

Department of Epidemiology and Biostatistics

513-607A

Principles of Inferential Statistics

Final Examination: In-class portion

(2 hours)

Q.....Points

Q1..._./2

Q2..._./2

Q3..._./2

Q4..._./2

Q5..._./3

Q6..._./3

Q7..._./3

Q8..._./4

Q9..._./4

December 3, 1986.

Name:

- a. What statistical test would you have used to assess the 9% vs 51%, the 4% vs 30% and the 0% vs 6% respectively?
- b. In the text, the authors say that "Because our null hypothesis was that ampicillin would not reduce the rate of clinical illness, the tests of significance for comparisons of colonization, bacteremia and the rate of post-partum febrile morbidity were one-tailed".

Comment. If you find it easier, use Greek symbols as well as words.

a. In the results section, the authors state "We found that the 35 women who had infants weighing 4000 g or more at birth had two-hour plasma glucose levels in the third trimester significantly higher than those of the 214 women who had normal-sized infants mean 107.5 (SD 26) vs 96.4 (SD 23) mg /dl, $p=0.01$ ".

What statistical test might the authors have used to derive this p-value?

b. They add in their next sentence

"We also found a significant correlation between the infant's body weight and the mother's two-hour plasma glucose level in the third trimester (Fig 1), although we observed considerable scatter in the data".

What do they mean by "a significant correlation"?

c. What is the statistical term for the equation shown at the top of Fig. 1?

What does the equation mean in words?

How would the equation read if body weight were in kilograms?

d. What is the single biggest problem with the data display and analysis in Figure 1?

In an investigation to determine the influence of sampling variability on the diagnostic yield of liver biopsy, two consecutive samples were obtained from each of 75 patients by redirecting the biopsy needle through a single entry site. The results are shown below:

	Number of specimens abnormal		
	0	1	2
Number of Patients with this many abnormal specimens:	12	6	57

- a. What is the (average) proportion of abnormal specimens per patient?
 - b. How well does the binomial distribution fit these data?
-
- a. How does one formally compare the number of episodes of infection/month in the controls (0.062) and in the patients receiving transfusion alone (0.220)?
 - b. Use a point estimate to quantify the reduction that the authors call "to a nearly normal level". How would you calculate an internal estimate for the reduction?
 - c. Comment on the comparisons the authors made.
 - d. What type of study would you have proposed to assess the benefit of prophylactic oral penicillin therapy?

In the "study design and analysis" section, the authors say that "the analysis was carried out separately with both patients and residents as the units of analysis".

- a. Which analysis do you think is more appropriate, and why? (you might also consider the firm as a third possible unit of analysis).

The title of the article asks a specific question.

- a. Does the last sentence of the abstract answer the question to your satisfaction ie. does it provide a definitive answer? (concentrate on numerical differences, not on biases, causation, effect of medication etc.)
- b. If not, rewrite the last sentence of the abstract your way. (you might want to use the 1.8 IQ point difference from Table 2 but you don't have to use exact numbers).

In the above-mentioned study from the Cleveland Metropolitan Hospital, patients and house officers are assigned at random to firms and (presumably) patients are

assigned randomly to physicians within firms. The average charge per patient was approximately \$4,000.

a. What shape is the distribution of charges/patient likely to have been and why?

a. The authors say that when the data was aggregated according to their primary care providers, and the physician used as the unit of analysis, this re-analysis had the advantage of providing normal distributions of charges.

Why should these distributions be normal?

The authors do not give a definition for the "coefficient of repeatability" they calculate from the data, but refer to an earlier Lancet article.

a. From the diagrams and the text, what must be the definition of their "coefficient of repeatability".

b. What other index of repeatability can you suggest?

A recent study (AJPH 76:512-514, 1986) investigated the accuracy of the in-home pregnancy test in early pregnancy detection. A total of 109 women of childbearing age whose menses were late by at least 6 days, but not more than 20 days, volunteered to perform their own pregnancy test using one of three in-home kits. For the 36 women who used the Daisy 2™ kit, the accuracy was 75.0% (95% CI 57.8%-87.9%). The manufacturers claim 98.9% accuracy.

Write a one-sentence conclusion for the abstract of the paper in the AJPH.

Write a one-sentence conclusion for the health column of a newspaper.

What do you think the authors meant by "accuracy"?

List and define other indices that might be appropriate for pregnancy test in early pregnancy detection. A total of 109 women of childbearing age whose menses