Computer Recording of Data from Patients on Regular Dialysis

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A single haemodialysis is accompanied by the recording of a large number of observations. If these are condensed into a summary so that pre- and post dialysis weights and blood pressures, measurements relating to shunt function and anti-coagulation, and a record of the location, length and type of dialysis are retained then each dialysis produces about 22 separate facts. With the addition of occasional haematological and biochemical observations, this number of facts builds up at the rate of approximately 250 per patient-month, or 3,000 per year. A programme consisting of as few as 20 patients therefore produces data at the rate of at least 60,000 per year. Because of the mass of data it becomes increasingly difficult to follow changes in individual parameters or to detect any overall drift in results affecting the group of patients. Changes in the team responsible for the patients' care and rotation of responsibilities within that team dictate that the data should be retained in an accessible form. Most of the facts are numerical, and those that are not can be coded simply. They are therefore eminently suitable for computer recording.

The staff of the renal unit and the computer team at St Thomas' Hospital have collaborated to design a system for the computer recording of data from patients on regular dialysis. The system was designed with the following aims:

1. To be simple and suitable for data recording to be handled by the patient and by the nursing and clerical staff of the unit.
2. To be capable of receiving input data about each dialysis, results of laboratory determinations, and free format clinical comments.
3. To process data and produce a regularly up-dated print out so that this could be used clinically for patient management.
4. To make data available for periodical scrutiny or research analysis.
events such as shunt operations, incidental infections, diagnosis of antibiotic hypersensitivities, and special X-rays and investigations. Each of these is allotted an identification code.

These three forms comprise a comprehensive clinical record and are themselves the documents from which the punch cards are prepared. A fourth form is used when a new patient's identification details have to be entered. One 80 column card is used for each form.

PROCESSING

The punch cards are processed once per week on an ICL 1905 E Computer using a single COBOL programme. This reads the cards, carries out simple validation checks and then writes them in a work file. This file is then used to update the master tape file. The records on the master tape are in the same form as the input cards. Each patient has an identification record and then the summaries of any number of dialyses, laboratory results and clinical comments, all in date order.

OUTPUT

At the same time as the master tape file is updated a summary of the current month's data for each patient is printed out. The print out at the end of the month is filed in the case notes, and the incomplete ones are destroyed. Regular output includes a list of cards with errors. These can be corrected and included in the next processing. The file of data on tape is available for future analysis using either standard statistical packages or special purpose FORTRAN programmes.
TECHNICAL DESCRIPTION OF THE SYSTEM

The data capture and processing and the output of the system is outlined in the flow diagram (Figure 1).

INPUT

Three forms are used to collect data:

**Form 1**  The dialysis record (Figure 2). The summary data is recorded in the numbered boxes by the patient or nurse either during or immediately after dialysis.

**Form 2**  Laboratory results. These are recorded on the reverse side of Form 1 by the unit secretary or nursing staff.

**Form 3**  This free format form permits the input of a record of clinical

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**Figure 1. Flow diagram of computer processing**
Figure 2. The dialysis record form (Form 1). This form serves both as a working document during the dialysis and as a document from which the punch cards are prepared. Data summarizing the dialysis is written in the numbered boxes. The form illustrated was completed by the patient during a home dialysis treatment. A four letter code (Col. 48-52) is used to record aspects of shunt function (ie whether the bubble trap pressure was constant or variable, whether the blood was pumped or not and whether a shunt or fistula was used) and to note if the patient's own dialyser or a reserve one was used. A five character code (Col. 51-56) is used to record the location of the dialyser and the type and number of equipment used. Changes in weight and the final dose of heparin used are worked out by computer from the data recorded on the form.