

MEDICINE AND THE COMPUTER

VI—Hospital Information System*

[FROM A SPECIAL CORRESPONDENT]

The primary aim of a hospital information system is as a management tool, to help the medical staff and administrators run the hospital more effectively—a particularly important requirement at the present time, when the expanding demand for services has to be met despite restricted resources. Traditional information systems cannot provide adequate information; they are too slow, inflexible, incomplete, and unintegrated. Most data recorded, therefore, are inaccessible for administrative analysis or indeed for medical research. Hence the ideal hospital information system should be computer based. The computer alone has sufficient data processing power to handle adequately the mass of raw data continually generated within a hospital. Moreover, it can perform most of the same data processing operations as a human being with such speed and efficiency that it can do in a few minutes what a large office would require days for. A fully developed system could be kept continuously up to date with all hospital data as the latter were generated.

Computerized Records

In the United States such large-scale systems are now being developed, while in Britain the foundations are being laid in a few hospitals. One of the farthest advanced is in operation at the Queen Elizabeth Hospital, Birmingham, a teaching hospital with no appreciable outpatient department. The basis of this is a system of computerized medical records, keeping the patient as the basic unit of record. On admission to hospital each patient is registered on a punched card, which continues thereafter to record much of the details of his investigation and treatment in hospital. In the Medical Records Office a typewriter cardpunch is used to type a patient's admission data on to his newly assembled casepapers. Simultaneously most of these data are automatically punched into computer-readable punched cards. Several copies of an all-important key card are also punched; the first few columns contain a shortened extract of the patient's personal data, sufficient to identify him uniquely in the small hospital population, the rest being left blank. All data concerning a patient's subsequent hospital experience are input to the computer on these key cards.

Each day the admission cards for newly admitted patients are read into the computer, which produces a new record on its inpatient file, containing the admission data on each patient; at the same time the validity of the key card data is checked.

Data about a patient's course in hospital are collected from the bed-state control forms. One for each ward is produced

by the computer each afternoon, containing a list of patients known by the computer to be in the ward. The night sister makes necessary amendments, adds other bed use summary data, and returns the form to the Medical Records Office. The last feeds the relevant data back into the computer, which is therefore provided with a check on any patients bypassing the Admissions Office, a record of ward and consultant transfers, and details of deaths, discharges, and home leave. This means that the inpatient file can now be brought up to date. For each patient transfer and discharge (including death details) are punched into the blank portion of one of the patient's key cards. This "up dating" is done every day, and the discharge cards are filed to await details of the patient's diagnoses and operations performed, which come from the diagnostic summary forms completed by the doctors when they write up the case records of discharged patients.

Analysis of Records

The cycle is thereby complete; by its repetition the computer accumulates medical records of patients to form a continually growing case register. Though the records are at present only shortened versions of conventional records, the data contained within them are readily accessible for extensive and rapid analysis. This contrasts strongly with any collection of conventionally held data, which are virtually inaccessible. For example, the computer produces a case load summary for each consultant, and monthly analyses include the use of beds by ward and by consultant and specialty. These have already shown considerable differences in bed usage between consultants and specialties, indicating valuable areas for study. At present these and other analyses are largely centred on the use of only one resource—namely, beds—but as the other major hospital departments become involved in the computer system further types of analyses will become feasible.

As well as the existing system of computerized medical records a computer linkage mechanism has been devised which will allow the development of a total, fully integrated hospital information system. As other departments computerize their records this linkage mechanism (which is the computer version of a conventional patient card index) will allow their patient data to be cross linked and to be linked to the patients' computerized medical records. Several departments are already on the way towards putting their records on the computer. In fact the hospital biochemistry department has already computerized its record keeping, and the patients' biochemistry records will soon be linkable with the data on their main inpatient record. A research tool of extreme value will thus be built up, enabling cross-correlation between biochemical and other factors.

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