

Opgave svar til kapitel 13 (mm2 biostat)

67:
SFFF?

68:
FSFSF

69:
SFFSF

70:
SSFSS

71:
FSSSF

73:
FSFSF

Solution to Exercise 13E

1. The heatwave appears to begin in week 10 and continue to include week 17. This period was much hotter than the corresponding period of 1982.

Table 19.8. Cross-tabulation of time period by year for geriatric admissions

Year	Period			Total
	Before heatwave	During heatwave	After heatwave	
1982	190	110	82	382
1983	180	178	110	468
Total	370	288	192	850

Table 19.9. Expected frequencies for Table 19.8

Year	Period			Total
	Before heatwave	During heatwave	After heatwave	
1982	166.3	129.4	86.3	382.0
1983	203.7	158.6	105.7	468.0
Total	370.0	288.0	192.0	850.0

2. There were 178 admissions during the heatwave in 1983 and 110 in the corresponding weeks of 1982. We could test the null hypothesis that these came from distributions with the same admission rate and we would get a significant difference. This would not be convincing, however. It could be due to other factors, such as the closure of another hospital with resulting changes in catchment area.
3. The cross-tabulation is shown in Table 19.8.
4. The null hypothesis is that there is no association between year and period, in other words that the distribution of admissions between the periods will be the same for each year. The expected values are shown in Table 19.9.
5. The chi-squared statistic is given by:

$$\begin{aligned} \sum \frac{(O - E)^2}{E} &= \frac{(190 - 166.3)^2}{166.3} + \frac{(110 - 129.4)^2}{129.4} + \frac{(82 - 86.3)^2}{86.3} \\ &\quad + \frac{(180 - 203.7)^2}{203.7} + \frac{(178 - 158.6)^2}{158.6} + \frac{(110 - 105.7)^2}{105.7} \\ &= 11.806 \end{aligned}$$

There are 2 rows and 3 columns, giving us $(2-1) \times (3-1) = 2$ degrees of freedom. Thus we have chi-squared = 11.8 with 2 degrees of freedom. From Table 13.3 we see that this has probability of less than 0.01. The data are not consistent with the null hypothesis. The evidence supports the view that admissions rose by more than could be ascribed to chance during the 1983 heatwave. We cannot be certain that this was due to the heatwave and not some other factor which happened to operate at the same time.

6. We could see whether the same effect occurred in other districts between 1982 and 1983. We could also look at older records to see whether there was a similar increase in admissions, say for the heatwaves of 1975 and 1976.

Chi kvadrat test for tabel 2.10:

$$\begin{aligned}\sum \frac{(O - E)^2}{E} &= \frac{(28 - 16.4)^2}{16.4} + \frac{(4 - 15.6)^2}{15.6} \\ &+ \frac{(10 - 11.8)^2}{11.8} + \frac{(13 - 11.2)^2}{11.2} \\ &+ \frac{(2 - 2.6)^2}{2.6} + \frac{(3 - 2.4)^2}{2.4} \\ &+ \frac{(5 - 8.7)^2}{8.7} + \frac{(12 - 8.3)^2}{8.3} \\ &+ \frac{(6 - 6.2)^2}{6.2} + \frac{(6 - 5.8)^2}{5.8} \\ &+ \frac{(4 - 9.3)^2}{9.3} + \frac{(14 - 8.7)^2}{8.7} \\ &= 27.2\end{aligned}$$

Antallet af frihedsgrader er 5, så iflg tabel 13.3 må H0 afvises og der må være en sammenhæng mellem behandling og den radiologiske vurdering. Streptomycin virker.