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AN AUTOMATED RECORDS SYSTEM FOR GENERAL PRACTICE

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The general practitioner through his contract with the local Executive Council is responsible for the medical care of a named group of people. Additionally he may from time to time accept responsibility for temporary residents. The average general practitioner has 2,500 to 3,000 patients on his list, and any one of these may consult him at any time. Thus in any general practitioner records system it is necessary to maintain an 'active file' of records available at short notice for all persons registered. This presents a different problem from that of a hospital where most transactions are covered by a relatively small file with very high activity and a large file from which records may be retrieved over a period of hours or days, rather than seconds or minutes.

During the course of one year between 8 and 12% of patients registered with the general practitioner would be expected to leave his list and a similar number will register. Additionally some people who remain registered with the general practitioner will change their addresses, or their names on marriage, so that it is necessary to make these and other amendments to the basic patient record.

This paper describes the methodology of setting up a computer-based practice file and of its continuous updating. This is the first phase of a feasibility study to establish an automated computer-based records system for administrative and research purposes. Some of the potential rewards of the system are discussed later. No attempt is being made to include records for clinical management in this system, since, as Marinker (1969) has pointed out, the unstructured nature of clinical notes presents the greatest obstacle to the application of electronic methods to data collection.

Establishment of a Practice Population File

Personal data of a patient registered with any general practitioner, including names, address, dates of birth and registration, and National Health Service number, are available from two sources—the records of the Executive Council and the medical record envelopes in the general practitioner's files. The data stored in each situation do not always exactly agree *(vide infra)*. However, since the former constitute the definitive practice list for administrative purposes, they have been used as the basis for the compilation of the new practice file.

The data on forms EC2, which relate to the patient's registration at the Executive Council, were typed on continuous stationery, using a fixed format, convenient for subsequent punching. The data were transferred directly from the typescript to two punch cards (2GP and 3GP), using the format devised by Cross, Droar, and Roberts (1968) for the computer-based registration system of the Queen Elizabeth Hospital, Birmingham (see Table).

Table

Column	Data	Characters
	Card 2GP	
1- 3	2GP (card code)	3
4- 9	Patient serial number	6
10	Sex (M or F)	1
14-26	Surname	13
27	Civil state (S, M, or N = not known)	1
28-38	First forename	11
39-41	First 3 letters of second forename	3
42-54	Maiden name	13
56-61	Date of birth	6
65-70	Date of registration	6
71-77	General practitioner code	7
	Card 3GP	
1- 3	3GP (card code)	3
4- 9	Patient serial number	6
10-55	Address	45
59-72	National Health Service number	13

The following items need further description:

Patient serial number This is a six-digit number using numeric characters only, and is the main link number in the system. For the compilation of the initial list it was allocated serially as the patient record was transcribed on to the continuous stationery.

Date of registration This refers to the date of registration with the general practitioner not with the

partnership. Thus in an ongoing partnership, in which one of the partners dies and the patients are transferred to another doctor, the date of registration will change.

General practitioner code This is the seven-digit number used by the Executive Councils to identify general practitioners.

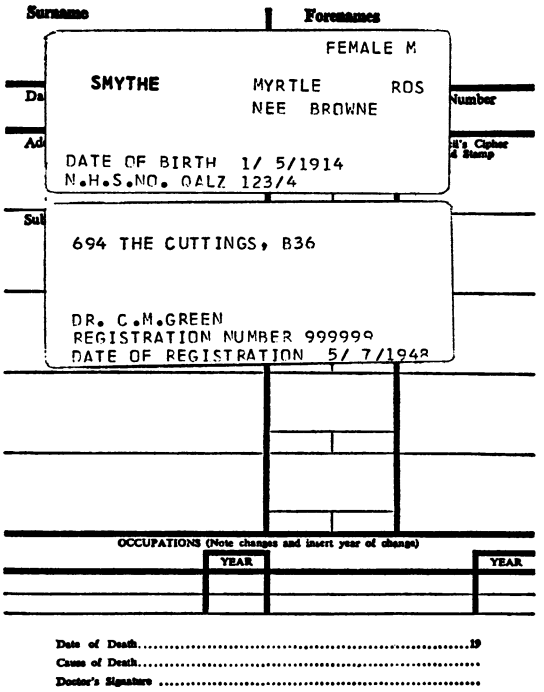
National Health Service number This was written as it appeared on the patient's medical record card.

Creation of Magnetic Tape File

The cards were sorted mechanically so that the 2GP and 3GP cards were consecutive for each serial number. None of the programs will accept cards that are out of sequence. The cards were read into the computer using a validation program (see Appendix I), and all records not accepted as valid were printed out in full and in two stages: stage 1, where there was a discrepancy in matching 2GP and 3GP cards; stage 2, where the 2GP or 3GP cards contained invalid data. The non-valid fields were underlined on the print-out and these invalid records were checked against the typescript for punching errors. These were corrected by completing a form GPR 1 (see Appendix II) using the same patient registration number.

After storing the validated records on magnetic tape, a pair of labels was produced for each record (see below).

FEMALE



Checking Validated Records against Practice Records

This part of the exercise was undertaken by the Executive Council and for this purpose the medical record envelopes were transported from the practice to the offices of the Executive Council. The forms EC2, which all Executive Councils file alphabetically by doctor, were matched with the corresponding medical record envelopes which, in the case of this practice, are filed alphabetically for all doctors combined.

The information on the pair of labels for each patient was then compared with the details on the medical record envelope and on form EC2, which relates to the patients' registration at the Executive Council. If they agreed exactly, the two labels were stuck on to a new medical record envelope. The original medical record envelope was cut down both sides and along the bottom. The clinical notes were placed inside the new envelope together with the reverse side of the original envelope bearing the notes, and the front of the envelope if it had an endorsement by a doctor.

If the details on the labels differed from those on the medical record envelope or on form EC2, and it was apparent that the correct details appeared on the labels, the case was cleared as above. If the labels contained the error, they were stuck on to form GPR 2 (see Appendix III) with a ring around the detail(s) needing correction. This form was then completed and the original medical record envelope was returned to the surgery and filed separately from the new envelopes.

The data were transferred to 8GP and 9GP punch cards which were then fed into the computer using a similar validation routine to that for the 2GP and 3GP punch cards, except that the registration number had to be matched with a registration number existing on the tape. If no registration number was found then the record was rejected. If the registration number was found then the whole of the existing record was overwritten with the data on 8GP and 9GP punch cards. Corrected labels were then produced and the information thereon was checked against the original medical record envelope before sticking them on to a new envelope.

Amendments and Updating of Magnetic Tape File

After the practice list of patients has been compiled on magnetic tape, four kinds of amendments have to be allowed for:

1. additions to the list, i.e., new registrations with the doctor
2. removals from the list, i.e., change of doctor

3. amendments to existing data
4. deletions from the list.

Amendments must, of course, be recorded and dealt with from the time the checking of the original list begins.

Additions to the List

When a patient registers with the general practitioner he gives his medical record card to the practitioner who signs it and then forwards it to the Executive Council. On receipt of the record card the latter calls for the medical record envelope from the doctor with whom the patient was formerly registered. While this is being done the staff at the Executive Council fill in a form GPR 1. This is sent to the data control centre and the serial number allocated to the patient is entered on the form. A 2GP and a 3GP punch card are produced and if the data thereon satisfy the validation routines, they are read to the tape, and a pair of labels is printed. These are stuck on to a new medical record envelope, and after receipt from the Executive Council the old envelope and its contents are put inside the new envelope which is then filed in the practice.

Amendments to Existing Data

When a change of name on marriage, a change of address, a change of marital status or any other change to existing data is notified to the Executive Council or to the practice, a form GPR 2 is completed.

Punch cards 8GP and 9GP are produced and, after validation of the data, new labels relating to that patient are printed on the computer and forwarded to the practice to be fixed over the first pair of labels. Thus within the practice no hand-written alterations should be made to the original labels on the notes.

Removals from the List

Removals from the list are notified to the Executive Council who prepare a list of all the removals each week. On receipt of the list in the practice the medical records envelopes are extracted from the file and for each patient a form GPR 3 (see Appendix IV) is completed. These forms are punched and the punch cards (7GP) read to tape. The validation includes comparing the registration number with an existing number and the surname attached to that existing number with the surname on the form. If they agree exactly then the tape record has added to it the date of leaving and the reason for leaving. The code for a patient's reason for leaving is as follows:

999 = dead
998 = removal to other area
997 = change of doctor while remaining in area
996 = embarkation
995 = enlistment in H.M. Services
994 = other

Deletions from the List

Finally, provision has to be made for the rare occurrence when a patient has inadvertently been given two registration numbers and hence has duplicate records on the tape file. A delete program has been written which removes the second entry on the tape record.

Discussion

The system described above has been established in the Study Practice of the Royal College of General Practitioners situated in Harborne, Birmingham. The magnetic tape file of 12,500 persons is maintained on an IBM 1440 computer housed at the Medical School, Birmingham.

One advantage of the system is the clarity of the patient's personal particulars on the front of the medical record envelope. The system also provides the means for examining the 'dynamics' of the practice list, i.e., the numbers and characteristics of new patients and those of leavers and their effect upon the composition of the practice population.

An up-to-date complete age-sex register can be produced by the computer at any time, or a list printed of those patients of a given sex and age group and possessing any other characteristic contained in the tape record which may be of interest.

The next stage in the development of the overall system is to capture information about a patient when he or she attends the surgery or is paid a visit. This will be achieved by producing on the computer three punch cards (in the first instance) for each patient on the list. These cards, which have identification particulars printed on them by the computer, will be filed in the medical records envelope, and when a consultation is made a card will be taken out and the following information recorded at the end of the consultation: date, place of consultation, diagnosis, and details of any referral to hospital.

The 'mean patient consulting rate' varies considerably from one practice to another: in 11 long-term studies summarized by the Royal College of General Practitioners (1970), the range of variation was from 2·9 to 6·2 consultations per patient per annum. Moreover, 27% of the patients registered with a general practitioner will not consult at all during a year, and some patients may consult as many as 50 times (Stoke Project, 1970). Thus in a general practice records system it is necessary to have a variable length record for each individual patient.

The intended patient record will therefore permit examination of consulting rates in relation to age, sex, diagnosis, and place of consultation. It will also enable studies to be made of referral and hospitalization patterns that are generated from general practice, since the outcome of a referral is communicated back to the general practitioner and details of the hospital consultation and/or admission can be coded and added to the tape record.

Finally, two applications of the system which are relevant to the administration of a general practice may be mentioned.

(1) Method of Payment of the General Practitioner

The general practitioner service in this country is administered by the local Executive Councils. Basically, the payment of the general practitioner consists of four parts:

(a) fixed amounts, providing that the list exceeds 1,000 patients
(b) payment for items of service
(c) capitation fees
(d) reimbursements for rent, rates, staff, etc.

One of the most difficult parts of the total payment to calculate is the monies payable for capitation and items of service. The amount of money payable for capitation is calculated under the present system by making hand counts at the Executive Council of the number of patients under 65 and the number of patients over 65 registered with each general practitioner. The monies payable for capitation are thus directly proportional to the number of patients registered, higher fees being payable for persons over the age of 65 and when the list size exceeds 1,000 patients. With the existence of a practice file that is continuously updated, the number of registered patients can be counted automatically on the specified days.

Items of service performed by the general practitioner can similarly be stored on the magnetic tape, and those that are eligible for payments will be 'flagged'.

(2) Provision of Other Medical Services

It is usual for local authorities, family planning services, and other 'ad hoc' medical services to inform the general practitioner of items of service provided for specific patients. This information could easily be accommodated within the records system here described, and, in the long term, much information about a population's use of the medical services would become available.

Summary

An automated records system is described which is designed to monitor the Health Service usage by a population registered with a group of general practitioners, and to assist in the administration of the services they are providing. The first phase of the system has been completed in the Study Practice of the Royal College of General Practitioners in Harborne, Birmingham. This has involved the construction and manipulation of a magnetic tape file and the complete renewal of the file of medical record envelopes; each new envelope carries a pair of labels containing the patient's personal particulars printed by the computer. A feasibility study of the second phase, the capturing of data given at consultations, is being undertaken.

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APPENDIX I

VALIDATION ROUTINE

Column	Validation
	Card 1
1- 3	Accept 2GP only
4- 9	Must be all numeric, blanks are not acceptable; a check is made to establish that no record exists for that registration number; if a record exists then the data are rejected
10	Accept M or F only, blanks are not acceptable
14-26	Accept all alpha characters, hyphen, in any column. Blank columns in the middle of a field are to be rejected
27	Accept M, S, W, D, N only (M = married, S = single, W = widowed, D = divorced, N = not known)
28-38	Validation as for columns 14-26
39-41	Validation as for columns 14-26
56-61	Apply standard date validation and transpose to date of twentieth century The date in columns 56-61 must precede the date in columns 65-70. If it does not precede that date then the record is to be rejected. In certain circumstances the full date of birth is not known. In these circumstances the designation 0000 followed by 2 digits designating the year is acceptable, these to be transposed within the machine to 0101 of the year and converted into the date of the twentieth century
71-77	Must be all numeric and must be an acceptable number

Column	Validation
	Card 2
1- 3	Accept 3GP only
4- 9	Accept if matching exactly with an existing 2GP card
10-55	Accept unconditionally
59-72	National Health Service number Any punctuation mark, i.e., slash (/), full stop, comma, hyphen, appearing in this field to be transcribed to a slash (/) If a slash appears in this field then there must be an alpha field of four characters followed by three numeric characters and one to three numeric characters after the slash (/). If there is no slash (/) within this field then alpha character must be followed by numeric characters; no number is allowable if it begins with a numeric character. If there are three alpha characters the maximum numeric is 7, if there are 4 alpha characters the maximum numeric is 7, if there are 5 alpha characters the maximum numeric is 3

APPENDIX II

GPR 1

AUTOMATED GENERAL PRACTICE RECORDS SYSTEM

FORM GPR 1 — PATIENT REGISTRATION FORM

Instructions: This form should be completed at the Executive Council Offices on registration of a patient with the practice.

1. Card code 1 [2][G][P]
2. Patient registration number (do *not* complete) 4
3. Sex (M or F) 10
4. Surname 14
5. Civil state 27 (S = single, M = married, N = not known)
6. First forename 28
7. Second forename 39 (first 3 letters only)
8. Maiden name 42
9. Date of birth 56
10. Date of acceptance on list 65
11. General Practitioner's identification number 71 [0][0][0]

12. Card code 1 [3][G][P]
13. Patient registration number (do *not* complete) 4
14. Address 10
25
15. National Health Service number 59

APPENDIX III

GENERAL PRACTICE REGISTRATION FORM 2

Name of G.P. Dr. .....

Card code [8][G][P] (1) Patient Registration number (4)

Sex (M or F) (10) (leave blank) (11)

Surname (14)

Civil state (27) M = married S = single W = widowed D = divorced A = apart N = not known

First forename (28)

Second forename (39) (first 3 letters only)

Maiden name (42) (55 leave blank)

Date of birth (56) (62 leave blank)

Date of acceptance on list (65)

General practitioner's identification number (71)

Card code [9][G][P] (1) Patient registration number (4) (leave blank)

Address .....

(10-55) .....

National Health Service number

59

APPENDIX IV

GENERAL PRACTICE REMOVALS

FORM GPR 3

To be completed only following notification by Executive Council of removal from list

Card code [7][G][P]

Patient registration number 4

Skip columns 10-13

Surname 14

Skip column 27

First forename 28

Skip column 39

Date of leaving 40

Reason for leaving 46