Low Technology

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1. INTRODUCTION

In preparation for The Patient's Charter Leicester General Hospital has instituted a monitoring procedure for waiting times at Out Patient clinics. After basic measurement systems have been introduced, the intention is to use the data generated in an action plan to move as rapidly as possible towards the White Paper targets (all patients to be seen within 30 minutes of their appointment time) This paper describes the types of data that are being collected and the methods of analysis used. They can be replicated on any PC with dBASE III or similar database, together with a few more specialised utilities.

2. DATA COLLECTION

A sample of approximately 10 clinics were chosen in each calendar month, starting in February 1992, representing the specialities in which the throughput of patients was greatest. As clinics are held weekly, a month's sample can contain the data from up to 40 clinics. Data was collected on each patient attending a clinic and, on average, approximately 1100 patients attended clinics in the sample in a typical month.

The data was collected manually onto record cards preprinted with the patients name, address and reference number. Patients were 'tracked' through the clinics using nursing staff resources. Information was recorded on :

Appointment time
Consultation Start and End times
Time Left Out-Patients
Other Departments attended BEFORE consultation
Other Departments attended AFTER consultation
New or Continuing Patient
Late (i.e. recorded as more than 10 minutes late)
Arrival time (if by ambulance)

3. DATA INPUT AND VALIDATION

The data was input into a dBASE III file using an input screen designed to ease data entry and data validation. A clinic's worth of data (typically, some 25-30 cases) was recorded and then exported to a simple comma delimited file. (This file is subsequently used in the statistical analysis)

The data was input a SECOND time, in order to validate it in accordance with good data preparation practice and a second text file produced. The two files of data were then compared (using software developed by the author) If any discrepancies were found, these were corrected by reference to the original record cards in a text editor capable of dual-file editing. When the data appeared reconciled, a cyclical redundancy check was performed to confirm the two files were identical. This method of validation would trap all errors except the extremely rare cases in which the same information was miskeyed on two separate occasions.

The error rates recorded were approxiately 1 per 1,300 key-strokes (1 per every 43 patient records) 40% of these errors were attributable to ambiguous hand-written data that was interpreted in different ways on each of the two input sessions.

Each month's data was 'stitched' together into a composite text file for each consultant. Duplicate files were created in which alphanumeric data was converted in numeric data for the ease of statistical analysis (e.g. [Y]es and [N]o converted into numeric codes such as 1 and 2)

4. DATA ANALYSIS

The data for each consultant was analysed by means of a dBASE program. Amongst other manipulations, the program calculated :

- The waiting time, in minutes, measured from the appointment time to the time of the start of the consultation. The raw time in minutes was also coded into '10 minute blocks' to provide a means of representing waiting times more meaningfully in a frequency distribution.

- The consultation time, in minutes, measured both at the absolute level and also put into '5-minute blocks' for the same reasons as above.

Eight files of data were then written for each consultant, as follows :

(1) The complete file of data as input but also including calculated waiting times (both absolute and in 10 minute blocks)

(2) As in (a) but excluding the 12% patients who arrived by ambulance and whose arrival/waiting times tended to fluctuate markedly through reasons not directly under the patients' control

(3) As in (b) but also excluding those who were late by more than 10 minutes (and may therefore have missed an appointments 'slot')

(4) As in (c) but including only those who had visited other departments BEFORE the consultation (often a 'nil' category)

(5) As in (c) but excluding those who needed to visit other departments (e.g. for a blood-test) before the consultation. This was, in many ways, the most critical data file including

-- patients arriving by their own transport

-- who did not have to visit other departments prior to the start of the consultation

-- and who had arived 'on time' for their appoinments

(6) Length of Consultation - All patients

(7) Length of Consultation - Continuing patients

(8) Length of Consultation - New patients

5. STATISTICAL ANALYSIS

The eight files of data were used to produce frequency distributions using the 10-minute blocked data (for waiting times) and the 5-minute blocked data (for length of consultation) The data was analysed using TURBOSTATS - a simple SPSS 'clone' written by the author and the output files produced by the analysis were collated and edited for uniformity of presentation.

The output produced is identical in appearance to the SPSS FREQUENCIES module with the addition of a bar-graph. Of particular use are the cumulative frequency distributions, enabling an 'at-a-glance' analysis of the proportions of patients seen within 10-minute blocks e.g. within 10, 20 or 30 minutes. A sample is shown below (with hypothetical data) :

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WAIT_  Waiting Time - 10 minute blocks          File: TOTAL.MAR

                                        Valid      Cum        Total
Value Label          Value   Frequency  Percent    Percent    Percent

 Before time           1        70        7.5          7.5        7.5
 0 - 10 mins           2       225       24.0         24.0       31.4
11 - 20 mins           3       205       21.8         21.8       53.2
21 - 30 mins           4       170       18.1         18.1       71.4
31 - 40 mins           5       151       16.1         16.1       87.4
41 - 50 mins           6        68        7.2          7.2       94.7
51 - 60 mins           7        32        3.4          3.4       98.1
61 - 70 mins           8        12        1.3          1.3       99.4
71 - 80 mins           9         5        0.5          0.5       99.9
80 +   mins           10         1        0.1          0.1      100.0
                       0         0        0.0       MISSING
                     -------   -------     -------
                   TOTAL   939     100.0       100.0
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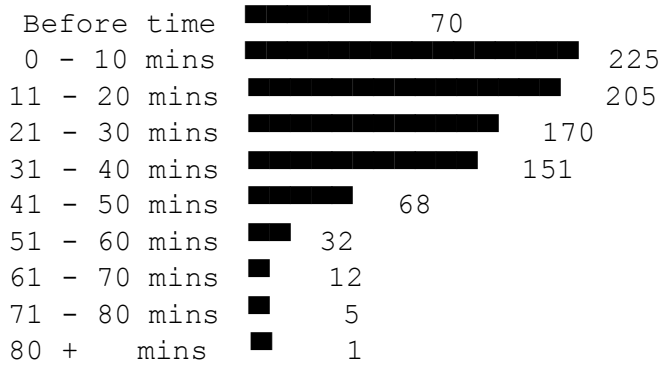


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Valid Cases    939    Missing Cases     0
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6. FEEDBACK OF RESULTS

Each consultant in the sample receives data in the categories described,usually one month in arrears. The care taken over data input, data validation and data comparability serves to enhance confidence in the quality of the data generated by the analysis.

7. TIME COSTINGS

For each month's data, approximately 1100 record cards (1 per patient) required some 18 hours of data input, validation and reconciliation. A further 5 hours was devoted to calculation, statistical treatments and preparation of the numerous reports.

8. DEVELOPMENTS

The data collected on typical lengths of consultations, both for new and for continuing patients, will assist in the planning of a more efficient appointments system. There is also some evidence of an 'Hawthorne effect' (in which the presence of observers has an effect on that which is being observed) as there appears to an improvement in the reduction of overall waiting times since the start of the monitoring exercise. This, of course, may be purely a sampling effect in that different clinics form the sample each month but, as the exercise proceeds and the same clinics are sampled again, more direct comparisons will be possible.

In many ways, this paper has detailed a 'low-technology' rather than a 'high-technology' solution. The entire software, apart from dBASE or a dBASE type database, was developed by the author and is available free or at a nominal charge (#15-00 in the case of TURBOSTATS)

However, it is evident that more sophisticated methods of data capture will be required, once the project moves away from the initial pilot monitoring stage and is put onto a more permanent basis. At the very least, the data capture should be 'swiped' using a bar-code reader and event-recording software used for the timings, probably on a hand-held computer. In the meantime, the 'low-technology' solution described in this article is within the reach of any unit with a pressing need to measure and assess out-patient waiting times without recourse to expensive hardware or software. Further details are available on request from the author.

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