

The London Hospital Computer and Operational Research Unit

The London Hospital Computer and Operational Research Unit: Progress Report 1967

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THE LONDON HOSPITAL
Computer and Operational Research Unit

Progress Report 1967

1. Computer Usage

There has been a steady increase in the demand for computer time leading to an overall mean running time of 104.6 hours per week for the year, compared with 50.7 and 74.4 hours per week respectively for 1964-5 and 1965-6. The day shift is almost completely taken up with data input for system programs using the regular computer operators. Most program development and research is carried out during the evening and at weekends; much more intensive use has been made of unattended overnight computer runs for data analysis and file searching. At intervals even these arrangements have proved inadequate and the machine has been operated throughout the night.

The present loading of the computer is fairly close to saturation level and it does not leave much margin in case of breakdown. In order to relieve this pressure it is hoped to increase the regular operating sessions into the evening by increasing the number of computer operators. Further relief will also be gained by improving the efficiency with which machine time is used both during the overnight analysis runs and during program testing sessions. Details of the use of computer time during the year are tabulated in Appendix 1.

2. Developments during the year

The computer has continued to take over the financial system from the increasingly unreliable punched card equipment and, in addition, the Medical College's payrolls have been taken on.

One of the major problems that has emerged in the financial system is the amount of program maintenance and modification required to keep the programs abreast of needs of the Finance Department. This continuing process is required in any system subject to change: and it is particularly difficult to test all aspects of a new modification to these programs in advance of the production run, particularly the payroll suite of programs. Every modification, however carefully checked, contains potential error: the only protection is to provide resources of staff and computer time to permit the provision of detailed specifications with duplicate running and extensive checking. These resources are not available either to the Computer Unit or to the Finance Department, so that modifications are made with such checking as is possible within the time-scale set. Effectively, therefore, such changes are checked by operational running and the risk of errors arising from such procedures is borne by both the Computer Unit and the Finance Department. In practice, in relation to the overall amount of work processed, the number of errors have been small.

In the Patient Administration System two major files were initiated covering summary returns from the Wards and the Out-Patient Clinics. These files have now been running for a complete year, providing basic data to enable the Administration to keep under constant review matters such as the use of the hospital beds and the functioning of the Out-Patient Clinics. The introduction of these files frees the patient-based records from the administrative routine thus allowing a more comprehensive patient record to be introduced.

At intervals projects have been taken on for various members of the Medical Staff. It has been found that the most useful results are produced when there is a continuing dialogue between the computer staff and the clinicians. Few medical projects are of the type that can be specified, programmed, tested, run and the results handed over without further discussion and examination. Research always involves much thought and re-examination of the materials. The computer renders certain things feasible but does not do the basic thinking; and the idea that it is an occult device that will automatically sort out problems, remedy defects in the data provided and somehow produce the 'answer', without effort, is difficult to dispel - even three years after installation. A brief introduction to the computer and its potential has, therefore, been written to assist the growing number of interested Medical Staff with some aspects of this process of acclimatization.

As a result of the high level of demand for the use of the Unit's slender resources, the House Governor set up a small Computer Executive Committee to oversee the use of these resources and to allocate priorities to computer projects. The build-up of the financial and patient administration systems made it increasingly difficult to cope with the volume of printing required. This bottleneck was overcome by the purchase of a Vacwell character printer, which prints at five times the speed of the other printing equipment. This machine has proved a very useful addition and it has the further advantage that it is capable of being modified for use with other computer equipment.

During the Summer the computer was out of action for two periods of about one week each, the first time as a result of a fundamental fault in the machine store and the second time with faulty operation of the magnetic film handlers and their controller. On each occasion this involved a period of acute dislocation preceded by a period of increasingly unreliable machine operation. Each breakdown left a legacy of about 60-80 hours of computing time to catch up during the following weeks - a difficult task with the current loading. Also it highlights the advantages of diversification of the computing load. In earlier years there was a better balance between system and research usage of the computer and any breakdown merely involved the suspension of research for a time, thus allowing the systems work to be cleared rapidly.

3. Operational Research Studies

Although it has slowly become clear that one of the continuing functions of the Operational Research Unit involves the scientific support of the developing hospital computer systems, a number of special projects were undertaken. The analysis of the Out-Patient Clinic and bedstate files was undertaken with the intention of developing effective management criteria. The initial Out-Patient programs were written to examine such matters as the duration of each consultant's clinic sessions, the spread of their appointments, the extent to which the first and last appointments were matched to the starting and finishing time of the clinics, the growth of the clinic. In the case of the bedstate file, the analysis is carried out in terms of the bed-usage by consultants, by wards and by specialty. Also the 'lodging' of each consultant's patients in other wards is tabulated. These analyses give important insights into the functioning of these aspects of the hospital even though the availability of complete files for 1967 gives great scope for more extensive analysis. The main need is for the implementation of ideas arising from the existing analyses rather than the quest for further complexity in the analysis. A number of out-patient clinics have been modified as a direct result of this work but there is much still to be done.

A preliminary study of the theatres was undertaken up to the point at which a computer system based on the anaesthetic record could be set up. This was not pursued at that stage but was followed by an extensive 8 week study of the emergency anaesthetic work at Alder Hey Hospital, Liverpool, and the Northampton General Hospital as well as The London. In addition to obtaining much descriptive material, this allows the construction of simple queueing models of the system to assist with the determination of staff requirements.

4. Current Developments

The last sections of the financial system will be taken onto the computer as from 1st April 1968, and thereafter the system will require only maintenance and modification rather than full scale development. As from 1st January 1968, the Patient Administration System is dependent on the Out-Patient Clinic and Bedstate files and more medical information can be included in the computer records. The two-part processing of discharge and diagnostic records has now been abandoned and a much more extensive record (Hospital Activity Analysis) has been introduced. The Patient Administration System currently lacks the protection of the detailed checks and controls devised over many years of accounting practice for the financial system; and the introduction of appropriate controls for the Patient Administration System is a continuing pre-occupation. The information on the system files is only as good as it has been demonstrated to be in practice and appropriate reporting of the patient files is under investigation.

Plans have been submitted to the Ministry for the installation of a substantial computer configuration to handle the hospital's developing Total Information System. The objective is to use modern computing techniques, backed by management science theory, to provide a better means of disseminating information throughout the hospital and controlling its operation. Experience gained in applying the existing computer to medico-administrative problems will provide the basis for the creation of an extensive Patient Administration System as the principal component of the Total Hospital Information Service. It is hoped that the machine will be installed in the year 1970-71 and will have facilities such as real time operation as well as providing considerable conventional computing power. It is envisaged that the design team for the necessary computer systems will be built up from April 1st 1968.

Continuing efforts are made to assist the process of computer education within the medical field. In addition to informal tutorial sessions, lectures have been given to some medical students and staff and the medical computing profession at large. Also, the Hospital Physicists' Association held a successful meeting on "The Uses of Computers in Hospitals" at The London Hospital last February with an attendance of just under 300.

Publications

Barber, Barry "Computer Assisted Physics in Radiotherapy",
Phys. Med. Biol., 1967, Vol.12, p.411 - 412.

Papers Presented

Abbott, W., "Hospital Systems Analysis and Implementation",
London Hospital Conference (H. P. A.) 1967.

Barber, Barry "Out-Patient Clinics and Computer Simulation",
London Hospital Conference (H. P. A.) 1967.

April, 1968

APPENDIX I

Table of Computer Usage

	1964-5		1965-6		1966-7	
	Hours	%	Hours	%	Hours	%
<u>A. Systems</u>						
1. Financial System	592.9	22.1	1261.5	32.6	1597.1	29.4
2. Patient Administration System	272.5	10.1	599.1	15.5	1735.1	32.3
3. Other	-	-	2.5	0.1	-	-
<u>B. Research and Other Usage</u>						
4. Operational Research	118.9	4.4	439.2	11.3	363.3	6.7
5. Patient Surveys	313.9	11.7	164.1	4.2	128.00	2.4
6. E.E.G. Department	14.9	0.6	271.1	7.0	550.9	10.1
7. Sundry Statistics	12.2	0.5	18.4	0.5	45.0	0.8
8. Mathematical Analysis	112.2	4.2	59.5	1.5	248.7	4.6
9. Other (a) Department of Pharmacology	145.9	5.4	184.9	4.8	17.9	0.3
(b) M. R. C. Units	143.0.	5.3	253.8	6.6	171.1	3.1
(c) Miscellaneous	595.8	22.2	218.4	5.6	78.0	1.4
10. Computer Unit	363.5	13.5	399.2	10.3	484.0	8.9
	<u>2685.7</u>	<u>100.0</u>	<u>3871.7</u>	<u>100.0</u>	<u>5437.1</u>	<u>100.0</u>
Average weekly running time	50.7 hours		74.4 hours		104.6 hours	