POISE: A PATIENT ORIENTED INFORMATION SYSTEM AND ENVIRONMENT

D. J. Shepley, B.A.Sc., P.Eng., M.D.
Director, Dept. of Medical Engineering and Computer Services,
The Hospital for Sick Children, Toronto, Ontario.

ABSTRACT

An integrated Patient Oriented Information System and Environment is described. This approach exploits the structured file. The advantages of modular growth and ease of integration of "modules" are discussed. The methods of data capture and the types of processing presently utilized are outlined. Two modules, Cardiology and Medical Records, are discussed in detail. Reference is made to the incorporation of future modules. The effective utilization by user is discussed and emphasized. Personnel, software and hardware requirements are described briefly.

INTRODUCTION

Health care today is extremely complex. It is initiated through actions based on data from a multitude of widely differing sources -- the patient, the relatives, the diagnostic laboratories, the consultant, the paramedical services, and so forth.

The data from these sources is often untimely, illegible, vague, ill-organized and voluminous. Yet, the provider of health care must use this data to define the problem and recommend treatment. How can the timeliness, accuracy, legibility, organization and contents be improved? Studies reveal that each source has its own data requirements.

These sources have developed different methods of capturing, filing, storing, retrieving and reporting the data they generate. Their needs are met after a fashion. But what about the patient's needs? Often the same data must be captured by the different sources. This duplicates files and duplicates effort. The proper data may not find its way back to where it is needed when a decision must be made. The goal becomes cloudy, for data must be organized to meet the needs of each source, yet minimize duplication, incompatibility and fragmentation of data relevant to the individual patient.

A Solution:

Simple structuring, nothing new to data processing, can solve this apparent problem. Exploiting this mechanism, detailed data banks can be established to meet the needs of the particular source. A master file will tie all the data banks together. This principle has been used by many others in establishing systems to handle patient and other types of data.

Advantages:

The advantages gained by using this mechanism include the ability to introduce a source of data, say from a biochemistry laboratory or a cardiology service, without having to implement a total information system; in other words, only one source or module need be added at a time. As well, information can be broken down to a more detailed level and added to the system as required. In addition, a complete file can be integrated into a larger, say regional, system just by adding the appropriate headers to the master file.

The Hospital for Sick Children:

Like all hospitals, The Hospital for Sick Children has a multitude of sources of data concerning a patient. Each source requires data to be organized to meet its needs. Recognizing the advantage and flexibility of the structured approach, a plan was established to organize the collection, storing, retrieval, and reporting of data where processing of the ever-increasing volumes of data had become cumbersome and time-consuming. Several data banks for off-line batch processing were organized keeping in mind that as hardware improved and terminals became available the creation and maintenance of the current master file as well as the data banks on current patients could be carried out in real-time.

When dealing with medical data, two needs must be considered; the need to render therapy based on current data, and the need to evaluate the effectiveness of the therapy through retrospective study and analysis. The time requirements for providing current data demand sophisticated hardware and are more stringent than the time requirements for providing data for researchers' analyses. Efforts were directed to develop a system to handle data in batch mode from two sources where many surveys and analyses are carried out continuously, Cardiology and Medical Records. This is not to say other sources do not carry out evaluative surveys but most specialties carry them out through the medical records department.

Cardiology:

First, the painful yet necessary task of determining what specific data are really required to follow the patient's condition was initiated. Workers in the Department of Cardiology had already carried out this task and had arrived at a definition of the data required, and a format for recording it; the Cardiology "Zebra" sheet. As new diagnostic techniques and treatments arise, space must be provided to incorporate them. Cardiology had already made this allowance. Data was abstracted from the "Zebra Sheets" and coded by clerks onto code sheets, to be used as source documents for keypunching. Approximately 20 years of data producing about 14,000 patient records were captured in this manner. Because of this volume, little processing was done on the unit record equipment then available in the hospital. When more powerful processing equipment was acquired the method was re-examined.

It was recognized early that the Zebra sheet, the doctor-system interface, would not be replaced by a "terminal" in the first instance, if at all. It was left untouched. It was felt that abstracting information onto code sheets

should be continued as a quality control. To ensure quality control coders were instructed to render no interpretation of the data they encoded. Thus any item which was found difficult to code was clarified with the physician who had recorded it. In other words, because the interpretation was rendered by the physician, the source of the data, validity was ensured.

In the past, processing on unit record equipment was limited to the production of cross-indices, for example, diagnosis to history number, history number to name, etc. These sequential listings were difficult to produce because of the time required to handle the large volume, but they allowed charts of individual patients to be pulled for specific research projects more readily. With the introduction of the more powerful processing capability, the computer, the file was converted and coding was expanded to include data which could not previously be processed. At present the file includes 16,000 patient records.

Requests for information in other than index form increased. It soon became apparent each request would require a separate complete program. An approach was sought which would enable us to use a standard output format so that data would be presented as expected and re-runs would be unnecessary. Programming would be minimal or only a few control card changes would be required. Further, we desired a system to present information in logical groupings, not necessarily exactly as requested, but in an order that would allow pulling out the points of interest. In other words, an order that provided logical groupings of complete records and allowed the researcher to manipulate the data manually in any way he wished within the groups of his interest. This feature obviates the necessity for the re-programming and re-runs which would be required when the data was "not quite right," yet, it allows researchers to focus on the group of patients in question.

Medical Records:

The Medical Records Department had accepted the difficult task of identifying what information was required to enable them to pull the 21,000 charts requested each year for research purposes, to provide the necessary statistics, to provide the necessary indices, and to provide appropriate information for accreditation and various in-hospital committees. A form was developed to enable a fixed body of information to be captured after a patient was discharged. The form is so designed that when other data sources or modules are integrated into POISE the sections relating to each source will be ignored or deleted from the form. The content itself was grouped into three data categories -- Identification, Diagnosis and Course.

Identification: Although a unique number identifies a record, accurate identification of an individual patient requires a complete identifying system. We accommodated multiple numbers and other points pertinent to the patient, for example, a unique history number, admission date, and registration number. These data become in fact the header which ties all records (medical or not), together for that patient and that admission.

Diagnosis: There are many diagnostic codes; ICDA-H, ICDA-8, SNOP, CMT, and so far the sub-specialties have, as well, their own specific codes. Thus no one diagnostic coding system would meet the demands from all sources so for this hospital accommodation was made for multiple diagnostic coding systems with ICDA-8 being the main one. Again the coders have been instructed to render no interpretation. Therefore, when any data are vague, the attending physician is consulted and the data corrected. This provides quality control and ensures clean data.

Course: In the beginning we recognized that detailed results were not required. It was only necessary to know if something had or had not been done. So approximately 95% of all the major tests and procedures were indicated. Accommodation was made through "other" for the 5% unusual tests or procedures. It is in this section that as data sources or specialties or modules become organized and integrated into POISE the various groupings of tests such as Biochemistry or Haematology, may be dropped or ignored by Medical Records since the results will be captured from and will be available through the system.

Once the abstract sheets were in use programs were established to build and maintain the file. It soon became apparent that many questions and requests would be asked of these data so, as with Cardiology, we provided listings of complete records in logical groupings. In fact, the indices required by medical records included those by diagnosis, by operation, by ward, by service, and by physician. These indices provide, for the most part, data about 90% prepared, so that medical records librarians can pull out a more appropriately defined set of charts for whatever purpose. The indices themselves are those required for accreditation.

ACKNOWLEDGEMENTS