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

BY
E. D. ACHESON, M.A., D.M., F.R.C.P., MAY READER IN MEDICINE,
AND
J. A. FORBES, M.A., M.D., GENERAL PRACTITIONER
From the Oxford Record Linkage Study,
Nuffield Department of Clinical Medicine, University of Oxford

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 file 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

<table>
<thead>
<tr>
<th>Information</th>
<th>Events in 9 Months</th>
<th>Average Weekly No. of Events</th>
<th>Average No. of Weekly Events per 1,000 Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrivals and Births</td>
<td>831</td>
<td>37-4</td>
<td>21-3</td>
</tr>
<tr>
<td>Departures</td>
<td>927</td>
<td>41-7*</td>
<td>23-8</td>
</tr>
<tr>
<td>Deaths</td>
<td>32</td>
<td>1-5</td>
<td>0-8</td>
</tr>
<tr>
<td>Changes of Name</td>
<td>14</td>
<td>0-6</td>
<td>0-3</td>
</tr>
<tr>
<td>Changes of Address</td>
<td>417</td>
<td>18-8</td>
<td>10-7</td>
</tr>
<tr>
<td>Total</td>
<td>2,221</td>
<td>100</td>
<td>56-9</td>
</tr>
</tbody>
</table>

* 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 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 III 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, not 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](cover.png)

**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

<table>
<thead>
<tr>
<th>Age Group (yrs)</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Departures and deaths per 1,000 Patients</td>
<td>Departures and deaths per 1,000 Patients</td>
</tr>
<tr>
<td>0–4</td>
<td>180</td>
<td>180</td>
</tr>
<tr>
<td>5–14</td>
<td>291</td>
<td>291</td>
</tr>
<tr>
<td>15–44</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>45–64</td>
<td>53</td>
<td>84</td>
</tr>
<tr>
<td>65 and Over</td>
<td>83</td>
<td>105</td>
</tr>
<tr>
<td>All Ages*</td>
<td>139</td>
<td>146</td>
</tr>
</tbody>
</table>

* 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

<table>
<thead>
<tr>
<th>Interval since Registration (mths)</th>
<th>Number remaining on April 1, 1967</th>
<th>Patients without Records</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 16</td>
<td>263</td>
<td>3</td>
</tr>
<tr>
<td>≤ 12</td>
<td>274</td>
<td>11</td>
</tr>
<tr>
<td>≤ 9</td>
<td>183</td>
<td>8</td>
</tr>
<tr>
<td>≤ 6</td>
<td>386</td>
<td>83</td>
</tr>
<tr>
<td>≤ 3</td>
<td>404</td>
<td>116</td>
</tr>
<tr>
<td>Total</td>
<td>1,510</td>
<td>221</td>
</tr>
</tbody>
</table>

### 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
calculate 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

<table>
<thead>
<tr>
<th>Age Group (yrs)</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of Attendances</td>
<td>Attendance Rate/1,000</td>
</tr>
<tr>
<td>0–4</td>
<td>91</td>
<td>208</td>
</tr>
<tr>
<td>5–14</td>
<td>65</td>
<td>111</td>
</tr>
<tr>
<td>15–44</td>
<td>139</td>
<td>119</td>
</tr>
<tr>
<td>45–64</td>
<td>71</td>
<td>77</td>
</tr>
<tr>
<td>65 and Over</td>
<td>12</td>
<td>53</td>
</tr>
<tr>
<td>Total</td>
<td>378</td>
<td>397</td>
</tr>
</tbody>
</table>

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
devonish 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 appoint-
ments 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 arrange-
ment 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 consider-
sably if the same procedure were 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.

This project has been made possible by the use of funds allocated by the Nuffield Provincial Hospitals Trust to the Oxford Record Linkage Study.

We wish to thank Doctors A. J. Tulloch, G. T. Smith, and L. M. M. Mutch for their co-operation.
REFERENCES


