EXPERIMENT IN THE RETRIEVAL OF INFORMATION IN GENERAL PRACTICE A PRELIMINARY REPORT

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The objectives of the Oxford Record Linkage Study are to reorganize selected medical data in personal cumulative files, to preserve the option to arrange these in family groups, and to integrate for a definable community medical data of like type which are currently the responsibility of different branches or agencies of the Health Service. Up to the present time, a person has entered the file as a result of certain events occurring since January 1, 1962, namely, birth (the baby), delivery (the mother), discharge from hospital, or death (Acheson, 1964). The disadvantage of such a system is that it contains no information about the remainder of the population, namely those born before 1962, who have not subsequently been discharged from hospital, been delivered of a baby, or died.

It was therefore decided to examine the practical problems involved in obtaining some elementary data about every member of a defined population, and in keeping this up to date. In doing so, our prime aim has been to devise a system which can be justified on the grounds of its usefulness, and only secondarily, to provide a research tool. This is because usefulness in the administration of medical care is likely to be the criterion on which the permanence or extension of such a system will be judged.

MATERIAL AND METHOD

The population chosen for study was a general practice of 6,725 persons, situated in a small market town in North Oxfordshire. There are three partners, one of whom (J.A.F.) has been responsible for supervising the day to day abstraction of data and its processing.

The following information about every patient registered with the practice on July 1, 1966, and those joining thereafter, has been transferred to 80-column punch cards.

CARD 1—*Identification Data*, including names, N.H.S. Number, and date of birth.

CARD 2—*Statistical Data*, including age, sex, geographical zone in the practice, distance from central surgery, dispensing or non-dispensing patient, and date of registration.

CARD 3—*Full Postal Address*.

The three cards are linked by means of a unique serial number (not the N.H.S. number) allotted to each record envelope at the outset. Additional cards are punched for modification of information, including changes of address or of name on marriage, and for deletions from the list either by death or withdrawal. The number of modifications to the file in each class during the first 9 months is set out in Table I (overleaf).

The data conforms with the conventions of the main Record Linkage Study file (Acheson, 1967). This will ensure that the files may be merged with the minimum effort should this become desirable. So far, processing has been done by business machines. In future, as more data are added about each patient, and more complex applications are attempted, a computer will be used.

At the beginning, records were brought in batches to the machine room at the Oxford Regional Hospital Board headquarters for punching and verifying, but later a part-time punch operator was employed at

TABLE I
NUMBER OF REGISTRATIONS, DEPARTURES, DEATHS,
AND CHANGES OF NAME OR ADDRESS JULY 1, 1966, TO
MARCH 31, 1967

Information	Events in 9 Months		Average Weekly No. of Events	Average No. of Weekly Events per 1,000 Patients
	No.	Per cent.		
Arrivals and Births	831	37.4	21.3	3.1
Departures	927	41.7*	23.8	3.5
Deaths	32	1.5	0.8	0.5
Changes of Name	14	0.6	0.3	0.04
Changes of Address	417	18.8	10.7	1.6
Total	2,221	100	56.9	8.3

* This figure has been inflated by the removal of about 200 medical records from the practice files during the period stated. These records were held for patients who had already left the practice and who could not be traced.

the practice using a hand key punch (purchase price £80). It took about 3 months to punch records for each patient.

RESULTS

EXTERNAL AND INTERNAL MIGRATION

The patients in the practice are distributed in the Figure according to year of registration. Just under half of the patients have registered in the period of 4 years and 3 months since the beginning of 1963. During this period the size of the practice increased by about 10 per cent., so it can be deduced that about 40 per cent. of the patients have left or died during that period, an average turnover of about 9 per cent. per annum. It seems likely that the turnover is increasing, because 24 per cent. of the patients registered on March 31, 1967, had joined the practice in the previous 15 months.

Although no figures are available for the age and sex distribution of those who left since the beginning

of 1961, this can be shown for the 9-month period since the commencement of the study. In Table II this has been related to the age and sex structure of the population at the approximate mid-point of this 9-month period. The proportion of departures is greater in females than males except in those over 65 years old. The reason for this is obscure. In each sex the rate of departure is highest amongst children of school age where it presumably reflects the mobility of their parents; in general, it falls with increasing age thereafter.

In addition to the external mobility manifested in the Figure and Table II, the internal mobility of the practice is striking. During the 9-month period, no fewer than 417 persons (6.2 per cent.) are known to have changed their addresses while remaining within the practice. The information on which this total is based was derived by checking the address of each patient who attended the surgery. It takes no account of the migration of those who have not sought treatment.

FIGURE.—Composition of the practice on March 31, 1967, according to year of registration.

TABLE II
ANNUAL DEPARTURE AND DEATH RATES PER 1,000 PATIENTS, BY AGE AND SEX BASED ON
PERIOD JULY 1, 1966, TO MARCH 31, 1967

Age Group (yrs)	Males			Females		
	Departures per 1,000 Patients	Deaths per 1,000 Patients	Departures and deaths per 1,000 Patients	Departures per 1,000 Patients	Deaths per 1,000 Patients	Departures and deaths per 1,000 Patients
0-4	180	—	180	204	—	204
5-14	291	—	291	304	—	304
15-44	131	—	131	276	—	276
45-64	53	—	84	84	—	84
65 and Over	83	105	188	53	76	129
All Ages*	139	7	146	219	5	224

* Excluding cases where age was not stated.

Mobility of this degree leads to an immense traffic in patients' notes between practices, placing a strain on the Executive Councils. This is reflected in Table III, which shows the number of patients registered in 1966 and 1967 and remaining on the list on March 31, 1967, whose records have not yet been received.

TABLE III
PROPORTION OF PATIENTS REGISTERED SINCE JANUARY 1, 1966, AND REMAINING IN THE PRACTICE ON MARCH 31, 1967, WHOSE MEDICAL RECORDS HAD NOT ARRIVED, BY INTERVAL SINCE REGISTRATION

Interval since Registration (mths)	Number remaining on April 1, 1967	Patients without Records	
		No.	Per cent.
- 15	263	3	1.1
- 12	274	11	4.0
- 9	183	8	4.4
- 6	386	83	21.5
- 3	404	116	28.7
Total	1,510	221	14.6

AGE AND SEX STRUCTURE OF THE PRACTICE

The system provides up-to-date information about the age and sex structure of the practice population, which is valuable for operational and medical research. Thus, in an *ad hoc* survey of the demand for urgent ambulatory medical treatment (Forbes, Mutch, Smith, and Tulloch, 1967), it was possible to compute the demand in each age and sex group (Table IV). During a 9 week period, data were recorded for each attendance at the surgery where treatment was requested by the patient on the same day as contact was made. Domiciliary visits were excluded. It is interesting to note that the highest attendance rates were those of young children of both sexes, and that the demand for urgent ambulatory treatment tended to fall throughout life, reaching its lowest figure in the elderly.

TABLE IV
ATTENDANCE RATES FOR URGENT DEMAND, BY AGE AND SEX BASED ON DECEMBER, 1966, POPULATION

Age Group (yrs)	Males		Females	
	No. of Attendances	Attendance Rate/1,000	No. of Attendances	Attendance Rate/1,000
0-4	91	208	68	153
5-14	65	111	72	131
15-44	139	119	183	118
45-64	71	77	63	99
65 and Over	12	53	11	48
Total	378		397	

A by-product of the system is that the practice is now in a position to check the figures in the Executive Council's quarterly returns for the size of the practice, mileage payments, number of dispensing patients, and the number of patients over 65 years of age.

FUTURE PLANS

We hope to add further carefully selected data to the file now that it is in being. At registration with the practice, a basic summary of past history, including important operations, illnesses, and drug sensitivities, and such elementary social data as parity and occupation will be recorded for each patient on a self-coding form, and punched on cards. It is hoped also to set up clinics for patients suffering from chronic disease who require regular surveillance; for the elderly; and for cervical cytology screening. Computer programmes will be prepared along the lines described by Galloway (1963), whereby appointments are mailed to patients, and clinic schedules prepared. As data are added to it, the file will become increasingly valuable in defining groups of patients with particular needs, and in assisting in the arrangement of appropriate care. As the realization of these plans will add to the work of the practice, it will be necessary to seek relief elsewhere, probably by providing nursing staff to deal with some, at least, of the demand for urgent ambulatory treatment.

The cost of editing, punching, and verifying the data from the file of 6,725 patients is estimated to have been approximately £250, but our experience suggests that this figure could be reduced considerably should the same procedure be extended to other general practices. Keeping the file up-to-date in respect of the limited number of events specified is relatively inexpensive. It accounts for approximately 10 hours of clerical and machine operator time each week, or at present scales, a weekly cost of about £3.

Against these costs, we cannot yet show any savings either in cash or services. Indeed, it is difficult to envisage cash savings accruing to the practice even when further developments described above come into effect. It should however be possible to identify certain groups of patients within the practice according to their needs and to offer services in a way not possible at present. On this scale, it is doubtful whether automatic data processing can ever be economical. If the system were extended to a group of practices, and included the accounting functions of the Executive Council, it might be justified on economic grounds.

Perhaps the most striking finding in this preliminary analysis has been the mobility of the population, both in terms of turnover, and of internal changes of address. One in four of the patients registered on March 31, 1967, had joined the practice within the previous 15 months, so that even if allowance is made for growth, it can be assumed that one in five of the patients in the practice left during that time.

In this area at any rate, the notion of the general practitioner typically providing continuity of care for the individual over many years may need to be revised. Only one third of the patients have been registered with this practice for more than 10 years.

The scale of this population movement imposes an almost intolerable strain on the manual clerical system of the Executive Councils. It has also important implications on the organization of diagnostic screening procedures. If, for example, it was considered desirable to offer a cytological examination of the cervix to every woman in the practice quinquennially, and this was attempted by means of a single campaign lasting, say, a month, about 50 per cent. of the women registered at some time during the quinquennium with the practice would be missed. A system spreading the load over the whole period and bringing forward samples of names systematically by area would be scarcely more efficient. It might be possible to exploit the mobility of the population by making arrangements for cytological screening, and for other examinations when the patient first registers with the practice. In this way, about half the total population will be covered in the quinquennium, given a system such as described here. The rest can be selected by a simple data-processing operation. Finally, it is worth noting that the turnover should also be taken into account when the number of examinations is estimated. Thus, in this practice, the number of women who should be offered a quinquennial cytological examination would be 50 per cent. more than the number registered on March 31, 1967. This applies equally to local authority programmes for cytological examination, if the area is one in which there is population movement on a big scale. Hall and Warin (1966) have pointed out that there are 35,000 women in the City of Oxford who should have regular cytological examinations and that, if they are to be examined every 5 years, 7,000 should be examined annually. This calculation is based on the assumption that the population is static over the quinquennium, or that equivalent

facilities have previously been available elsewhere to women moving into the area.

Further administrative problems arise on account of changes of address within the practice. Our observations show an annual rate of movement of 6 per cent. noted by the clerical staff at the surgery. If allowance is made for patients who moved but did not receive medical services during that time, the figure must be higher. If it is judged desirable to have the facility to locate patients, either frequent contact must be kept with them, or recourse must be had to more up-to-date information about whereabouts from other sources, *e.g.* the register of voters. If we admit that in certain circumstances, we cannot await the time-honoured signal of the call for help in order to prevent disability and death from chronic disease, the precise whereabouts of the person at risk must be a matter of concern to his doctor.

It is premature to attempt to justify the extension of the system of data retrieval described here. The early results are reported in the hope that they will help other workers. A result less tangible than economics or improved services to the patient, which has nevertheless given satisfaction to the authors, is the gradual definition of the demographic characteristics of a practice which previously were nebulous in the extreme.

SUMMARY

An experiment in obtaining elementary data about every member of a defined population is described.

The population chosen was a general practice in North Oxfordshire. Certain data about every patient were transferred to punch cards, and our preliminary results reveal a high degree of population mobility in the area, and underline the value of obtaining information on the age and sex structure in a practice.

Plans have been made to add further selected data to the file, and as more complex applications are attempted, a computer will be used. The cost of the experiment is given.

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