Biostatistics III

Lecture 6

2 handouts today:
- Tutorial 1
- Another table of random nos. Fisher & Yates

* Note change of due date for Assignment 2 (Week 6).

Example: allocate 20 patients to T, C using BCD(3/5), and Table 5.2.

\[ D_n = T_n - C_n \]

Scheme:

\[
\begin{align*}
D_n < 0 & : 0-5 \rightarrow T & p = 0.6 \\
& : 6-9 \rightarrow C & p = 0.4 \\
D_n = 0 & : 0-4 \rightarrow T & p = \frac{1}{2} \\
& : 5-9 \rightarrow C & p = \frac{1}{2} \\
D_n > 0 & : 0-5 \rightarrow C & p = 0.6 \\
& : 6-9 \rightarrow T & p = 0.4
\end{align*}
\]

0-3 \rightarrow T

4-9 \rightarrow C
15th row: Table 5.2

0 2 2 7 2 4 6 0 5 7 ...
↑ ↑ T C T T C C C ...

finish as exercise.

See Assignment 2.
- Can show (but won't) that for \( p = \frac{3}{5} \), there is \( \frac{1}{20} \) chance of imbalance \( > 10 \).

For \( p = \frac{3}{4} \), corresponding difference is 4.

- Can set pre-defined limits for imbalance.

We want to achieve balance within subgroups defined by important factors e.g. age, time in remission...

Two strategies are
- minimization
- stratification.

One extension: use S.R. until limit exceed, then introduce biased coin to correct imbalance.
§2.3.4 **Minimization**

- Extension of BCD
- Dynamic method
- Aims to minimize imbalance in T's and C's over factors known to affect prognosis, including centre/hospital in multi-centre trial.

- It does not address imbalance in combinations of factors simultaneously; see stratification

For 'new patient,' determine levels of prognostic factors.

Observe: for i-th factor (category)

new's level has T_i on T, =patient and C_i on C.

Define a discrepancy score S_2

(Also called a balancing function.)
Typically use one of

\[ S_{1i} = C_i - T_i \]

\[ S_{\Delta i} = \frac{C_i - T_i}{C_i + T_i + 1} \]

\[ S_{2i} = \begin{cases} 
1 & \text{if } C_i > T_i \\
0 & \text{if } C_i = T_i \\
-1 & \text{if } C_i < T_i 
\end{cases} \]

Total score is

\[ S = \sum_{i} w_i S_i \quad \text{or} \quad S = \sum_{i} S_i \]

\( w_i \) large if \( i^{th} \) factor important.

\[ \rightarrow \text{allocate new patient to T or C to minimize S} \]

according to a biased coin with high bias (\( p = \frac{3}{4} \)).

- See Tutorial 1 for comparison of \( S \)'s.

- Method can be generalized to >2 treatments.
§ 2.3.5 Stratification

- Enables balance within stratum defined by simultaneous combination of factors.

→ Generate separate random list using RPB or BCD for each stratum.

- RPB within strata probably most widely used method.