b/d) = (a x d) / (b x c)
= 34 x 1500 / 10 x 1200 = 4.25

The odds of attention deficit disorder for those exposed to lead is 4.25 times the odds of attention deficit disorder for those not exposed to lead.

c. Calculate and interpret the APe%.

APe% = [(OR - 1) / OR] x 100%
= [(4.25 - 1) / 4.25] x 100% = 76.5%

Assuming a causal relationship between lead exposure and attention deficit disorder, 76.5% of attention deficit disorder among those exposed to lead could be prevented by eliminating lead exposure.

d. Calculate and interpret the APt%. Assume the probability of exposure to lead is 0.05.

$$AP_t\% = \frac{(OR \times P_e) + P_e}{(OR \times P_e) - P_e + 1} \times 100$$

APt% = (4.25 x 0.05) + 0.05   x 100 = _0.263_ x 100 = 22.6%
_____(4.25 x 0.05) - 0.05 + 1   1.163

Assuming a causal relationship between lead exposure and attention deficit disorder, 22.6% of all attention deficit disorder cases in the total population are attributable to lead exposure.

Note - this formula is discussed in lecture video 4.1.1