

## **THE PATTERN OF PRESCRIBING\***

TEVIOT S. EIMERL, *D.S.C., V.R.D., M.D.*

Penketh, Lancs.

Research Assistant (part-time). Department of Social Medicine, University of Manchester. Surgeon-Captain, R.N.R.

This paper describes a sample study of all patient-contacts during four separate weeks in March, May, and June, 1960. An analysis is offered of the prescriptions issued with particular reference to age, sex, diagnosis, therapeutic intent, and the cost of the drugs prescribed.

### **Description of the Method**

During four sample weeks a detailed survey was made of all contacts with patients, whether in their homes, at the surgery, or elsewhere. This was, in effect, an experimental attempt at a case-load analysis, with the aim of showing not only the location of doctor-patient contacts but also the proportion of contacts requiring drugs as compared with advice, the relationship between the cost of drugs and age, sex, diagnosis, and therapeutic intent and perhaps most important in view of the discussion concerning the place of family doctors in medical care, the level of diagnosis made, that is, the relative amounts of presumptive and definitive diagnosis.

The method used was simple. A carbon copy was kept of every prescribing form E.C.10 issued; this shows normally the type and amount of drugs or dressings prescribed, the name and address of the patient and the age (if under fourteen). On the reverse, details of the patient's sex, age, diagnosis, and the location of the contact—home, surgery, or elsewhere (which was specified), were added. An assessment was also made as to whether the diagnosis was symptomatic, presumptive, or definitive and further whether the complaint was:

1. Trivial (self-limiting: recovery 10–14 days)
2. Acute, requiring major adjustment by the patient to change or handicap (illness extending to 3 months duration)
3. Acute, not requiring major adjustment (illness up to 3 months duration)

\*Part of a thesis demonstrating operational research in general practice which was submitted for the M.D. (Liverpool).

4. Chronic, requiring major adjustment (illness lasting more than 3 months)
5. Chronic, not requiring major adjustment (illness lasting more than 3 months).

Details were similarly recorded for patients who did not require the prescription of drugs or dressings, so that all patient contacts were included.

An attempt was made to assess the precise therapeutic intention in the doctor's mind at the moment of putting pen to paper, when writing prescriptions at each of the 435 patient/doctor contacts in the survey period. At the time of writing the prescription, on the reverse of the carbon copy E.C.10, a note was made of the particular category of estimated pharmacological efficiency. The E.C.10 carbon copies were costed according to the usual formula: i.e.,

Net ingredient cost price in pence and decimal fractions,  
 Plus 25 per cent "on cost",  
 Plus the dispensing fee,  
 Plus container allowance of 1.62d.  
 Giving finally the gross cost to the National Health Service in pounds, shillings, and pence.

Information from all these forms was transcribed on to punched cards and analysed. So far as diagnoses are concerned, the same classification was adopted as that used by Backett *et al.* (1954), the 28 groupings being based on the underlying disease processes. The 28 disease groups are as shown in table VII.

Before considering the results, mention can be made of the Hinchliffe Committee's Report (1959) on the Cost of Prescribing, in which the overriding need for penetrative study and co-ordinated knowledge of prescribing habits was emphasized. The lack of such information was deplored. (Paragraphs 302 and 305 of the report.)

When discussing the habits of the individual practitioner faced with the need to prescribe for his patient, Asher (1960) outlined several of the less desirable reasons which, in his view, influenced doctors' prescribing habits.

This lack of basic information, resulting in expression of these diverse opinions, will persist until methods are developed which permit intelligent investigation. The author was fortunate in having made available to him such a method which he could use in evaluating his own prescribing habits. The danger of distortion of emphasis inherent in such self-enquiries is real: yet the value of this study may lie in the demonstration of one possible and practicable method of investigation.

In table I it is shown that nearly twice as many prescriptions were issued to female patients in comparison with males—female 62.3 per cent, male 37.7 per cent (the reasons for this are discussed below): that a prescription was issued in 2 out of 3 consultations—65.6 per cent: that 6 out of 7 scripts were written in the surgery, and that

an estimated total of 2.6 prescriptions were issued for each patient in a year.

In order to avoid distortion due to imbalance between the proportions of the practice population calculated either by sex or by age group, the method of assessing all rates in values per 1,000 patients for each of the age and sex groups has been followed in the next section to be described.

TABLE I  
NUMBER OF PRESCRIPTIONS ISSUED, BY SEX AND LOCATION

Sex	Surgery	Home	Other	Total: Per cent
Male .. ..	135	28	1	164 = 37.7
Female .. ..	232	37	2	271 = 62.3
All .. ..	367	65	3	435 = 100.0
<i>Number of doctor/patient contacts:</i>				
Male .. ..	247	Prescriptions issued in 65.6 per cent		
Female .. ..	415			
All .. ..	662			
<i>Prescriptions issued, by location:</i>				
At surgery .. ..	..	..	..	84.3 per cent
At patient's home .. ..	..	..	..	14.9 per cent
Other .. ..	..	..	..	0.8 per cent
Total .. ..	..	..	..	100.0 per cent
<i>Prescriptions issued, per patient per annum = 2.6</i>				

It is commonly held that a large proportion of the doctor's time is taken up in dealing with the very young and the aged. From table II one can see that the highest consulting rate is that for babies under 1 year old, and the next highest is that for elderly ladies 75 years and more old. These two groups are small in actual numbers—only 3.3 per cent of the practice population.

TABLE II  
CONSULTING RATES BY AGE AND SEX, PER 1,000 PATIENTS

	<i>Age group</i>									
	—1	—4	—14	—24	—34	—44	—54	—64	—74	75+
Male ..	923	342	160	208	171	224	310	431	250	333
Female ..	812	311	138	336	624	340	369	486	351	692

The significant finding is that a considerable proportion of the doctor's time is taken up in consultation with the female group aged 14 to 44. Twice as many women as men in this age group

required attention (males 31.7 per cent; females 68.4 per cent). This finding is especially true of the decade 24—34 years of age, where no less than three times as many women as men consulted their family doctor at the surgery. It is unusual and unexpected, but is supported by the evidence of table II in which it is shown that there is a much higher rate of issue of prescriptions for women in the age group 14 to 44, with the maximum rate in the decade 24—34. High levels of prescribing frequency are also found in the female groups 54—64 years of age, and 75 years and over; that these two groups should require greater amounts of treatment is, however, comprehensible.

TABLE III  
PRESCRIPTIONS ISSUED, BY AGE AND SEX, PER 1,000 PATIENTS

	<i>Age group</i>									
	—1	—4	—14	—24	—34	—44	—54	—64	—74	75+
Male ..	308	276	83	129	109	168	221	294	175	278
Female ..	312	189	85	235	370	229	225	402	228	538

On investigating the actual cost of prescribing in relation to age and sex, it is seen that the cost of the prescriptions issued to women aged 14 to 44 is not out of proportion.

The significant finding here is that males aged 24 to 54, who are commonly regarded as the healthier section of the community, need medical care necessitating more expensive prescribing. At first sight this seems unusual and unexpected, until it is remembered that the majority of the male population of the practice work in South Lancashire, an area of high morbidity, with a large volume of respiratory tract disorders: in keeping with present-day practice the prescribing of antibiotics is standard, and it may well be that this is the main cause of the higher cost.

TABLE IV  
AVERAGE COST OF PRESCRIPTIONS ISSUED, BY AGE AND SEX

	<i>Age group</i>									
	—1	—4	—14	—24	—34	—44	—54	—64	—74	75+
Male ..	80	55	73	75	153	154	209	98	93	52
Female ..	83	44	77	71	87	59	100	128	78	101

Table V shows that there was little difference in the cost of

prescriptions issued for male or female patients as individuals, but in table VI a further finding of considerable interest is that the average patient/drug cost varies with the sex. The cost of prescribing for females is half as much again as that for males. Not only do female patients require more attention, but the cost of prescribing for them is much greater, because of the increased frequency of prescribing which outweighs the slightly lower cost of drugs prescribed.

TABLE V  
TO SHOW AVERAGE COST OF PRESCRIPTION ISSUED, BY SEX (IN PENCE)

Male .. 92d.	Female .. 88d.	All prescriptions: average cost 89d.
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TABLE VI  
AVERAGE PATIENT/DRUG COST, BY SEX

*Part 1.*—Rate of prescriptions issued per patient per annum, by sex:

Males .. .. .	2.0
Females .. .. .	3.1

*Part 2.*—The above rates are multiplied by the average cost per prescription, shown in table V:

Males .. .. .	92d. x 2.0 = 184d.
Females .. .. .	88d. x 3.1 = 273d.

Male/female ratio = 1:1½

Table VII shows the average cost per script prescribed by diagnosis, age group, and the sexes. The salient points indicated by this analysis are that the highest costs are incurred in the following groups:

- Upper respiratory tract disease in males aged 24–54
- Upper respiratory tract disease in females aged 75 and over
- In otitis media in children of both sexes under age 14
- In bronchitis and other lower respiratory tract disorders in males aged 34–54
- In bronchitis and lower respiratory tract disease in females between the ages of 24–34 and 54–64
- In acute alimentary tract infection in children of both sexes aged 4 and under.

Cardiovascular disease, including hypertension, requires more expensive prescribing in females aged 24–34, and more especially in older women, 54–75 years of age and over. The treatment of phlebitis and varicose veins is expensive for women aged 44–54 and over 75. These costs it is believed are due to the use of phenylbutazone for phlebitis, and for the prescription of various kinds of elastic stockings for varicose veins.

The treatment of various forms of skin disease, especially sepsis

in one form or another, is more expensive for the age groups 34—54 in males, and 34—54 in females. Whilst the treatment of simple "rheumatism" in both sexes is not unduly expensive, that of arthritis and joint disorders is more costly in the age groups 54—64 in both sexes; more females than males are affected in this manner.

The treatment of anaemia, mainly that of the iron-deficiency type, surprisingly is more expensive in women aged about 24, and in the 44—54 age group. Anaemia is often found in expectant mothers and in women suffering from rheumatoid arthritis: it is the writer's habit to use injections of ferrivenin for these conditions: this may account for the age and sex loading.

The group with a high incidence common to both sexes is that of functional and neurotic disorders: the cost of treatment for this condition is relatively low, principally because it is the writer's habit to prescribe, e.g., phenobarbitone in the first instance, rather than some of the more modern and much more expensive tranquillizers. It has been found by experience that the effect of such sedation is more predictable in general practice than most of the tranquillizers now in current use. Equally, in patients presenting with peptic ulcer reliance is placed on the simpler standard preparations coupled with advice about diet and general care, rather than on prescribing the more modern, more expensive, yet less predictable preparations.

Table VIII presents an analysis of patient contacts by level of diagnosis and severity of complaint for both sexes. This analysis shows that more than half of the diagnoses were at the symptomatic and presumptive level (males 57.2 per cent, females 52.2 per cent). There is a slight overall preponderance of bias in favour of the male rather than of the female in the various ratios that can be extracted from this table. Thus:

More male (48.7 per cent) than female (44.4 per cent) patients were regarded as suffering from trivial and acute ordinary complaints.

At the definitive level of diagnosis, for acute and chronic serious grades of severity of complaint, it is seen that the ratio for males is 16.1 per cent, or one in seven of all patients consulting, and that for females the ratio is 9.9 per cent, or one in ten of all patients consulting.

The effect of pregnancy care on the figures obtained is shown by the fact that only in the category acute ordinary—definitive (in which pregnancy was included) is the ratio for females (20.3 per cent) higher than that for males (12.5 per cent).

This table demonstrates above all else the difference between



levels of diagnosis in medical care of the patient in his environment, and hospital care. In hospital care diagnosis is paramount, therapy following on. In medical care at family doctor level the demand of reassurance or relief of symptoms by his patient must be equated by the doctor with his professional need to make a diagnosis. It is significant therefore that in only 302 out of 662 patient contacts was a diagnosis at definitive level considered possible by the author. Even when allowance is made for observer error, self-selection, and bias the importance of this finding is undisputable.

TABLE VIII

PATIENT CONTACTS: ANALYSIS BY LEVEL OF DIAGNOSIS AND SEVERITY OF COMPLAINT

<i>Males</i>								
<i>Level</i>	<i>Symptomatic</i>		<i>Presumptive</i>		<i>Definitive</i>		<i>Total</i>	
<i>Severity:</i>	<i>No.</i>	<i>Percent- age</i>	<i>No.</i>	<i>Percent- age</i>	<i>No.</i>	<i>Percent- age</i>	<i>No.</i>	<i>Percent- age</i>
Trivial .. ..	42	17.1	38	15.3	29	11.8	109	44.2
Acute ordinary ..	6	2.4	34	13.9	31	12.5	71	28.2
Acute serious ..	—	—	6	2.4	9	3.6	15	6.0
Chronic ordinary ..	4	1.7	3	1.2	6	2.4	13	5.3
Chronic serious ..	3	1.2	5	2.0	31	12.5	39	15.7
Total .. ..	55	22.4	86	34.8	106	42.8	247	100.0
<i>Females</i>								
<i>Level</i>	<i>Symptomatic</i>		<i>Presumptive</i>		<i>Definitive</i>		<i>Total</i>	
<i>Severity:</i>	<i>No.</i>	<i>Percent- age</i>	<i>No.</i>	<i>Percent- age</i>	<i>No.</i>	<i>Percent- age</i>	<i>No.</i>	<i>Percent- age</i>
Trivial .. ..	95	22.9	33	7.9	45	10.9	173	41.7
Acute ordinary ..	16	3.8	41	9.8	83	20.3	140	33.9
Acute serious ..	2	0.4	6	1.4	11	2.7	19	4.5
Chronic ordinary ..	5	1.2	10	2.4	27	6.7	42	10.3
Chronic serious ..	4	0.8	7	1.6	30	7.2	41	9.6
Total .. ..	122	29.1	97	23.1	196	47.8	415	100.0

Evaluation of the information obtained in this prescribing study shows that the broad pattern of morbidity established by other investigators is reflected in the sample surveyed. Certain diseases require more expensive treatment than average, when medical care is given by the family doctor. Many imponderable factors enter into this assessment: examples taken from the text illustrate that treatment along modern lines of say, phlebitis and arthritis in older women, and pregnancy care in younger women is rather expensive. What the figures do not demonstrate is the tremendous value to the individual patient and to the community of a more rapid return to health, the reduction of morbidity, and the consequent saving



in demand on the medical services as a whole: these more than outweigh any immediate increase in cost. Conversely, it has been shown that the cost of treatment for children under four years of age, and for the elderly is below the average, with the exception of the treatment of elderly ladies over 75.

Perhaps the most useful lesson that can be drawn from this demonstration is that an individual practitioner's prescribing costs can mount very rapidly if he happens to have a small number of patients needing expensive therapy; particularly when this rise is only considered during a given month, is the effect most noticeable. That the practitioner may by the use of such expensive preparations take advantage of scientific progress, and produce results beneficial to his patient and to the community generally, are advantages that the community itself derives from placing these preparations freely at his disposal for use when required. Yet there are dangers for the prescriber inherent in such action, especially in regard to the present method of assessing his prescribing costs in relation to those of his colleagues. The argument can be advanced that an individual practitioner's prescribing costs should be related primarily to the expected demand for medication by prescription he is likely to meet, basing the assessment on the age-and-sex composition of his practice.

In this investigation an attempt was made at a case-load analysis of prescribing habits with particular reference to age, sex, diagnosis, and the cost of the drugs prescribed. It would appear that this is the first time such an attempt has been made and the results described, for in all the published reports that have been scrutinized only the broad outline of prescribing by the family doctor is shown. Scott *et al.* (1960), in a topical report of considerable interest describe their investigation into the several components of the family doctor's therapy at the General Practice Teaching Unit, Edinburgh University: the survey covered the period 1 October 1956 to 30 September 1957. A figure of 6.6 consultations for each patient during the year is given: in only 38 per cent of consultations was a written prescription for drugs and/or dressings issued, although in an additional 4 per cent the practitioner handed out some medicine at the time of consultation. These figures contrast with those obtained in the author's prescribing study, where it was shown that the patient consulting rate was 4.1 consultations per annum, and that written prescriptions were issued in 65.6 per cent of all patient/doctor contacts or consultations. Scott and his colleagues do not attempt an investigation of the doctors' prescribing habits in detail.

At first sight the two sets of figures indicate that there is a marked difference in prescribing habits between Penketh and Edinburgh, but that this is not so is shown in table IX which illustrates the vary-

ing prescribing habits observed in different surveys, in broad outline.

TABLE IX  
NUMBER OF PRESCRIPTIONS PER PATIENT PER ANNUM

<i>Author</i>	<i>Number of prescriptions per patient per annum</i>
Backett (1954)	Under 4.0
Brotherston (1956)	4.1
Scott (1960)	2.5
Eimerl (1960)	2.6

To counter the possible charge that during the investigation there had been a deviation from the normal pattern of use of drugs, an unbiased factual comment on the rate of issue of prescriptions and their average cost was obtained from information supplied regularly to each principal in the National Health Service. The figures quoted below were supplied by the Joint Prescribing Bureau through the agency of the executive council.

TABLE X

<i>Period</i>	<i>Average number of prescriptions per person on the N.H.S. prescribing list</i>
May 1959 .. .. .	0.23
*Survey period 1960 .. .. .	0.22
July 1960 .. .. .	0.20
May 1961 .. .. .	0.20

\*Figures for this period obtained by calculation.

### Estimation of Therapeutic Intent

In order to demonstrate the possible range of pharmacological efficiency, 5 categories were chosen:

1. Specific: *examples:*

Insulin in diabetes mellitus  
Digoxin in congestive cardiac failure  
Thyroid in myxoedema  
Cyanocobalmin injections in Addisonian anaemia

2. Probable: *examples:*

Antibiotics in infections  
Aspirin in rheumatic carditis  
Corticosteroids in rheumatoid arthritis  
Topical hydrocortisone in infantile eczema

3. Possible: *examples:*

Corticosteroids in bronchial asthma  
Antacids in gastric function disorders  
Tranquillizers: phenobarbitone

4. Hopeful: *examples:*

Antibiotics in chronic bronchitis  
 Mixed corticosteroids and tranquillisers  
 Tonics  
 Aspirin in fibrositis

5. Placebo: *examples:*

Any preparation given with the intention of alleviating mental stress and which the prescriber believes possesses minimal pharmacological activity.

Many drugs can appear in more than one category: the selection of the particular one was dependent in each instance on the combination of the clinical condition diagnosed and the degree of importance and effectiveness attached to the pharmacological actions of the drug prescribed. It is accepted that different prescribers would attach differing degrees of importance to the drugs prescribed. The main purpose of the 5-tier estimation was both to educate the practitioner in recognition of his therapeutic intentions and to demonstrate the extent to prescribe specifically, i.e., using a particular drug in the sure knowledge that it would be wholly effective. At the same time it was hoped to estimate, equally clearly, the volume of minimal therapeutic intent prescribing which was known to exist, i.e., at the hopeful and placebo levels. This lower extent would be assessed as another manifestation of the need of the patient for reassurance, a demand which is still made upon the family doctor.

TABLE XI  
 ILLUSTRATING RANGE OF THERAPEUTIC INTENT

<i>Intention</i>	<i>Number</i>	<i>Percentage</i>
Specific .. .. .	44	7.55
Probable .. .. .	87	15.03
Possible .. .. .	149	25.69
Hopeful .. .. .	124	21.38
Placebo .. .. .	176	30.35
Total .. .. .	580	100.00

To check the accuracy of the diagnoses, all carbon copies of the original prescriptions were re-scrutinized some 6 months after the last of the four sample weeks. In the light of the patient's subsequent progress, a change of diagnosis was required in only 21 of the 435, i.e., 4.8 per cent. Most of the changes were due to a later recognition that many of the symptomatic diagnoses were manifestations of sublatent anxiety states.

The figure of 580 separate therapeutic intentions in 435 patient/doctor contacts can be explained by the fact that where more than one preparation or drug was prescribed at a consultation, each

item was assessed for the individual intent. When the 580 estimated intentions were similarly re-scrutinized a change was made in 25, i.e., 4.3 per cent. Three-quarters of the changes were made at the possible and hopeful levels. Almost all the changes (23 out of 25) were to a lower category.

Though the results of the original and later checks indicate a minor degree of overlapping of the categories there is not enough to make a revision necessary. Broadly, the indications used for therapeutic intent fit most of the situations met with.

The principle of sampling was applied to this pioneer study of prescribing habits in one practice in a mainly residential semi-rural area in S.W. Lancs. The results may not be generally applicable but the technique devised is capable of wide application. It is being used elsewhere by a large group of volunteer practitioners and many thousands of scripts will be collected for analysis and more detailed study. Though the investigation is not directly clinical, it is of value; for only in general practice can the large volume of mundane, day-to-day treatment be demonstrated. This large volume is of interest to the community for the costs involved in the aggregate are considerable.

### Summary

A novel method of estimating the prescribing habits of the family doctor is described by which it is possible to demonstrate the pattern of prescribing in relation to diagnosis, cost and range of therapeutic intention present in the prescriber's mind at the time of writing the prescription.

The method used carries independent assessment a stage further than the Hincliffe Report; it meets to some extent the needs described in paragraphs 302 and 305 of that report for penetrative study and co-ordinated knowledge of prescribing habits.

### Acknowledgements

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