General Practice Observed

New Approach to Information Handling in General Practice

K. A. HARDEN, R. McG. HARDEN, D. REEKIE

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Summary

In this paper we describe the use of punched feature cards in a general practice for 18 months. Its advantages are the low cost, speed of information retrieval, visible statistics, computer compatibility, accuracy, confidentiality, flexibility, and simplicity of setting up and collection of information. The system encourages the doctor to ask questions about his practice, and could readily be adopted in other practices.

Introduction

A Royal College of General Practitioners' report suggested that "if we are to move efficiently from the present to the future, more data, facts, information, evaluation, and critical assessments of what goes on are essential."¹ The efficient provision of health care requires the availability of information relating to morbidity, patterns of demand, and use of resources. Much of the information available at present relates to the highly selected hospital population, but that from general practice has been largely untapped. This can be attributed partly to the difficulties of information collection using conventional methods. The use of computers has been disappointing except in limited spheres such as immunization procedures. We describe a system of information collection which is suited to the special requirements of general practice and its use in one practice over 18 months. The system consists of feature cards together with the patient's clinical notes.

Feature Cards

Punched feature card systems are a recent advance in data-handling techniques.² Traditional punched-card systems are item-based—that is, there is one card for each item or patient indexed. In a feature card system each card represents a characteristic or feature—for example, a disease (chronic bronchitis), an item of personal data (age), a method of treatment, or some other fact (surgery attendance) (fig. 1).^{*} Each numbered position

on the card represents a patient. Each patient has a unique number and is represented by the same position on every card. A punched hole at that position shows that the patient represented by the position has the characteristic or feature represented by the card (fig. 2).

The number of holes represents the number of patients who possess the feature and the position indicates which patients. To find which or how many patients possess a combination of two or more features one simply stacks the cards representing the features on top of each other. Holes which pass through the stack of cards represent patients possessing all of the characteristics selected. For example, in figure 3, the hole passing through the three cards represents a man with chronic bronchitis who has been given influenza vaccine. The bottom line in the figure represents an unvaccinated man with chronic bronchitis.

The total number of features recorded was about 1,000 in the following six categories: (a) personal data—including sex, date of birth, marital status, type of house, number of children, socio-economic group, nationality; (b) total morbidity diagnosed—all diagnoses being coded according to the classification of the Royal College of General Practitioners. This includes about 500 diagnostic categories and is based on the International Classification of Diseases; (c) selected treatments—for example, antibiotics, diuretics, digoxin, psychotropic drugs, oral contraceptives, intrauterine devices, steroids; (d) all immunization procedures; (e) work load statistics—including surgery attendances, home visits, repeat prescriptions; and (f) patient management—including hospital referrals (coded by hospital and specialty), laboratory investigations (according to department), automated follow-up system where required.

The Practice

The practice is a group one with five doctors providing primary medical care for about 8,900 patients. Part of the practice is in Woodside Health Centre in Glasgow and part in Bearsden, a Glasgow suburb. The records of individual patients were kept in conventional N.H.S. medical record cards in the Bearsden practice and in A4 folders in Woodside Health Centre. Each patient was given a unique number on a purely arbitrary serial basis in the order in which the files happened to be at the start of the project. Subsequent patients joining the list were given the next number.

Separate series of feature cards were kept for the Bearsden and Woodside parts of the practice. There were about 3,400 patients in Woodside, and, as the cards had only 2,500 positions, two series of cards were required—an A series for patients with unit number 0001-2499 and a B series for patients with unit number 2500 or more. This allowed for a potential expansion of up to 4999 patients. In Bearsden, with 5,500 patients, three series of cards were used—an A series for numbers 1-2499, a B series, for 2500-4999, and a C series for patients numbered 5000 and over.

*Cards were supplied by J. L. Jolley and Partners, High Wycombe, Bucks.

Woodside Health Centre, Glasgow

K. A. HARDEN, M.B., CH.B., General Practitioner

Department of Medical Education, The University, Dundee

R. McG. HARDEN, M.D., M.R.C.P., Senior Lecturer in Therapeutics

Computer Applications Unit, Western Regional Hospital Board, Glasgow

D. REEKIE, B.Sc., PH.D.

FIG. 1—An example of a standard feature card for patients numbered 0 to 2499.

FIG. 1—An example of a standard feature card for patients numbered 0 to 2499.

0,0	00	01	02	03	04	05	06	07	08	09	10	1
	50	51	52	53	54	55	56	57	58	59	60	6
0,1	00	01	02	03	04	05	06	07	08	09	10	1
	50	51	52	53	54	55	56	57	58	59	60	6
0,2	00	01	02	03	04	05	06	07	08	09	10	1
	50	51	52	53	54	55	56	57	58	59	60	6
0,3	00	01	02	03	04	05	06	07	08	09	10	1
	50	51	52	53	54	55	56	57	58	59	60	6
0,4	00	01	02	03	04	05	06	07	08	09	10	1
	50	51	52	53	54	55	56	57	58	59	60	6

FIG. 2—Section of feature card representing the diagnosis "Chronic Bronchitis." Patients numbered 0007, 0052, and 0155 have been coded as having chronic bronchitis.

Collection of Information

Information was collected in three ways: firstly, name and address, date of birth, sex, and unit number were taken from the front of the N.H.S. record envelope. This information was typed on to a hectocarbon master card for each patient (obviating further typing). Two sets of cards were produced—one was used as an alphabetical index and the other used to cross-check with the executive council files.³ This checking exercise was time-consuming and mistakes were discovered in both the executive council and the practice files. The information was then punched on the appropriate feature cards. Secondly, when the doctor saw the patient for the first time, he recorded information about socio-economic group, housing, etc., on a "social data card" and this was punched by the secretary on to the feature cards.

Thirdly, details of diagnoses, treatments, immunizations, and management procedures were taken from the patient's case notes at the end of each surgery session. An exact diagnosis was made wherever possible. Nevertheless, if an exact diagnosis could not be made then the main symptom or symptoms were noted. Conditions such as diabetes were recorded whether they were or were not the presenting problem. The diagnostic coding was done by the secretary from an alphabetical list based on the R.C.G.P. classification. When problems arose the I.C.D. index was consulted. Details of the surgery attendance—for example, whether a new or return visit—were marked in the patient's record card by the receptionist. This information was coded and punched by the secretary on to the feature cards at the end of each surgery session. Details of home visits were recorded by the doctors using pocket dic-

FIG. 3—To identify the men with chronic bronchitis and whether they have or have not been immunized with influenza vaccine, the cards "male", "chronic bronchitis," and "influenza vaccine" are stacked. Holes which pass through the stack (detected by placing the cards on a blue transparency or on a light box) indicate male chronic bronchitis immunized with influenza vaccine.

tating machines and the information was coded and punched by the secretary after she had typed the notes.

The feature cards were stored for quick retrieval in a vertical visible filing unit. A manual desk punch was chosen to punch the cards because of the increased speed over its mechanical counterparts. Secretarial work came to 30 hours per week but this included the Bearsden and Woodside practices and the development and maintenance of the system. Additional help was needed to cross-check the practice records with the executive council files.

In a search the position of holes can be identified and the number of holes counted if the card or stack of cards is placed on top of a coloured card or a light source such as an x-ray viewing box. The number of holes can also be counted using an

optical reader designed for this purpose. Where many holes are punched on the card, the reader saves an appreciable amount of time. A paper-tape punch can be connected to the reader through a convertor unit so that the data on the feature cards can be transferred to paper tape; in this way the cards can be used as an input to the computer. This enables more detailed analyses to be made as well as the central collection of data from feature card systems in individual practices.

Some Information Obtained

The following examples illustrate the type of information obtained in the Bearsden practice during the first year. The figures are based on a practice of 5,492 (including 13 temporary residents) at the mid-point of the year.

The practice received a request from a Scottish Home and Health Department Subcommittee about the number of patients suffering from infectious diseases and the proportion admitted to hospital. The information was obtained by the practice secretary in 20 minutes (table I).

TABLE I—Patients Suffering from Infectious Diseases in Practice of 5,492 Patients from 1 February 1972 to 31 January 1973

R.C.G.P. Code No.	Infectious Disease	Total	No. per 1,000 Population	Admitted to Hospital
1	Tuberculosis of respiratory system	1	0.18	0
2	Tuberculosis, other forms	1	0.18	0
4	Gonococcal infections and other venereal diseases	1	0.18	0
5	Intestinal infectious disease	3	0.55	0
6	Scarlet fever	13	2.37	0
7	Erysipelas	1	0.18	0
8	Whooping cough	2	0.36	0
11	Measles	15	2.73	0
12	Rubella	34	6.19	0
13	Chickenpox	42	7.65	0
14	Herpes zoster	20	3.64	0
15	Mumps	85	15.48	0
16	Infective hepatitis	21	3.82	0
17	Infectious mononucleosis	20	3.64	0
19	Epidemic pleurodynia	4	0.73	0
28	Other recognized infectious diseases	47	8.56	0
31	Pyrexia without rash	17	3.10	0
303	D. and V. (undiagnosed)	262	47.71	1

Another survey was made of the number of patients treated with antibiotics by stacking the date-of-birth cards with the "antibiotic" card. About one-quarter of the patients had received antibiotics during the year (table II).

TABLE II—Patients Treated on one or more Occasions with Antibiotics 1 February 1972 to 31 January 1973

Date of Birth	No. of Patients
1970-1973	98
1960-1969	364
1950-1959	164
1940-1949	162
1930-1939	151
1920-1929	140
1910-1919	96
1900-1909	78
1890-1899	28
1880-1889	12
1870-1879	2
Total	1,295 (23%)

A survey was made of the number of patients treated with sedatives, hypnotics, and antidepressants. Almost 12% of patients were prescribed these drugs.

To identify patients in the practice not immunized against measles the dates-of-birth cards were stacked on the measles-vaccination card. Of the 108 children between 1½ and 2½ years 48 had been immunized. The remaining 60 are being contacted.

We decided to review all patients in the practice suffering from angina because of the accumulating evidence that they might benefit from clofibrate. Patients over 70 years were omitted. A list of the patients' unit numbers was obtained in about 10 minutes by withdrawing the appropriate feature cards. After reviewing each of the 30 patients thus identified, several were found suitable for clofibrate. A check six months later confirmed that 16 were in fact receiving the new treatment (table III).

TABLE III—Patients with Angina

Date of Birth	No. of Patients		
	Total	No. on Clofibrate	No. Not on Clofibrate
1940-1973	0	0	0
1930-1939	2	2	0
1920-1929	4	3	1
1910-1919	11	4	7
1900-1909	13	5	8
1890-1899	5	2	3
1880-1889	1	0	1
1870-1879	0	0	0
Total	36	16	20

Work load statistics are produced monthly and provide an interesting breakdown of numbers of consultations and home visits. We can see if this work load is created by a few patients coming frequently or more patients coming less frequently, and we can look at the characteristics which the heavy users of general practitioners' time possess (table IV).

TABLE IV—Items of Service by doctors—February 1972 to January 1973

Month	No. of New Surgery Attendances /1,000 Patients	No. of Repeat Surgery Attendances /1,000 Patients	Total Items of Service by Doctors /1,000 Patients
February 1972	139	42	231
March 1972	132	56	232
April 1972	110	71	218
May 1972	140	70	257
June 1972	131	74	249
July 1972	93	46	172
August 1972	100	69	204
September 1972	107	53	195
October 1972	126	65	232
November 1972	125	68	243
December 1972	111	56	221
January 1973	133	68	265
Total	1,447	738	2,719

Data Validity

Four validity checks have been made on the results collected. Firstly, the feature cards for "upper respiratory infections" were withdrawn and the first 200 patients recorded as having had upper respiratory infections were found. The record cards of these patients were withdrawn. Of the 200 196 were found to have been correctly coded and recorded. The four incorrectly coded had been recorded as cases of pharyngitis. Secondly, a similar exercise was carried out for the diagnoses neurotic and endogenous depression and of 76 patients so coded, none were coded incorrectly. Thirdly, a total of 53 home visits were identified from a home-visit book and a check was made to see if these had been so coded. Only one was not so coded, the doctor having failed to record notes. Finally, a 100 case sheets were pulled at random from the filing system. Each one was inspected to see if the diagnoses and treatments had been correctly coded. A total of 169 items of information had been coded: four had been incorrectly coded—three by the secretary, and one by the doctor. One patient with pharyngitis had been coded as upper respiratory infection, one non-specific urethritis had been coded as non-venereal urethritis, and one patient on a sedative for one year had been coded as on a sedative for less than three months. The doctor had marked a reaction to measles vaccination as

measles. Sixteen items of information had not been transferred from the case sheets because the doctor had failed to indicate the item appropriately.

Thus no cases of punching errors were found and the error rate in coding was 1.5%—most of the errors being minor ones. The commonest error was error of omission because the doctor failed to indicate the information to be coded.

Discussion

The advantages of systematically collecting information in general practice are obvious: the information obtained may be used in the preventive field; statistical and epidemiological data are provided; the doctor can assess his method of working; and research and teaching are helped.⁴ In this paper we describe a system of information collection in general practice, its advantages, and its relevance to current trends.

Many of the morbidity figures reported from general practice have been recorded using techniques such as the "E" book.⁵ But the exercise may be time-consuming,⁶ and while such methods have served a useful function the information is limited and its analysis difficult. These difficulties have led workers to look for alternative methods and computers have seemed the obvious choice. Nevertheless, while there has been much discussion and speculation about the use of computers, practical experience has been limited and a few large-scale projects in general practice in Britain are still running. In the view of at least one worker in the field "the medical profession is in danger of being dazzled by optimistic claims about the usefulness of computers in case record processing."⁷ At the same time as developments have taken place in computing, advances have also been made in other methods of data-handling. The advantages of computing may be hidden criticism of previous poor techniques related to the system that has been discarded rather than to what is possible using manual techniques.⁸

Advantages of Feature Cards

SIMPLICITY

The system was simple to set up. The general practitioners had almost no additional work. This is an important advantage of the project as problems often arise when busy general practitioners are asked to undertake even a small additional task over a long period. The only special form was the social-data card and this was completed when a patient was first seen. The coding and punching of the feature cards and other tasks involved in the maintenance of the system have been undertaken by the secretaries in the practice.

LOW COST

The method described is inexpensive to set up and cheap to run compared with computer systems. The total initial cost, including the cards, punches, and filing cabinets (but without the computer linkage) was less than £400. The feature cards cost 2p each. Much of the primary data handling can be undertaken without using the computer facility. For example, the cost of a search in response to a query on the number of patients seen in the practice with infectious diseases and the proportion admitted to hospital was 20 minutes secretarial time—about 20p. The cost of using computers to collect all the data in general practice is considerable, and "likely to be greater than expected."⁹

AVAILABILITY AND SPEED OF RETRIEVAL

In the past general practitioners have had little time to assess information about their practices. If data are to be collected they

should be readily available to the general practitioner and presented to him in a useful fashion. The doctors in this practice find that a great advantage of the system is that the information is readily available and can be retrieved on the spot. No special expertise is required. A doctor will be better motivated to use a system which he can consult on his own without any special search programmes or the help of a third party and in which results are obtained quickly—for example, to identify all the men with chronic bronchitis he needs to examine only the "male" and "chronic bronchitis" cards and not the cards for each patient in the practice. In edge-punched item-card systems, where each card represents an individual patient, the speed of retrieval of information is slow as each patient's card must be processed during the search.¹⁰ Even with computers the response to ad hoc queries may be disappointingly slow.⁸

VISIBLE STATISTICS

The density of holes on the cards gives a simple, easy, visible indication of frequency, and patterns of disease. Correlations between different features can be tested quickly.

COMPUTER COMPATIBILITY

While the primary data handling and analysis may be carried out without mechanical help the fact that feature cards can be read by an optical scanner and used as an input to the computer allows more detailed data processing where appropriate. This avoids further coding or punching.

ACCURACY

Experience has shown that the system compares very favourably with other systems with regard to accuracy¹¹ and that punching errors, if they occur at all, are extremely rare, if care is taken.

CONFIDENTIALITY

The information coded on the feature cards does not present problems of confidentiality as the patients are identified only by a unit number. When the data are transferred from feature cards to computer no names or addresses are included: these remain on the surgery premises. The set of feature cards can be used for teaching purposes without fear of patient identification.

OPEN-ENDED

The system is open-ended. As new patients enter the practice they are allotted the next serial number and their features can be coded without delay. New feature cards can be added as the need arises to code new diseases, additional therapies, or management procedures. Where a more detailed study is required in one area—for example, for research purposes—additional features can be coded in that area. In this way the new cards can be used alongside the existing system so that research projects can be carried out with little additional work. We have already found that the system encourages the doctor in practice to undertake research.

UP TO DATE

The information is up to date as the cards are punched daily after each surgery session; this is possible because the system is self-contained in the surgery premises.

If it is true, as some people have estimated, that most general practitioners will have computer terminals in their surgery within 20 years then it is not too soon for them to start gaining experience of data handling. This system provides a simple way

of initiating them into this field. On the other hand, if such forecasts prove over-optimistic general practitioners who adopt the scheme will have a simple, practical method of collecting information in their practice.¹² The availability of information gives the doctor feedback about his practice and encourages him to ask questions. It draws attention to issues such as the high percentage of patients treated with antibiotics and sedatives. Information is being collected on a continuing basis and we think that the system could be readily adapted in other practices.

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Outside Europe

U.N.I.C.E.F./W.H.O. Course for Senior Teachers of Child Health: Can a Small International Group Create Change

G. J. EBRAHIM, D. MORLEY, JUNE K. LLOYD, O. H. WOLFF

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Introduction

The economic gap between the industrialized and the developing countries is well known; the gap between the educational methods less so. Whereas the methods used in many medical schools in the United Kingdom have changed dramatically in the last 20 years there have been few similar changes in the developing countries.

Of the 500 million children under the age of 5, 400 million live in the developing world and 97% of deaths in this age group occur there. If these countries are to show social and economic advances the children must remain healthy and their intellectual potential must be unhindered by preventable illness in the early years of life. Until parents are confident that their children will survive in good health, they are unlikely to adopt family planning seriously.

The World Health Organization (W.H.O.) and the United Nations Children's Fund (U.N.I.C.E.F.) have brought together groups of senior teachers of child health and financed a course of study for the last 12 years. These courses have changed considerably since 1961 and this paper describes the 1973 course. Few, if any, similar courses for senior teachers exist and we believe that they have great potential for the evolution of child health services in the developing world.

Institute of Child Health, University of London

G. J. EBRAHIM, F.R.C.P., D.C.H., Senior Lecturer and Tutor
D. MORLEY, M.D., M.R.C.P., Reader in Tropical Child Health
JUNE K. LLOYD, M.D., F.R.C.P., Reader in Child Health
O. H. WOLFF, M.D., F.R.C.P., Professor of Child Health

The Course

PARTICIPANTS

The representatives of U.N.I.C.E.F. and W.H.O. in the developing world are responsible for advertising the course and each year distribute a booklet describing the course, its objectives, and the administrative details.* Past Fellows also distribute the booklet and recommend new applicants. The number of Fellows is limited to 10 each year. Applicants must be senior paediatricians employed by teaching institutions, have a minimum of two years' teaching experience, and be sponsored by their governments. Each year 20 to 30 applications are received. The final selection, which takes into account the standard of paediatric teaching in the various countries and aims at an even distribution among them, is the responsibility of the Institute of Child Health. The selection takes place in co-operation with U.N.I.C.E.F. and W.H.O., who provide the Fellowships (covering travel, accommodation, and tuition fee.) The distribution of the 81 participants from the various countries over the past 12 years is shown in the table.

Geographical Distribution of Fellowships 1962-73

Country		Country	
Afghanistan	5	Lebanon	1
Bolivia	1	Mexico	1
Brazil	1	Pakistan	2
Burma	3	Papua New Guinea	1
Chile	1	Peru	1
Cuba	1	Philippines	4
Egypt	6	Sri Lanka	1
India	19	Sudan	2
Indonesia	10	Taiwan	5
Iran	3	Thailand	6
Iraq	2	Turkey	1
Korea	4		

*Available from the Institute of Child Health, 30 Guilford Street, London WC1N 1EH