

## **The summary (S) card**

**A method of recording data in a general practice**

**FROM**

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**T**HE Diagnostic Index was introduced as a device for recording general-practice data to enable incidence and prevalence of episodes of illness to be examined. This did not, however, directly meet the need for a recording mechanism to study consecutive illnesses in an individual. This need was expressed by James Scott, of Keele, in 1960 and the Research Unit began the development of a summary card (Scott-card) to be kept with the patients' medical records.

At first the cards were simple and unstructured. The capability for mechanical analysis was added and tried in practice in various versions. Two areas of recording were envisaged, one in which the individual would be identified both in clear and in code with some characteristics which would mostly remain constant. Allowance was made for change of marital status and name at marriage as well as alteration in social status.

The second area of recording was for illnesses experienced by the person. Different variants of the card allowed for the accumulation of up to 20 episodes of illness in fair detail. Diagnosis was recorded in terms of the classification of disease introduced for use in general practice by the Royal College of General Practitioners. Flexibility in recording information relating to each episode of illness was afforded by a number of uncommitted columns the use of which was to be determined by the practitioner.

A developed version of the S card (S5) was introduced into the Birchfield study practice of the Research Unit of the College in 1965. An account is given of the experience of the use of cards S5 and S6 in this practice during the five-year period, 1966-1970.

### **Data recording**

The cards are kept in the medical record envelopes provided for every patient registered on the practice National Health Service list. A card incorporating as many basic data as possible was prepared for every patient in the practice and for each new entrant on registration. Further information was added by the doctor or his staff when the patient attended or consulted. Each new episode was entered, as it began, either by the doctor himself or by the practice research secretary through whose hands all medical record envelopes passed before their return to the reception staff for filing.

The diagnosis was customarily written in clear, or in code, in the margin of the clinical record, or even on the S-card itself. Both doctors and research secretary worked from displays of the classification of the Royal College of General Practitioners designed to be kept on the desk for easy reference.

At the end of the study period some more information was added to the S-card. This was obtained from the age-sex register, a card-index containing additional information, some of which could have been duplicated on to the S-card itself at first. Some items, such as the total number of episodes on each card, had to be incorporated during the manual updating and validation which preceded the processing of the recorded data.

### Data processing

Processing of the data was delayed until the completion of the recording period although ongoing processing methods are being considered for subsequent investigations. The data were transferred from the S-card to punched cards, each punched card containing the details of a single episode as outlined in Table 1. These cards were then 'verified' in order to reduce the number of errors arising at this stage of the data processing.

TABLE 1  
THE LOCATION OF DATA RELATING TO A SINGLE EPISODE ON THE PUNCHED CARD

<i>Column</i>	<i>Data</i>
8-10	First three letters of surname
11	First letter of first forename
12-17	Date of birth (European usage)
18	Card number
19	Sex
20	Marital status
21	Social status
22-27	Date of entry to practice
28-33	Date of removal from practice
34	Ethnic group
35-36	Total number of episodes on card
37-39	Total number of months in the practice
40	Age at date of entry to practice
41-42	Episode number
43-48	Date of episode
49-51	Diagnostic code

Owing to the limited speed at which cards can be read into a computer it was necessary to transfer the data to a disk file to reduce access time. As some of the data stored on the punched cards are 'redundant'—for example the patient details were repeated for every episode—some reduction of the data was performed at this stage. In addition, a certain amount of recoding and feasibility checking was performed, for example, month and day information was compressed into a single unit and sex and marital status codes were changed from alphabetic to numeric. Where data were missing or not feasible 'not known' categories were created.

Thus using a basic 'record' length of 16 'words' the patient details were stored in the first 12 words and information about the location of the relevant episode and next patient details were contained in words 16 and 15 respectively as shown in Table 2. It should be noted that an 'identifier' is automatically allocated to a record once the record length has been specified in the computer program.

If a patient consulted the doctor during the study period, details of the dates and diagnostic codes of blocks of five episodes were stored in the records immediately following that containing the patient details (Table 3). The last words of these episode records contains information about the location of further episode details.

This phase of the operation was quite lengthy in terms of program development and computer time. However, having established this form of storage subsequent scanning of the data is relatively much easier and quicker. For example, compilation

TABLE 2  
THE LOCATION AND FORM OF DATA ON A DISK FILE RECORD  
(NK=Not known)

<i>Word number</i>	<i>Patient detail</i>	<i>Key</i>
1	First two letters of surname	
2	Third letter of surname and first letter of first forename	
3	Year of birth	NK=00
4	Month and day of birth	NK=1300
5	Card number	
6	Sex	M=1 F=2 NK=3
7	Marital status	S=1 M=2 W=3 D=4 NK=5
8	Social status	Classes 1-5 NK=6
9	Year of entry to practice	NK=00
10	Month and day of entry to practice	NK=1300
11	Year of removal from practice	NK=00
12	Month and day of removal from practice	NK=1300
13	Ethnic group	Europeans=1 Negro=2 Asian=3 Mixed=4 NK=5
14	Number of episodes	
15	Next patient record number	
16	Next record number—put equal to 0 if next record contains details of a new patient	

TABLE 3  
THE LOCATION AND FORM OF EPISODE DETAILS ON A DISK FILE RECORD

<i>Word number</i>	<i>Episode detail</i>
1, 4, 7, 10, 13	Year of episodes
2, 5, 8, 11, 14	Month and day of episodes
3, 6, 9, 12, 15	Diagnostic Code (RCGP Classification system) NK=511
16	Next record number—put equal to 0 if next record refers to a new patient

and printing of the summary tables outlined in the next section relating to a total of 33,535 episodes and 7,563 patients takes just only six minutes of computer time (IBM 1130).

### Patient details

#### *Patients leaving*

Of the 7,563 patients whose summary records were observed, 671 and 1,007 left the practice during 1969 and 1970 respectively. Owing to a misinterpretation of instructions during the early stages of the study, summary records of patients who left the practice during 1966, 1967 and 1968 and possibly some during 1969 were not retained on the departure of the patient, so the following account refers to a 75 per cent sample of the practice population.

#### *New patients*

The observed pattern of new patients joining the practice provides some interesting historical information (Table 4). The practice as it now exists was formed by the fusion, in 1958, of two long-established practices including patients who had been on National Health Insurance ('panel') lists from before the second world war. The practice area, however, was in a part of the city subject to slum clearance and urban renewal. In such areas there is overcrowding and a fluctuating population. Rebuilding is intended to accommodate a smaller population and as this takes place there is some diminution in practice list size.

It can be seen from Table 4 that 45 per cent of the patients in the survey joined the practice during the survey period. A further 25 per cent had been in the practice for between one and six years, 18 per cent between seven and 16 years and 12 per cent for more than 16 years.

TABLE 4  
THE NUMBER OF PATIENTS REGISTERING WITH THE PRACTICE IN DIFFERENT YEARS

<i>Year of entry</i>	<i>Number of patients</i>	<i>Percentage</i>
Before 1940	50	0.7
1940-1949	847 (526 in 1948)	11.2
1950-1959	1382 (435 in 1958)	18.3
1960 1961 1962 1963 1964 1965	247 263 317 220 347 471 } 1865	24.6
1966 1967 1968 1969 1970	446 706 683 779 727 } 3341	
Not known	76	1.0
Total	7563	100.0

#### *Age-sex distribution*

The age-sex distribution, age being taken at the date of completion of the survey (1 January, 1971), is shown in Table 5.

TABLE 5  
THE PERCENTAGES OF 7563 MALE AND FEMALE PATIENTS IN THE VARIOUS AGE RANGES

<i>Age range</i>	<i>Male</i>	<i>Female</i>	<i>Total</i>
0-4	5.2	4.9	10.1
5-9	4.4	4.6	9.0
10-14	3.6	3.4	7.0
15-24	6.5	7.7	14.2
25-44	11.6	12.3	23.9
45-64	9.6	11.2	20.8
Over 64	4.7	8.2	12.9
All ages	45.6	52.3	97.9

The details of 2.1% of the patients attending were not known.

More female than male patients were registered with the practice. This difference is confined to the adult population (over 15) where 55 per cent of the patients are female. Among the over 64-year-olds female patients outnumber males by almost two to one.

*Marital status*

The percentage of single patients was 41.2 and 42.2 were married. Of the rest 4.2 per cent were widowed and 0.2 per cent were divorced. The marital status of 12.2 per cent of the patients registered was not known.

*Ethnic group*

Classification of patients according to ethnic group indicated that 89.0 per cent were European, 8.8 per cent were of Negro and 1.7 per cent of Asian origin, 0.1 per cent were of mixed race and the origin of 0.4 per cent was not known.

*Social class*

The social status classification is not wholly reliable owing to the difficulties inherent in this form of measurement. However, an indication of the relative proportions of males and females from different social backgrounds is given in Table 6.

TABLE 6

THE PERCENTAGES OF MALE AND FEMALE PATIENTS IN THE VARIOUS SOCIAL STATUS GROUPS

<i>Social status</i>	<i>Male</i>	<i>Female</i>
I	1.4	1.2
II	4.3	4.0
III	16.0	14.5
IV	26.1	25.0
V	38.6	42.5
Not known	13.5	12.9

Analysis of these data indicates that there is a significant ( $\chi^2 p < 0.02$ ) interdependence between social status and sex. Observation of the individual cell  $\chi^2$  values indicates that either there is a greater proportion of women in social status group V or that the assessment is biased in this direction.

**Practice activity**

The total number of episodes observed during the survey period was 33,535. As there were records pertaining to 7,563 patients, this represents a mean annual rate of 0.89 episodes per patient. Table 7 shows that 16.1 per cent of patients did not attend the practice centre during the study period and 9.6 per cent had more than ten episodes of illness. Reference to Table 8 shows that this 9.6 per cent of high users of general practice accounted for 31.5 per cent of the total episode load. If a high user of general practice is classified as one who had more than five episodes of illness during the five years of the survey then the 30.9 per cent of high users accounted for 67.7 per cent of the total episode load. In other words one third of the patients caused two thirds of the work as measured by the number of episodes.

*Age-sex groups and episode load*

The influence of the age-sex distribution on episode load is outlined in Table 9. For the purposes of this classification, the age at time of episode was calculated and therefore these figures are not strictly comparable with the age-sex distribution in Table 5.

There is no difference between the sexes for the proportion of children's episodes. There is however a clear difference between the sexes in the adult age range, this difference being greater than would have been predicted by reference to the numbers of males and females registered.

TABLE 7

THE PERCENTAGE OF MALE AND FEMALE PATIENTS CONTRIBUTIONS TO THE EPISODE LOAD OF THE PRACTICE

<i>Number of episodes per patient during 5 years of study period</i>	<i>Percentage of patients</i>				
	<i>Males</i>	<i>Females</i>	<i>Not known</i>	<i>Total</i>	<i>Cumulative total</i>
0	7.9	7.3	0.9	16.1	100.0
1-2	12.6	12.8	0.6	26.0	83.9
3-5	12.5	14.0	0.5	27.0	57.9
6-10	9.1	12.1	0.1	21.2	30.9
11-20	3.3	5.5	—	8.8	9.6
more than 20	0.2	0.6	—	0.8	0.8
Total	45.6	52.3	2.1	100.0	

TABLE 8

THE PERCENTAGE OF THE TOTAL EPISODE LOAD INFLUENCED BY HIGH AND LOW USERS OF GENERAL PRACTICE

<i>Number of episodes per patient during 5 years of study period</i>	<i>Percentage of episode load</i>				
	<i>Males</i>	<i>Females</i>	<i>Not known</i>	<i>Total</i>	<i>Cumulative total</i>
0	0	0	0	0	
1-2	4.2	4.3	0.2	8.7	100.0
3-5	10.9	12.3	0.4	23.6	91.3
6-10	15.4	20.8	0.1	36.3	67.7
11-20	10.1	16.8	0.1	27.0	31.4
more than 20	1.0	3.4	—	4.4	4.4
Total	41.6	57.6	0.8	100.0	

The conclusion that can be drawn from Tables 5 and 9 is that not only are there more females than males in the age range 15-64 registered with the practice but that this group of patients accounts for a disproportionately large part of the total episode load.

#### *Clinical activity*

The initial analysis of the clinical activity is into the 19 broad classifications outlined in the 1963 revised edition of the Royal College of General Practitioners' classification of morbidity. Reference to Table 10 indicates that diseases of the respiratory system impose by far the greatest episode load on the practice—35 episodes per week on average although this category of illness is particularly likely to be subject to seasonal variation. Seven other morbidity groups each account for between five and ten per cent of the episode load, a further six for between one and five per cent and the remaining five groups each account for less than one per cent.

TABLE 9

THE PERCENTAGE OF MALE AND FEMALE PATIENTS IN THE VARIOUS AGE RANGES WHO CONTRIBUTED TO A TOTAL EPISODE LOAD OF 33,359. EPISODES THAT COULD NOT BE ATTRIBUTED TO A PARTICULAR SEX OR AGE RANGE HAVE BEEN IGNORED.

Age range	Episodes		
	Males	Females	Total
0- 4	7.0	6.6	13.6
5- 9	4.6	4.4	9.0
10-14	2.7	3.0	5.7
	14.3	14.0	
15-24	5.6	9.4	15.0
25-44	9.2	15.5	24.7
45-64	9.1	12.6	21.7
	23.9	37.5	
Over 64	3.7	6.6	10.3
Total	41.9	58.1	100.0

TABLE 10

THE NUMBERS AND PERCENTAGE OF 33359 EPISODES ACCORDING TO THE MAIN GROUPS IN THE RCGP (1963) CLASSIFICATION

RCGP code	Morbidity group	Percentage of episodes	Number of episodes in 5 years
8	Respiratory system	27.7	9224
6	Nervous system and sense organs	9.8	3263
12	Skin and cellular tissue	9.5	3163
9	Digestive system	7.9	2643
5	Mental, psychoneurotic and personality disorders	7.9	2625
13	Bones and organs of movement	6.5	2182
10	Genito-urinary system	5.4	1813
17	Accidents, poisoning and violence	5.4	1803
18	Prophylactic procedures	4.6	1541
3	Allergic, endocrine, metabolic and nutritional diseases	3.5	1170
1	Communicable diseases	3.3	1108
7	Circulatory system	3.0	985
19	Administrative procedures	1.8	617
11	Deliveries and complications of pregnancy	1.5	513
16	Symptoms and ill-defined conditions	0.5	165
2	Neoplasms	0.4	145
4	Blood and blood-forming organs	0.3	102
14	Congenital malformation	0.1	28
15	Diseases in early infancy	0.02	9
	Unclassified	0.1	260

Observation of the percentage of individual disease categories in relation to episode load (Table 11) shows a preponderance of respiratory ailments together with anxiety and depression. Following these conditions acute episodes relating to the ears, eyes, genito-urinary, digestive and musculoskeletal systems feature highly. Osteoarthritis, eczema and boils also have a significant impact on practice activity. Prophylactic procedures, health education and normal pregnancy account for the contribution of the rest of the major individual categories of disease episodes.

The categories listed in Table 11 account for about half of the practice episode load. The remaining activity is spread very widely in that a further 118 categories of the

RCGP classification of morbidity each contribute between 0.1 per cent and 0.99 per cent of the episode load—in other words each of these categories were used between 33 and 333 times in the five years of study.

The implication from these observations is that if the existing system of classification of disease is considered to be appropriate then the general practitioner is indeed a general practitioner. Furthermore any attempt at arranging specialisation within general practice on the basis of this classification of morbidity system is likely to be difficult.

TABLE 11

PERCENTAGE OF EPISODES ACCORDING TO INDIVIDUAL DISEASE HEADINGS IN THE RCGP CLASSIFICATION OF MORBIDITY (1963). (ONE PER CENT IS EQUIVALENT TO 333 EPISODES IN FIVE YEARS)

<i>Disease code</i>	<i>Diagnostic heading</i>	<i>Percentage of episodes</i>
240	Non-febrile common cold	9.02
242	Febrile sore throat including tonsillitis	6.06
135	Anxiety states with associated somatic symptoms	4.72
247	Acute bronchitis	4.08
483	Lacerations	3.13
183	Acute otitis media	2.34
505	Other prophylactic procedures	1.64
379	Eczema	1.55
134	Neurotic depressive state	1.50
187	Wax in ear	1.45
304	Acute vomiting and/or diarrhoea (afebrile)	1.41
48	Sprains and strains	1.40
170	Conjunctivitis and ophthalmia	1.36
408	Fibrositis and other muscular rheumatism	1.31
313	Acute cystitis	1.26
352	Normal pregnancy	1.18
406	Osteoarthrosis	1.16
504	Health education	1.16
241	Febrile common cold and influenza type illness	1.13
370	Boils and carbuncle	1.12
268	Cough	1.11
280	Disorders of gastric function	1.07
427	Imprecisely diagnosed disease of bones and joints	1.07

#### Age-sex groups and morbidity

When the age and sex of the patients is taken into account, different patterns of morbidity from those observed in the previous section are observed. However, reference to a two-way tabulation of the 14 age-sex categories and 19 morbidity groups indicates that only one individual element of this classification accounts for more than three per cent of the total episode load—that being 3.14 per cent of male children who attend with a respiratory ailment.

In order to identify particular at-risk groups of the population with regard to the different morbidity groups it is necessary to isolate those elements of the age-sex and morbidity classification whose contribution to the total episode load is different (higher or lower) from the proportions expected by reference to the separate one-way classifications discussed above. A significant ( $\chi^2$   $p < 0.001$ ) interdependence between the age-sex and morbidity classification was shown and those elements contributing most to the higher than expected category are ranked in Table 12.

As would have been expected, deliveries and complications of pregnancy stand out as being associated with women between the ages of 15 and 44. This same age group is particularly prone to diseases of the genito urinary system.



Communicable diseases and diseases of the respiratory system are observed to be associated with children of both sexes. Among the older adults (over 44) diseases of the circulatory and musculoskeletal systems come to the fore. Two other diseases were found to be associated with particular age-sex groups—these being mental, psychoneurotic and personality disorders among middle-aged women and accidents among young men.

TABLE 12

A RANKING OF THOSE AGE-SEX AND MORBIDITY SUBGROUPS WHICH CONTRIBUTE MORE TO THE EPISODE LOAD THAN WOULD HAVE BEEN PREDICTED BY REFERENCE TO THE FREQUENCIES OBSERVED IN THE SEPARATE ONE-WAY CLASSIFICATIONS

<i>Age-sex group</i>	<i>Morbidity group</i>
15-24 F	Deliveries and complications of pregnancy
25-44 F	Genito urinary system
25-44 F	Deliveries and complications of pregnancy
15-24 F	Genito urinary system
7-64 F	Circulatory system
25-44 F	Prophylactic procedures
0- 4 M	Respiratory system
0- 4 F	Respiratory system
45-64 F	Mental, psychoneurotic and personality disorders
7-64 M	Circulatory system
5- 9 F	Communicable diseases
15-24 F	Administrative procedures
5- 9 M	Communicable diseases
7-64 F	Bones and organs of movement
45-64 M	Bones and organs of movement
15-24 M	Accidents, poisoning and violence
25-44 F	Mental, psychoneurotic and personality disorders
0- 4 F	Communicable diseases
45-64 F	Bones and organs of movement
45-64 M	Circulatory system
5- 9 M	Respiratory system
5- 9 F	Respiratory system

## Discussion

### *The units of measurement*

The data recorded on S cards are based on episodes of illness. This unit of measurement is convenient for recording and analytical purposes in that it constrains the description of morbidity to the set of some 500 three-digit numbers contained in the Royal College of General Practitioners' classification of morbidity. A further analytical convenience is obtained by locating the occurrence of an episode on a time scale to the date of the first consultation related to that episode. The S card does allow for further details of an episode to be recorded but these are not normally suitable for the type of analysis discussed here.

Sections in this paper were concerned with discussions of workload, prevalence and incidence of disease. These discussions must be viewed in the light of certain assumptions made on the data. For example, the description of morbidity was assumed to be sufficient to differentiate one disease pattern from another. Second it was assumed that the date of onset of an episode is a consistent description of a type of episode and is not systematically influenced by other patient factors. A third and perhaps most important assumption is that the duration of an episode in terms of time or number of consultations, although inextricably bound to the morbidity, is not significantly influenced by patient variables.

Although these assumptions may not always be met completely, the analytical

advantages derived from them are considerable and help to produce useful information.

#### *Technical aspects of the analysis of summarised data*

The initial recording of data on the summary card is relatively simple although it is time-consuming due to the coding activity involved. However as the recorders become familiar with the system and the discipline it imposes on diagnostic activity, the time involved becomes less.

It is necessary to extract the summary cards from the patient record envelopes for transfer to computer cards, so a second set of cards has to be inserted. Where the analysis is at five-year intervals this procedure does not impose much waste of record space. Furthermore, the continuity of the summarised records is maintained, information only being lost for short periods of time during the punching operation.

At the punching stage full details were transferred from the summary cards to the punched cards. A considerable amount of space was saved when the data were transferred to disk file for computer analysis. This data-transfer stage did provide useful information for future use of the system by highlighting items of redundant information recorded in the initial stages. Thus future use of the summary card may be modified following this experience.

Once the data had been transferred to this rapid-access store, analysis of various kinds became relatively simple. Although only relatively low-level analyses are discussed in this paper there is great potential for more sophisticated analyses using this form of computer storage.

#### *Demographic and clinical analyses*

Using these comprehensive records of all patients registered with the practice an accurate description of the practice activity can be made. First, the practice population can be precisely defined. Apart from the general characteristics related to sex and age, attention can be paid to particular sections of the practice population such as migrant patients or high and low users of the practice services.

From the clinical viewpoint the identification of morbidity patterns and in particular the high-risk groups within the practice is likely to be of value both for research and practice management purposes.

#### *Future analyses*

Only the tip of the iceberg has been explored in this paper with regard to the potential use of these data and method of data storage. It is proposed to carry out three more analyses. First, the clinical characteristics of migrants and high and low users of general practice will be investigated. Second, analyses of particular morbidity patterns will be performed in order to identify any sequential dependencies. Third, the potential links between meteorological variables and incidence of disease will be explored using data obtained concurrently at the local weather observatory.

### **Conclusions**

This paper has outlined the technical aspects of the analysis of data collected on summary cards. In addition a superficial analysis of the various patient and morbidity variables has been presented. This data-recording method has a number of qualities. First from the clinical management viewpoint, a concise clinical history of an individual patient is available providing the general practitioner is familiar with the system of classification of morbidity.

From the research viewpoint these patient records can be conveniently analysed without recourse to record linkage—a difficulty associated with time based records.

Thus a potentially useful clinical management aid is seen also to be a very convenient research method.

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### REFERENCE

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