Analytic Study Designs (Lab)

Goals: To understand, differentiate, and identify relative strengths and weaknesses of the various types of epidemiologic study designs

1. After reading the following passages, identify the exposure variable, disease outcome variable, and extraneous ("potentially confounding") variables, if any, that have been identified in the description. Then, identify the study design.

    a. Questionnaires were mailed to every 10th person listed in the city telephone directory. Each person was asked to list age, sex, smoking habits, and respiratory symptoms during the preceding seven days. About 20% of the questionnaires were completed and returned. About 10% of respondents reported having upper respiratory symptoms.

    b. 1,500 employees of a major aircraft company were initially examined in 1951 and were classified by diagnostic criteria for coronary artery disease (CAD). New cases of CAD have been identified by examinations every three years and through death certificates. Incidences in different subgroups have been computed.

    c. A random sample of middle-aged sedentary adults was selected from four census tracts, and each person was examined for coronary artery disease (CAD). All persons without disease were randomly assigned to either a two-year program of aerobic exercise or a two-year arthritis-prevention non-aerobic exercise program. Both groups were observed semi-annually for incidence of CAD.

    d. A 39-year old woman presents with a mild sore throat, fever, malaise and headache and is treated with penicillin, for presumed streptococcal infection. She returns in a week with hypertension, fever, rash and abdominal pain. She responds favorably to chloramphenicol, after a diagnosis of Rocky Mountain spotted fever is made.
    [This is a case report. Case reports are not always regarded as analytic studies (i.e., just one case and no comparison group). Nevertheless, an interesting case report can occasionally serve to alert the public of an important and potentially fatal disease.]

    e. 50 patients with thyroid cancer are identified and surveyed by patient interviews to identify previous radiation exposure.
    [This is a case series. Case series are not always regarded as analytic studies because there is no comparison group to directly determine associations. However, we can occasionally use information from outside of the study for the sake of comparison, and comparisons can be made between different subtypes of the disease. In addition, the natural history of disease can be studied.]

    f. Patients admitted for carcinoma of the stomach and patients without a diagnosis of cancer are interviewed about their chewing tobacco history to assess the possible association of chewing tobacco and gastric cancer.

    g. Data on median income for households in census tracts within a large metropolitan county in the U.S. were obtained from the Census Bureau's Current Population Survey. Air

pollution levels were measured in these same census tracts during a period of one-month. The data were analyzed using a geographic information system (GIS) to produce maps showing pollution and income levels by census tract.

2. You have developed the hypothesis that automobile drivers who regularly sleep less than 6 hours per night have a higher incidence of fatal automobile accidents. How want to design a case-control study to test this hypothesis.

   a. How will you define a case in this study? Are there any special considerations?

   b. Where would you find the cases?

   c. Name a suitable population from which to choose the controls.

   d. What major characteristic must you strive to measure similarly in each study participant?

   e. What difficulties will be encountered in measuring this characteristic?

3. You have developed the hypothesis that improving school lunches in elementary schools will decrease obesity among the students. You have randomly identified 6 elementary schools in the state of North Carolina to participate in this study and want to design a group-level intervention trial to test this hypothesis. You will study changes in the body mass index (BMIyou're your outcome variable. Consider:

   a. What is your unit of intervention in this study? What is your unit of observation?

   b. What type of study design is this?

   c. You decide to assign the elementary schools to control or intervention group by randomization. What sorts of problems could arise? What is another method of assignment that might work better?

4. What is the importance of randomization in an intervention trial, and what does it accomplish?

5. What is meant by the phrase "ecologic fallacy"?

6. Different study designs have particular advantages and disadvantages. Contrast the case-control and cohort designs with respect to:

   a. Cost [and sample size requirements]
   b. Time typically required for completion of the study.
   c. Number and types of factors that can be studied.
   d. Measures of disease frequency and association that can calculated