COOPERATIVE SAS USAGE: UNIVERSITY OF TORONTO AND TORONTO GENERAL HOSPITAL

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Abstract

Toronto General Hospital is one of several teaching hospitals affiliated with the University of Toronto. The Cardiovascular Surgical Division of Toronto General Hospital uses the SAS package installed at the University of Toronto in many of their research projects.

With technical support from the SAS installation group at University of Toronto Computing Services (U.T.C.S.), and the versatility of the SAS package, the division is able to perform sophisticated statistical analysis on its Metro-Toronto adult open heart data. Monthly and quarterly reports on morbidity and mortality of patients undergoing routine surgery have been compiled and generated. The ability of the package to extract and analyse from a large volume of patient information collected at various intervals helps in isolating factors associated with post-op morbidity and mortality.

It is anticipated that the SAS package's inherent ease of use, the ability to perform complex calculation and equally important, the strong local support, will combine to attract numerous new applications and an increasing usage from various hospitals in the area.

Project Scope and Organization

The City of Toronto, as one of the major adult open heart centers in Canada, performs about two thousand open heart operations a year. In 1981, three hospitals in the Metro area, Toronto General, St. Michael's and Toronto Western, agreed to participate in the Metro-Toronto Adult Open Heart Project. The large number of patients and the complexity of their cardiovascular diseases made the use of an information system mandatory. Faced with the vast amount of health, operating, and post-operative data associated with each operation, the hospitals have had to deal with the major task of proper and efficient management of this information. Meaningful analyses of the cause and effect relationship are extracted from this data in order to document indications and results of surgery, identify problem areas, identify changes in the patient population for planning purposes and permit comparisons in the city-wide practice of Cardiovascular surgery. Qualified personnel from each hospital were selected to participate in the study under the leadership of the Project Coordinator and Director of Research for Cardiovascular Surgery (CVS) for Toronto General Hospital (TGH).

System Package Selection

When computerization of the data was deemed essential, the criteria for selection of a suitable data management and analysis package were: its ability to handle large and growing volumes of data; the versatility and capability to perform sophisticated statistical analyses; report writing function; and the ease of use of the package. It was felt that SAS (Statistical Analysis System) would meet all the data processing and statistical needs of prospective and retrospective studies that were being undertaken. In 1981, SAS was not available on Toronto General Hospital’s IBM 4341 computer. Thus it was necessary to find a SAS installation which could meet all of the project’s computing needs. University of Toronto Computing Services (U.T.C.S.) was chosen for the following reasons:

I) Hardware Peripherals - readily accessible CRTs and printers
II) "Behind the Lines" application support
III) Accessible and knowledgeable installation representative
IV) Advising Service has staff with extensive background to handle problems and support for other aspects of computer usage, such as WYLBUR help, credit requests and hardware problems.
V) Centralized Information Source - Among other computer usage courses, two levels of SAS courses are offered on a regular basis. SAS manuals are kept in stock.

Since TGH is one of several teaching hospitals affiliated with the University of Toronto, U.T.C.S. was available to the Division. The whole selection process was extensive and the decision to use U.T.C.S.'s resources was not made without thorough review and consideration.

SAS AT U.T.C.S.

SAS has been available at U. of T. for over seven years and currently runs on two IBM machines (3033/NI2 and 4341 Mod II). It is U.T.C.S.'s most heavily used software package, by its' own internal staff as well as a wide spectrum of users, including researchers, administrators and students. SAS, SAS/GRAPH and SAS/ETS are installed, tested and announced by the SAS installation representative. Information about SAS software changes, new features, and local improvements appear in articles in almost every issue of ComputerNews, U.T.C.S.' own Newsletter. Messages are printed with every SAS job to provide more timely information about common problems or current changes. SAS courses, individual consultation and a Phone-In Advising Service are also offered by the same Support group.

How SAS Is Used By TGH/CVS

For each patient that undergoes open heart surgery, demographic clinical and research data are accurately documented. Data are collected and carefully checked before input; intermediate
reports are produced for quality control and internal consistency of the data. Monthly reports concerning the morbidity and mortality for certain subgroups of patients undergoing routine surgery are then produced. Complex statistical calculations using SAS procedures GLM (General Linear Model), TTEST, and ANOVA (Analysis of Variance), among others, are also performed in order to isolate the factors associated with post-operative morbidity and mortality. PROC BMDP is used frequently to take advantage of BMDP's (Biomedical Computer Programs - P Series) survival analysis programs without sacrificing SAS' data manipulation abilities. The ease of use of the system has allowed researchers to concentrate on analyzing results rather than learning how to write SAS programs, saving them time and money. The flexibility of SAS' file management abilities has been satisfactory in meeting the changing needs of cardiovascular surgery studies.

Benefits of Cooperative SAS Usage

Cooperation between U.T.C.S. and TGH has had many positive benefits for both sides. U.T.C.S. support staff have become familiar with the Open Heart Project through frequent contact with TGH researchers. This enables TGH to get problems solved more quickly, while U.T.C.S. can get a better understanding of practical SAS application and common problem areas. Useful tools, such as an easy WYLBUR command for allocating SAS data libraries, have been created in response to user difficulties. TGH staff are able to learn more efficient data management techniques, while U.T.C.S. can observe the real problems that arise in maintaining large data sets. It is expected that the congenial working relationship between these two organizations will continue to illustrate the cooperative usage of SAS for many years to come.

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