THE COMPARATIVE UTILITY OF A FILE CABINET PROGRAM VS A GENERAL STATISTICAL PROGRAM IN MICRO-COMPUTER MANAGEMENT AND ANALYSIS OF CLINICAL NURSING DATA

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Abstract

The purpose of this paper is to describe the use of two microcomputer software packages in the storage, retrieval, and analysis of clinical and nursing research data on a hospital neonatal special care unit. The programs discussed are: the PFS Package (The Personal Filing System, Report, and Graph); and A-Stat. The comparison was done using an Apple II Plus and supporting peripherals. Examples of the uses of each program in the clinical setting are described and comparisons made in terms of the different needs they meet. The PFS package was much more applicable to patient data management and was more user friendly for inexperienced computer users. A-Stat provides much more sophisticated statistical options, but is limited in the variety of non-parametric tests necessitated by the small sample sizes common in clinical nursing research studies.

Introduction

With increasing frequency the microcomputer is being adopted for both research and the management of patient information in clinical settings. In this paper, the focus is on the utility of two types of software packages for both information management and statistical analysis that are integral elements of a hospital unit on which clinical nursing research is an ongoing activity. Ideally, the advent of integrated software will make this type of investigation obsolete, since the same software will perform both functions. However, we are still several years away from that luxury. The two software packages discussed are the PFS package (Software Publishing Corporation) and A-Stat 79. C (Rosen-Grandon Associates).

The Setting

The clinical setting in which the software is evaluated is a neonatal special care unit at Columbus Riverside Methodist Hospital (a 1000-bed community hospital). The normal maximum capacity for the unit is 10 babies. While this unit has the capabilities for caring for high-risk babies for a relatively short period of time, we typically transfer neonates with serious short-run, or long-run complications to specialized intensive-care unit at The Children's Hospital in Columbus. Thus, our short-term patients vary greatly, but our long-term patients are generally "growers." The setting makes the following requirements essential for any computer and data management system.

1. It must allow for flexible input.
2. It must be user friendly, because input is dependent on staff nurses and unit clerks with very limited computer experience.
3. It must have simplified input requirements--preferably menu-driven except for "special" entries such as narrative nursing notes.
4. It must provide for a wide variety of data: documentation of patient condition and progress; frequent changes in diagnoses, nutrition and treatments; wide variation in length of patient stay, i.e. from a few hours to many weeks.
5. It must be priced within the normal cost constraints of a hospital nursing unit's budget.

The Microcomputer System:

The hardware configuration on which our evaluation was conducted consists of:

1. A 48K Apple II Plus with DOS 3.3
2. Two disk drives
3. An NEC green screen monitor
4. An Epson MX-80 dot matrix printer.

Procedures

To evaluate the two program packages, I used both in the context of a study of an intervention strategy aimed toward minimizing the bilateral head-flattening in pre-term infants. We used forms and data which had been used over the six-month course of the study, setting them up according to the requirements of the PFS and A-STAT packages.
All clinical and research observations were recorded and analyzed by distribution summary procedures; the statistics requires the for the data analysis were computed when possible.

The PFS Package:

Marketing figures show that the PFS set of software is very popular among Apple computer users. The package consists of three separate programs: The Personal Filing System, PFS: Report, and PFS Graph.

The basic program is PFS: Personal Filing System, it is a very versatile and flexible program. Essentially, the user is free to design an information recording form in a format specifically suited to the users' needs. Once the form is designed, it is stored. The form may consist of from one to 32 pages (one page=one screen). The forms are stored on a standard 5 1/4 diskette; a diskette can hold up to 1000 one-page forms. Additional diskettes may be used for additional cases. The program permits the user to add or delete items at any time or to modify the structure of the form after several forms have been filled in. This is particularly important in a setting like ours in which the patients may be subjects in several simultaneous clinical studies, or may not be involved in any studies. Only the input which is relevant to that patient is required. Specific forms can be retrieved easily, and hard copy of all or part of the information may be printed at any time.

A part of one patient/subject's record is shown in Figure 1. Each record consisted of four pages, of which two are shown here. This represents a "third generation" of the form. Changing the form is easy and existing data are in no danger of being lost, however, I found the "running time" for the saved data to be transferred from Disk 2 back to the revised form on Disk 1 rather long. For subsequent changes, I will add new material at the end of the current form and update all existing records since that will be quicker.

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11: XXXXXXX STATUS: E

BIRTH DATE: 10-24-80
GESTATIONAL AGE: 46 WKS.
SEX: Male: 48/1
BIRTH WT.: 17.40
BIRTH WT.: 2.15 IBS.
HEIGHT LENGTH, CHEST: 20.5
HEIGHT LENGTH, CHEST: 11
HEART RATE: 180
HEAD SHAPE: Comments:
Mother's Age: 30
Father's Age: 34
Marital Status: COMMENTS:
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PFS:Report uses PFS files to produce tabular reports. The user identifies the columns and rows of the report. The rows are the cases and the columns are the variables. The report may consist of up to nine columns, each of which corresponds to an information category on the original form. Additional derived columns may be calculated by simple statistics. Totals and means may be computed for each column at any time. This capacity for generating "instant" summary data is a distinct advantage for a hospital unit which not only has "special" patients, but is also quite small in comparison to the other units in the system. Smaller, specialized units seldom get the "special" statistical services from a hospital mainframe system, because such services are simply not cost-effective for the larger system.

The PFS:Report program also permits partitioning of the cases into sub-cATEGORIES (e.g., babies grouped by gestational age, by birth weight, or by diagnosis), and computing simple summary statistics for selected columns. For example, interim summaries of some characteristics the babies in our study grouped by membership in the experimental (E) or control (C) group. Report provides a quick easy way to keep up to date on the progress of the study as you go along. For example, we noted earlier that the random assignment of babies to the two groups had resulted in having bigger babies in the experimental group and smaller babies in the control group. This was not desirable so we had to be observant of the weights in the event that we needed to intervene in the random assignment process.

While screen displays are directly available, the maximal utility of this program is in the printing of hard copy. This is of special importance in a hospital like ours which may be totally "computerized," thus requiring hard copy for the necessary "permanent" patient records.

PFS:Graph is the third program of this set. It permits the user to devise a wide variety of bar graphs, line graphs and pie charts to display information contained in PFS files. With appropriate additional software (e.g., Graftrax-80) the charts may be printed on a dot matrix printer. The hard copy is of adequate quality for inclusion in summary reports. When printed out using the "expand" command they are large enough to use as camera-ready copy for the preparation of visuals such as slides and/or transparencies. Figure 3 shows one graph generated from our study data. Again, changing the forms and updating the data for graphs is easily done using PFS.
A-STAT 79.6C

A-STAT is a powerful multi-statistics package that is quite good in numerical computations; it also provides excellent file structure and management. While the package is statistically oriented, there is a program option called Write.File.Cabinet which permits the user to convert A-STAT files into a file cabinet database that can be used with the file cabinet program available from Apple Computer Corporation's User Contributed Software. Among the many statistical procedures available in the A-STAT package are:

1. frequency distributions;
2. variable transformation;
3. bi-variate tables analysis;
4. correlation and regression—bivariate and multiple variable;
5. analysis of variance.

Until recently, A-STAT was ranked among the very best in statistical packages available for microcomputers. However, it remains to be seen if it will maintain its position in the face of the increased competition from many other packages that have appeared in the last 18 months, as well as those which currently are being developed.

Results

1. Not surprisingly, the PFS package proved to be much more applicable to patient data management. The ability to use up to 32 pages of reporting text made the inclusion of nursing notes as well as the structured variables a clear advantage of PFS over A-STAT. I would highly recommend that any nursing unit going to a micro system explore this alternative.

2. PFS:File Cabinet meets all the requirements identified earlier, as do Report and Graph. File Cabinet does not require pre-coding of input and both numeric and discursive input are accepted. This is useful in the clinical setting, because study data may be input by several different nurses and unit clerks over the course of a study.

3. The statistics generated by PFS:Report, while highly limited, were adequate for most of the "first-line" data requirements of this study. As is the case in many clinical studies, our N was small, thereby eliminating the necessity for any "number-crunching" procedures, and prompting our use of non-parametric statistics. Thus, the Report printout provided all the information we needed to calculate the appropriate statistics (e.g. the Randomization test). These calculations usually required less than 10 minutes after the print-outs of "first-line" data were obtained. This is a very useful feature of PFS, since most statistical packages (including A-STAT) provide inadequate or minimally adequate coverage of non-parametric statistics.

4. A-STAT is clearly superior for detailed distribution descriptions, cross-tabulations, and linear regression analysis. However, I would rate its user friendliness in terms of the documentation only a "medium," even for a user with experience in research and computer use. I found that it was hopeless for the neophyte. Assuming there is an experienced researcher (such as a clinical nurse researcher) on the research team, this person would probably reap the most benefits from the A-STAT package.

Concluding Remarks

Both PFS and A-STAT are good choices for microcomputer use in the clinical setting. Given the nature of patient records, PFS is clearly a possible first choice. However, its value should be ultimately determined through comparison with other database systems such as VISICALC or MULTIPLAN.

A-STAT is clearly useful for the experienced clinical nurse researcher, because it has a considerably wider range of statistical options. However, it may soon be eclipsed by newer packages. Unfortunately, integrated software which is truly compatible with the requirements of both clinicians and researchers in nursing is not generally and cheaply available. Thus, our best option is careful evaluation and combination of the software that is available, along with keeping a keen eye on the lookout for that "magic package" when it does appear.