

MATH 204 - ASSIGNMENT 3

Please Hand in Assignment in the Lecture on Monday 6th April.

- The following data are counts of the number of urinary tract infections (UTI) across units in eight hospitals in the Netherlands between 1992-1993. Four hospitals have **High** rates of UTI, and four have **Low** rates. Also, the antibiotic prophylaxis (ABP) policy of the units concerned was also recorded as **Yes** (policy was implemented) or **No** (policy was not implemented). It was thought that hospitals that implemented an ABP policy would have a lower rate of UTI.

ABP	Low Rate Hospital			High Rate Hospital		
	UTI		Total	UTI		Total
	Yes	No		Yes	No	
Yes	20	1093	1113	22	144	166
No	5	715	720	99	1421	1520
Total	25	1808	1833	121	1565	1686

Reference: Reintjes, R, de Boer, A, van Pelt, W and Mintjes-de Groot, J, *Epidemiology*, **11**, No. 1 (2000), 81-83

- For the Low Rate and High Rate hospitals separately, assess whether there is an association between UTI and ABP, that is the rate of UTI is the same irrespective of whether ABP policy was implemented or not, using a Chi-squared test.
6 Marks
- After **pooling the data** across Low Rate and High Rate hospitals, again assess whether there is an association between UTI and ABP using a Chi-squared test.
3 Marks
- Compute odds ratios to assess the association between UTI and ABP, first for the Low Rate and High Rate hospitals separately, then for the pooled data. What are the conclusions about the efficacy of ABP policies that follow from these calculations ?
5 Marks

Recall that the **odds** on event E with probability $P(E)$ are

$$\frac{P(E)}{1 - P(E)}$$

and that the **odds ratio** derived from two conditional probabilities defined for events E and F is

$$\psi = \frac{P(E|F)/(1 - P(E|F))}{P(E|F')/(1 - P(E|F'))}$$

In this case, E corresponds to "UTI recorded" and F corresponds to "ABP policy implemented", so that F' means "ABP policy not implemented"

2. The following data correspond to the percentage reduction (compared to baseline) in weekly headache activity for three therapy groups. Subjects were drawn independently from the study population, and randomized to treatment.

- RB: Relaxation response and biofeedback
- R: Relaxation response only
- U: Untreated

RB	R	U
62	69	50
74	43	-120
86	100	100
74	94	-288
91	100	4
37	98	-76

The data may be downloaded in SPSS format from

<http://www.math.mcgill.ca/~dstephens/204/Data/Headaches.sav>

Comment on the evidence that there is a difference (in terms of change of headache activity) between therapy groups

- (a) assuming that the data are normally distributed, with equal group variances across the therapy groups

3 Marks

- (b) after using a suitable non-parametric testing procedure

3 Marks