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The Impact of Drug Information on
the Prescribing of Drugs

by

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A thesis presented for the degree of

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Summary

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Using prescription analyses and questionnaires, the way drug information was used by general medical practitioners during the drug adoption process was studied. Three new drugs were considered; an innovation and two 'me-too' products. The innovation was accepted by general practitioners via a contagion process, information passing among doctors. The 'me-too' preparations were accepted more slowly and by a process which did not include the contagion effect.

'Industrial' information such as direct mail was used more at the 'awareness' stage of the adoption process while 'professional' sources of information such as articles in medical journals were used more to evaluate a new product. It was shown that 'industrial' information was preferred by older single practice doctors who did not specialise, had a first degree only and who did not dispense their own prescriptions.

Doctors were divided into *early* and *late-prescribers* by using the date they first prescribed the innovatory drug. Their approach to drug information sources was further studied and it was shown that the *early-prescriber* issued slightly more prescriptions per month, had a larger list size, read fewer journals and generally rated industrial sources of information more highly than *late-prescribers*.

The prescribing habits of three consultant rheumatologists were analysed and compared with those of the general practitioners in the community which they served. Very little association was noted and the influence of the consultant on the prescribing habits of general practitioners was concluded to be low. The consultants influence was suggested to be of two components, active and passive; the active component being the most influential. Journal advertising and advertisement placement were studied for one of the 'me-too' drugs. It was concluded that advertisement placement should be based on the reading patterns of general practitioners and not on *ad-hoc* data gathered by representatives as was the present practice.

A model was proposed relating the 'time to prescribe' a new drug to the variables suggested throughout this work. Four of these variables were shown to be significant. These were, the list size, the medical age of the prescriber, the number of new preparations prescribed in a given time and the number of partners in the practice.

Key words

Drug-Information; Innovation; Drug-Adoption; Prescribing.

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To
G. M. I.

CONTENTS

| | |
|--|------|
| Title Page | I |
| Summary | II |
| Acknowledgements | III |
| Dedication | IV |
| Contents | V |
| List of Tables | VIII |
| List of Figures | XIII |
| <u>Chapter 1 General Introduction</u> | 1 |
| Objectives | 4 |
| The Process of Prescribing | 4 |
| The Prescriber | 14 |
| The Patient | 18 |
| The Pharmaceutical Industry and Advertising | 22 |
| Sources of Information for General Practitioners | 27 |
| The Future of Drug Information | 36 |
| <u>Chapter 2 The Questionnaire</u> | 40 |
| Population and Sample | 44 |
| Hypotheses | 50 |
| Using of Information in the Prescribing Process | 52 |
| Reassurance in the Manufacturing Company | 64 |
| Statistical Consideration | 66 |
| Practice Size | 68 |
| The Age of the Physician | 78 |
| Education | 85 |
| University Attended | 86 |
| List Size | 91 |
| Dispensing Practitioners | 93 |
| Specialisation | 96 |
| Discussion and Conclusion | 99 |

| | |
|---|-----|
| Summary of Hypotheses | 99 |
| The Drugs Chosen | 101 |
| The Sources of Information | 103 |
| Methodological Considerations | 108 |
| Comments from General Practitioners | 109 |
| <u>Chapter 3 Prescription Analysis</u> | 131 |
| Hospital Prescribing | 135 |
| Prescribing of one General Practitioner | 135 |
| Methodology of Prescription Analysis | 137 |
| Data Analysis | 139 |
| The Newcastle Study | 150 |
| Drug Totals for A, B and C | 151 |
| <u>Chapter 4 Early and Late Prescribers</u> | 156 |
| Hypotheses 27 to 54 | |
| Deltakos Study | 182 |
| Results of Chapter 4 | 184 |
| Conclusion | 187 |
| <u>Chapter 5 The Influence of Particular Sources of Information</u> | |
| 5A The Consultant | 190 |
| Variables Chosen | 191 |
| Assessment of Influence | 192 |
| Methodology | 196 |
| Analysis | 197 |
| Results | 198 |
| Discussion and Conclusion of Chapter 5A | 201 |
| 5B The Influence of the Pharmaceutical Industry | 203 |
| The Impact of Drug Advertisements | 205 |
| Prescribing Statistics | 208 |

| | |
|--|---|
| <u>Chapter 6 The Prescribing Model</u> | 228 |
| Variables Selected | 229 |
| Previous Models | 230 |
| Attitude Testing | 232 |
| Hypothesis 24 | 239 |
| Hypothesis 25 | 241 |
| Hypothesis 26 | 245 |
| Multiple Regression analysis | 248 |
| General Equation | 249 |
| <u>Chapter 7 Discussion Conclusion and Recommendation for Further Work</u> | |
| Discussion | 250 |
| Conclusion | 261 |
| Recommendation for further work | 263 |
| Appendix 1 | Questionnaire 1 264 |
| Appendix 2 | Questionnaire 2 276 |
| Appendix 3 | Statistics 283 |
| Appendix 4 | Figures from the Work of Coleman Katz and Menzel 287 |
| Appendix 5 | Questionnaire 3 289 |
| Bibliography | 290 |

List of Tables

| <u>Table</u> | | |
|--------------|---|----|
| 1 | Direct Mail to Doctors | 43 |
| 2 | General Rating of Sources of Information | 47 |
| 3 | Specific Rating of Sources of Information | 48 |
| 4 | Sources of Information for Awareness | 52 |
| 5 | Sources of Information for Evaluation | 53 |
| 6 | Sources of Information for Advice/Information | 55 |
| 7 | Sources for Awareness for Drug A | 57 |
| 8 | Comparison of the Number of Doctors who had Heard of and Prescribed New Drugs | 58 |
| 9a | Sources for Evaluation/Information of Drug A | 59 |
| 9b | Most Useful Source of Information | 61 |
| 10 | Reassurance in the Manufacturer of A, B and C | 64 |
| 11 | Reassurance in the Manufacturer of Drug A | 65 |
| 12 | Reassurance in the Manufacturer of Drug B and C | 65 |
| 13 | Hypothesis 1 Drug A | 70 |
| 14 | Hypothesis 1 Drug B | 70 |
| 15 | Hypothesis 1 Drug C | 70 |
| 16 | Practice Size by Sources of Information | 71 |
| 17 | Hypothesis 4 Drug A | 74 |
| 18 | Hypothesis 4 Drug B | 74 |
| 19 | Hypothesis 4 Drug C | 74 |
| 20 | Practice Size by Sources of Information for Awareness | 76 |
| 21 | Practice Size by Sources of Information for Evaluation | 77 |
| 22 | Practice Size by the use of the Representative | 77 |
| 23 | Practice Size by the use of <i>Mims</i> | 78 |
| 24 | Hypothesis 7 for Drug A | 81 |
| 25 | Hypothesis 7 for Drug B | 81 |

Table

| | | |
|-----|--|-----|
| 26 | Hypothesis 7 for Drug C | 82 |
| 27 | Age by Sources of Information for Awareness | 83 |
| 28 | Age by Sources of Information for Evaluation | 84 |
| 29 | University Attended by Score for 'Units' | 87 |
| 30 | 'Industrial'/Professional' Scores | 87 |
| 31 | Sources of Information used for Awareness for Drugs A, B and C | 88 |
| 32 | Hypothesis 13 by Drugs A, B and C | 88 |
| 33a | Education by Sources of Information used for Evaluation | 89 |
| 33 | Education by Sources used for Awareness | 90 |
| 34 | Hypothesis 16 by Drugs A, B and C | 92 |
| 35 | Hypothesis 18 by Drugs A, B and C | 94 |
| 36 | The number of Receptionists by Sources of Information for Awareness | 96 |
| 37 | Hypothesis 22 by Drug A, B and C | 97 |
| 38 | Specialisation by Sources of Information for Evaluation | 98 |
| 38a | Percentage who have Heard of and Prescribed Drugs A, B and C by Area | 107 |
| 39 | Sex of the Doctor by Respondents and Non-Respondents | 157 |
| 40 | Education by Respondents and Non-Respondents | 158 |
| 41 | Years Qualified by Respondents and Non-Respondents | 158 |
| 42 | Partnership by Respondents and Non-Respondents | 159 |
| 43 | Sex of the Doctor by Drugs A, B and C | 160 |
| 44 | Qualifications by Drugs A,B and C | 160 |
| 45 | Years Qualified by Drugs A, B and C | 161 |
| 46 | Prescribing Time by Sex of Doctor | 162 |
| 47 | Prescribing time by Partnership Number | 163 |

Table

| | | |
|-----|---|-----|
| 47a | Prescribing Time by Single Practice | 164 |
| 48 | Prescribing Time by Years Qualified | 164 |
| 49 | Prescribing Time by Qualifications | 165 |
| 50 | Prescribing Time by List Size | 166 |
| 51 | Prescribing Time by University Attended | 167 |
| 52 | Prescribing Time by Sources of Information | 168 |
| 53 | Prescribing Time by Number of Sources Used | 170 |
| 54 | Prescribing Time by Sources of Information Used for Awareness | 170 |
| 55 | Prescribing Time by Sources of Information Used for Evaluation | 170 |
| 56 | Prescribing Time by Total Number of Sources of Information Used for Further Information | 171 |
| 57 | Prescribing Time by Use of the Yellow Card Adverse Drug Reaction Reporting | 171 |
| 58 | Prescribing Time by Other Methods of Adverse Drug Reaction Reporting | 172 |
| 59 | Prescribing Time by Use of the Data Sheet | 173 |
| 60 | Prescribing Time by Use of Direct Mail | 173 |
| 61 | Prescribing Time by Use of Consultants | 174 |
| 62 | Prescribing Time by Consultant Recommendation Substitution | 175 |
| 63 | Prescribing Time by Journal Reading | 175 |
| 64 | Prescribing Time by Use of Controlled Circulation Journals | 176 |
| 65 | Prescribing Time of Single Practice by Representatives Seen | 176 |
| 65a | Prescribing Time by Number of Representatives Seen | 177 |
| 66 | Prescribing Time by Representative-Selectivity | 178 |
| 67 | Prescribing Time by 'Use' of the Representative | 178 |
| 68 | Prescribing Time by Attendance at Postgraduate Refresher Courses | 179 |

Table

| | | |
|----|---|-----|
| 69 | Prescribing Time by Attendance at Meetings Outside the Area | 180 |
| 70 | Prescribing Time by Usefulness of Symposia | 180 |
| 71 | Prescribing Time by Specialisation | 181 |
| 72 | Consultant:Doctor-groups Correlation | 199 |
| 73 | Doctor-groups : Doctor-groups Correlation | 199 |
| 74 | Prescribing of N* Prescriptions by Consultants | 200 |
| 75 | Advertisement Recall | 207 |
| 76 | Breakdown of Promotional Expenditure | 211 |
| 77 | Summary of Awareness and Usage, Five and Eleven Months After Launch | 212 |
| 78 | The Cost of Advertising | 215 |
| 79 | Promotional Expenditure for a New Drug | 217 |
| 80 | Choice of Journals by General Practitioners | 224 |
| 81 | Cost and Inclusions of Advertisement for Drug C | 225 |
| 82 | Drug A Time to Prescribe by Drug B Time to Prescribe | 239 |
| 83 | Drug A Time to Prescribe by Drug D Time to Prescribe | 240 |
| 84 | Drug A Time to Prescribe by Drug B or C Time to Prescribe (Drugs D, E and F all early) | 241 |
| 85 | Drug A Time to Prescribe by Level of Prescribing for Therapeutic Class A | 242 |
| 86 | Drug B or C Time to Prescribe by Level of Prescribing for Therapeutic Class B/C | 243 |
| 87 | Drug D Time to Prescribe by Level of Prescribing for Therapeutic Class D | 243 |
| 88 | Drug E Time to Prescribe by Level of Prescribing for Therapeutic Class E | 244 |
| 89 | Drug F Time to Prescribe by Level of Prescribing for Therapeutic Class F | 244 |
| 90 | Drug A Time to prescribe by Number of Different Preparations Prescribed in the Therapeutic Class A | 245 |
| 91 | Drug B or C Time to Prescribe by Number of Different Preparations Prescribed in Therapeutic Class B/C | 246 |

Table

| | | |
|----|--|-----|
| 92 | Drug D Time to Prescribe by Number of Different Preparations Prescribed in Therapeutic Class D | 246 |
| 93 | Drug E Time to Prescribe by Number of Different Preparations Prescribed in Therapeutic Class E | 247 |
| 94 | Drug F Time to Prescribe by Number of Different Preparations Prescribed in Therapeutic Class F | 247 |

List of Figures

Figure

| | | |
|----|---|-----|
| 1 | The Antecedents, Process and Results of Drug Adoption | 13 |
| 2 | Hospital Referral as a Source of Information about new Drugs | 17 |
| 3 | Details Taken from National Health Service Prescriptions | 137 |
| 4 | Cumulative Number of Doctors Introducing Drug A, B and C | 140 |
| 4a | The Number of New Prescribers of Drug A each month | 141 |
| 5 | Cumulative Proportion of Doctors Introducing Drug A | 142 |
| 6 | Compilation of the Early and Late-Prescribers | 143 |
| 7 | The Effect of 'Partnership Number' on the Prescribing of Drug A | 146 |
| 8 | The Effect of Integration on the Prescribing of Drug A | 147 |
| 9 | The Acceptance of an Innovation Drug A | 153 |
| 10 | The Acceptance of Minor Innovations Drugs B and C | 154 |
| 11 | Semi-logarithmic plot of Prescribers of Drug A | 155 |
| 12 | Patient Referral to a Consultant | 195 |
| 13 | The Birth of a Drug | 204 |
| 14 | The Influence of Advertising on the Sales of Drug C | 216 |
| 15 | The number of New Prescribers of Drug C each Month | 219 |
| 16 | Cumulative number of tablets of B and C Dispensed | 220 |
| 17 | Cumulative number of doctors prescribing Drugs B and C for the First Time | 221 |
| 18 | Different Prescribing Patterns of Drugs B and C | 222 |

Figure

| | | |
|----|---|-----|
| 19 | A Model of Drug Prescribing | 231 |
| 20 | Drug Prescribing | 234 |
| 21 | A Model of Prescribing | 235 |
| 22 | Decision Tree on Prescribing a New Drug | 236 |
| 23 | The Individual and the Community as the Target for Outside Stimuli | 237 |
| 24 | Measurement of 'The Prescriber' 'His Personality' and 'Information Influence' | 238 |

DRUG INFORMATION AND THE PRESCRIBING OF DRUGS

Chapter 1

General Introduction

In the United States, and to a similar extent in the United Kingdom, the information explosion, particularly the drug information explosion is acute. The amount of information available on the 4,000 different dosage forms of 1200 single drug entities together with the 6,000 combination formulations is immense. Seventy per cent of the currently available preparations in the United States were not in existence fifteen years ago when more than half of the physicians were receiving their formal education in pharmacology (Herman C.M. 1976).

The knowledge related to the practice of therapeutics is changing so rapidly and so constantly, that the practicing physician can hardly keep up (Hefferman M. 1977), yet the rate of prescribing has kept pace, increasing in the United Kingdom by over twenty-five per cent in the last ten years (Fry J. 1978). From wherever the figures are calculated, the underlying problem is obvious.

Information, in abundance, is available but how does the doctor choose the correct form for the correct purpose?

Information about drugs, whether new or established appears in a number of different forms. The emphasis placed on different aspects of a drug preparation depends on the aim of the informer and the background of the informant.

The pharmaceutical industry produces the majority of information about medicinal products for the medical profession.

The information input is either directly from the industry such as advertisements, direct mail and the representatives, or it is in the form of sponsored journals such as 'Pulse'. It is intended to sell

products. There is a certain amount of information which must be present in any promotional literature but such information will naturally highlight the 'good points' of the preparation.

On the other hand, information from other sources such as government bodies may stress the cost. It is often used as a comparison among similar products to attempt to influence the prescriber to choose the cheaper preparation. Other sources such as drug information units need effort on the part of the doctor to obtain the information.

Information about preparations which are new to the doctor is essential prior to prescribing (Thornber R. 1977) if the doctor is to make a reasoned decision.

There is a perceived risk involved in prescribing any new preparation. The preferred method of handling this risk is to increase knowledge about the new preparation. In most cases this involves information processing by receiving or seeking and evaluating new information or through referring to and evaluating already stored information (Cox D.F. 1964).

Parish (1976) showed the 'misuse of information' when *Mims* was cited as a source of information about adverse effects. (*Mims* is a monthly publication sent free to all general medical practitioners listing drugs in a recipe style format. The Editor looks on it as an 'aide memoire').

The prescriber needs information about the effectiveness of various treatments and the efficiency and cost of such treatment (Editorial BMJ 1974). He also needs information about contraindications, and toxic effects, if he is to choose the new drug rationally.

The latter forms of information are also needed by nurses and pharmacists (Editorial Pharm. J. 1974) if they are to fill their roles adequately.

From the plethora of drug information available the prescriber is expected to choose the right drug for the right patient, in the right amount at the right time (Hepler 1974). Unfortunately such logical and sensible drug prescribing may still be neglected in medical schools (Linnett 1968).

The prescriber must judge when reliable information concerning a new product has become available. Until it is, it would usually be better and safer if the prescriber restricted himself to preparations with which he was more accustomed (Wade O.L. 1969). The picture presented is of a great deal of information concerning new and established products. Some information is biased one way and some biased another way. In the middle is the prescriber faced with a patient who needs treatment. To prescribe an unfamiliar product without enough reliable information to assist the decision, may be 'unprofessional': to deny a new treatment because of the inability of the prescriber to evaluate the information available, may be safe but it may also be unacceptable.

Yet the prescriber makes decisions, some of which are potentially hazardous, every day of his working life. He obviously must feel capable of making assessments from what information is available. Some doctors prescribe new drugs within weeks (sometimes days) of their introduction. This diffusion process must be started with something of an act of faith as it is at present. (Mapes R.E.A. 1977a). It allows experience to be gained at least by some doctors with each new product. It is on this experience that further 'innovation' can be

based and on which eventual judgements on relative efficacy can be made (Teeling-Smith G. 1968.) (An 'innovation' means a new and novel product which offers some advance over other established products of a similar type).

Objectives

It is intended in this work to show:- how doctors view information about drugs; how they would improve those sources currently available; why some doctors choose new drugs early on in the product's life and why some rarely accept a new product.

The Process of Prescribing

Before proceeding to a discussion of the prescriber and the various sources of information, the process of prescribing will be considered. The nature of a disease and the condition of a patient should be the prime factors upon which physicians base their selection and prescription of drugs (Brodie quoted in Hepler C.D. 1974).

There are many complex social pressures placed on the general practitioner during a consultation. Cultural, social, patient and organizational factors, influence the course of drug adoption. (Miller R.R. 1973).

The doctor must be aware of his patient's expectations. Dosage form and ease of administration may limit the prescribing and force it along certain channels. Many suggestions as to what the doctor should ask himself prior to prescribing, have been discussed and documented.

Linnett, (1968) suggests three questions:-

1. Does the drug really seem to offer an advantage over its predecessors or is it a 'me-too' drug. ('Me-too' generally

means a product which offers little or no therapeutic advantage over other products in a therapeutic class.

There are examples among the β blockers and psychotropics but who decides what is a therapeutic advance and what is not and what criteria they use, is not always apparent.)

2. Do the published reports bear out the claims?
3. What is the drugs toxicity and limit of use?

In the first question it would be difficult to define the word 'advantage' particularly in the case of the depressed patient. A 'me-too' drug with a different colour or shape may be all that is required and therefore offers advantages over its predecessors. A different definition is necessary in the case of these 'me-too' drugs, the innovatory essence of which may be in its newness and where the word 'innovation' may be fairly used.

As has been stated, there is a great deal of pressure, placed on the doctor to prescribe a new drug. This pressure comes not only from the pharmaceutical industry, but also from the medical profession itself. The press and the patient can also constitute significant pressures.

If a new product is issued at the conclusion of the consultation, it is chosen because of a combined stimulus of several forms of advertising or communication (Caplow 1954). If all doctors reacted in the same way to promotion, then the pattern of drug adoption would be very different from that which is found. There are what seem to be thresholds which must be reached before a prescription decision can be made. As the stimulus, in the form of drug information, is increased so the threshold of more and more prescribers is reached.

The threshold will differ for each therapeutic class and for each type of innovation. More information may be needed to convince the doctor to change from one preparation to a totally new therapy unless no other product could treat the patient. In this case, any new treatment, if meeting the basic safety requirements seen to be necessary by the prescriber, would be expected to be adopted. "The more closely the behaviour demanded for use of the innovation is compatible with the structure of the culture prior to its introduction the greater the chance of its acceptance" (Graham 1954). This is likely to be true up to the point where the prescriber has his first line product and a few similar 'reserve' preparations in the same therapeutic class, after which the necessity for change would diminish rapidly, raising his threshold to further similar products.

The threshold is attained after a number of cognitive stages have been traversed. These stages are the theoretical assumptions concerning the process of drug adoption.

The adopter must make the decision to begin prescribing the new product often at the expense of another previously used product.

Johnson & Haver listed five stages in decision making :-

1. Observing the problem
2. Making an analysis of it
3. Deciding the available courses of action
4. Taking one course
5. Accepting the consequences (Johnson G.L. 1953).

A process consisting of several stages was suggested by Ryan and Gross (1943). They differentiated between sources of information which brought awareness to the Iowa farmers and information sources used to influence adoption.

The way a new drug is adopted is viewed again as stages in time. As in the more general decision stages, the process of drug adoption is considered to consist of five stages.

The five accepted cognitive stages of drug adoption are awareness, interest, evaluation, trial and adoption. The time to pass from awareness to adoption is a complex function of the prescriber. The stages may be gone through at a single consultation following stage 1, awareness.

AWARENESS: Becoming aware of a product's existence is a natural pre-requisite to any process involving the product. Awareness of a new product is generally considered to be a passive activity (Hessinger E., 1959). Bauer however, comments that when it comes to discussions of physicians' sources of information about new drugs, very often there is a tacit assumption that the problem of awareness will take care of itself. If the information is somewhere available, the physician will seek it out (Bauer R.A. 1966). This implies awareness is active. Before deliberate searching of any kind regarding a product can be made, passive awareness must precede it.

The information concerning the new drugs existence arrives soon after the new product's 'launch.' (Launch means the release after licensing of a new product onto the market.)

Awareness can result from a number of forms of information. The diversity of the forms leads to the possibility of an active sub-division of awareness. This sub-division is fulfilled by the drug firm representative and any other interactive form of information.

When a new product is introduced by a representative the prescriber is 'expected' to respond by questioning further. This merges awareness and 'interest'. As the prescriber may go no further than this stage, it is valid to call awareness via a representative

or other interactive form 'active awareness'. (The representative as a source of information is otherwise passive, as the prescriber does not actively seek the source).

There is also a 'sub-conscious'/'conscious' sub-division of awareness. Seeing advertisements in medical journals can be regarded as sub-conscious awareness. The advertisements form part of a whole and they may be seen superficially by the reader if he scans the journal. Direct mail, on the other hand is 'complete'. It does not form part of something else. The difficulty on the part of the advertiser is to get the direct mail advertisement opened.

Need for a particular new product may be an integral part of awareness (Hassinger E. 1959). The need may come prior to any form of advertising or soon after. Sub-conscious awareness, after seeing an advertisement fleetingly in a medical journal is likely to be transient unless either the need for the product in some way is made apparent or a further exposure to information concerning the product, soon after the advertisement has been seen, is given. It is possible that such a process of sub-conscious to conscious awareness following the realisation of a need does exist. Once conscious awareness is involved, the potential prescriber of the new product must show an interest in the innovation before he can progress further towards adoption.

It may not be 'need' that triggers the change, it may be a comment from a colleague or some direct mail which brings the new product to mind again. Timing is crucial.

INTEREST: Interest in a new product is more likely if some form of need is again perceived. The need may be apparent to the prescriber at the time of first awareness because of failures in previous therapy.

It is not necessary for the need to be on a personal level at this stage. If further information concerning the new product is readily available (which was previously stated to be the case) the prescriber begins to search. This may take the form of questioning the drug firm representative.

The data sheet may also be studied. An individual practitioner with a special interest in say depression, will be more likely to show interest in a new anti-depressant than a colleague with major interests in other fields or with no particular specialist interest. As interest can be closely linked to awareness, so it can be closely linked to 'evaluation' which is the third stage in the process of drug adoption.

EVALUATION: The interest stage should be looked at as a general interest or evaluation of a new therapy or concept of therapy. Questioning the representative, and discussing with colleagues helps to establish the product as a suitable addition to treatments already available.

Evaluation is orientated to a more personal approach.

"How will the new drug help me in my practice?"

Rogers calls this stage a "mental trial" (Rogers E.M 1962).

The more 'reassuring' sources are used at this stage*. These generally come from within the profession convincing the prescriber that the innovation is useful or not useful.

As with the interest stage, the sources of information chosen will not only depend upon the information and the drug, but also upon the prescriber's personality and values. These will also govern

* It will be shown that different information sources are used predominantly in at least two of the stages.

to some extent the way he interprets the same piece of information. There is an inherent risk involved with all preparations. The risk as perceived by the prescriber depends upon the prescriber and on the drug. As the general practitioner is frequently making important decisions involving risk, the acceptance of a new drug is of relatively minor importance and low risk (Williamson 1975). Information from peers and colleagues is likely to be sought here. Information sources needed, change from being passive to active.

If the individual feels that the advantages outweigh the disadvantages, and if the necessary reassurance is given, the fourth stage of adoption is reached.

TRIAL: There is an active step from interest generally to active evaluation. There is a bigger step from evaluation to 'trial'.

Patients are now involved although only limited numbers. Here validation of the evaluation occurs. The trial stage will be characterised by concentrating information searches to route of administration and dosages as well as duration of treatment.

The results of the trial lead to adoption, rejection or further trial. The results may be misinterpreted by the prescriber. Over caution may result in ^{the dose} being too low for too short a period. This is particularly true of antidepressants. (Parish P.A. 1973).

Assuming the trial has been judged successful, and the final stage of the process is reached.

ADOPTION: Adoption is characterised by continued use of the innovation either as one of a number of preparations to be used in a particular disease state, or as the first product of choice. The 'activity' of each of the stages can be as shown.

1. Awareness - passive on the part of the doctor
2. Interest - passive/active
3. Evaluation- Active
4. Trial - Active
5. Adoption - Active/passive

Some practitioners appear to go through all five stages in a very short time while others never pass the awareness stage. (Miller R.R. 1973b).

An innovation can be rejected at any stage of the adoption process. It may be because evaluating the product shows no necessity to prescribe - there is no perceived need. It may be that the trial stage leads to results which do not validate the prescriber's reasons for trying the product. A paper presented to the Midwest Sociological Society in 1959 by Johnson and Van den Ban was discussed by Rogers (1962) in which 'discontinuances'* were studied.

One significant finding was that relatively later adopters had twice as many discontinuances as earlier adopters. This implies that the later adopters who by definition need more information and/or reassurance concerning the new product to reach the prescribing threshold, still only adopt in an incomplete manner, reverting to their previous practices (or possibly take on other preparations) more often than those who prescribe early.

If this is true in medicine, the total number of new products prescribed by late adopters should be less (assuming the former discontinuance option of reverting to the original preparations) than the total for early adopters.

The suggestions of Johnson and Van den Ban were supported by Silverman and Bailey in 1961 again reported by Rogers (1962).

*(If a prescriber adopts a product and then rejects it, the rejection is termed a discontinuance).

Adoption of the Innovation

The model shown in Fig. 1 is adapted from the general model of Rogers (1962 p. 306).

The antecedents, process and results of the doctor-patient interaction and new drug adoption were considered by Rogers (Rogers E.M. 1962).

First, considering the antecedents - the environment in which the practitioner finds himself at the time of the consultation there are certain variables which can be grouped together as personal characteristics. These unique characteristics may be the major influence on the way a practitioner responds to a particular patient. They include age, sex, degree of introversion or extraversion, orientation (whether it is towards patient or drug), integration in a social or medical environment.

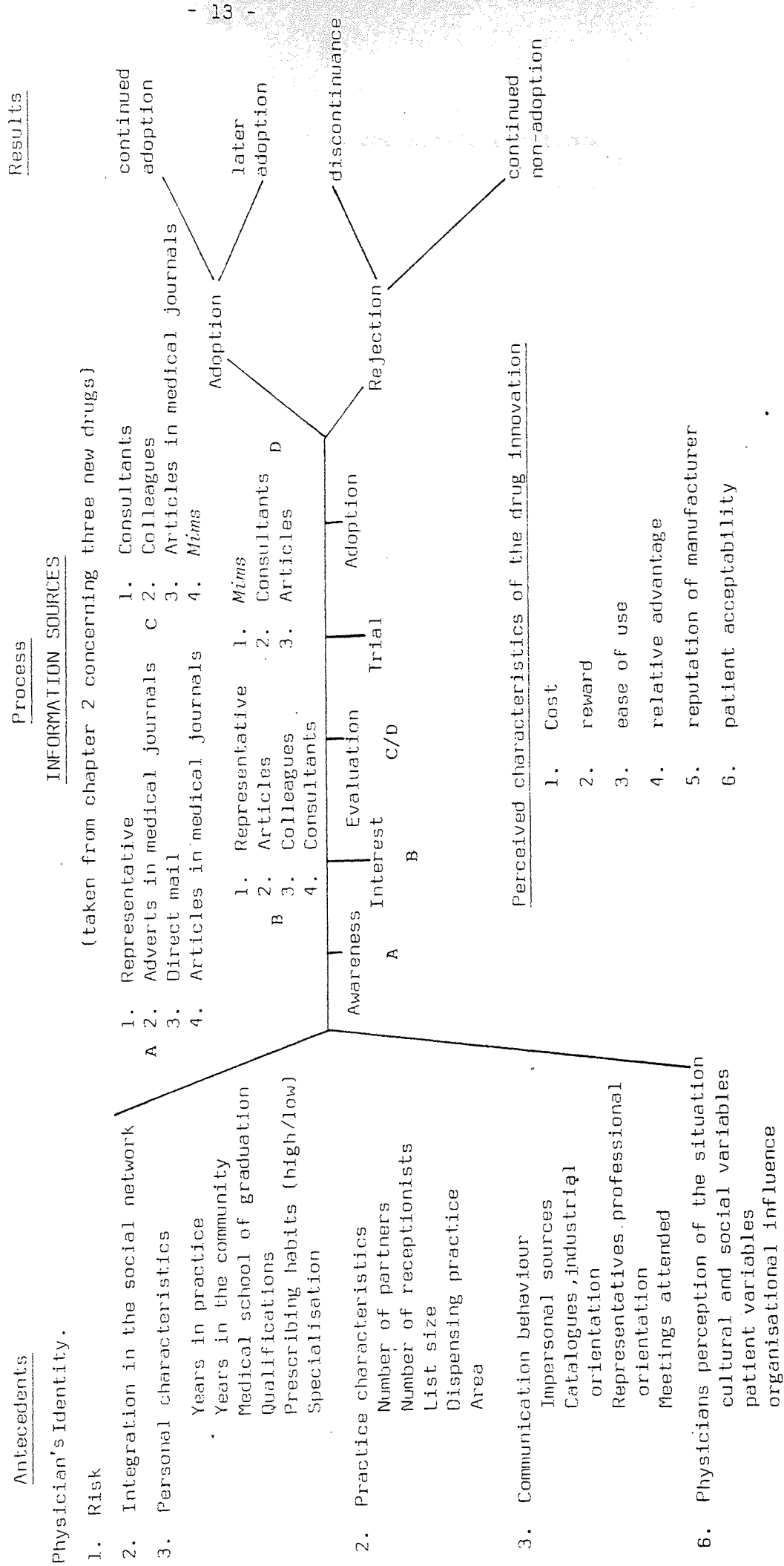
Other variables which might be gathered together under the broad heading "Physician identity" include the medical school attended, the qualification obtained, the degree of specialisation etc.

Further antecedents which will to some extent determine the sources of information, if any, chosen prior to prescribing a new medicinal product may include the prescriber's attitude towards representatives, colleagues, consultants and the patient as individuals and the industry as a body.

From these variables a new general variable can be postulated as the 'situation perception' which may be defined as the way a physician views the patient and his symptoms, taking all the previously considered antecedents into account.

Figure 1

The Antecedents, Process and Results of Drug Adoption



The writing of a prescription is only one possible outcome of a social interaction (Mant A. 1975). The prescription is an expected end to a consultation and is a token, if nothing else, that the prescriber is doing everything possible. (Marshal J. 1973).

The Prescriber

When considering the adoption process a number of terms have been used to identify those who accept an innovation and those who do not. The former are labelled 'innovators' the latter at best are termed 'conservatives' at worst 'laggards' and 'drones'. These labels imply much more than they should. They are loaded and give the impression that the 'innovators' are good doctors and 'laggards' or 'drones' are slow and lazy. It is fair to suggest that on the one hand the innovator is the prescriber who gives his patient the opportunity to try a new preparation which may, for the first time, bring relief from symptoms or remission from the disease, but on the other hand, this same innovator may be fairly accused of putting his patient at unnecessary risk by using a product which has not been tested over extended periods and for which the contraindication and side effects are not fully comprehended.

The opposite comments refer to the 'laggards' and 'drones'. It is time to stop the use of such emotive terms by calling those prescribers who use a new product soon after its launch 'early prescribers' and those who use the product later or not at all 'late prescribers' and 'non-prescribers' respectively. For the sake of completeness a middle group, between early and late/non may be called Group 2 prescribers.

*It should be noted that Professor Mapes defines conservative in the following terms. The use, to a noticeable degree of preparations which are prescribed unambiguously for the management of known clinical conditions but where the pace

of pharmacological developments has left and replaced these treatments.' Another definition he gives is of the incautious prescriber "Prescribing Drugs with unwanted side effects", (Mapes R.E.A. 1977).

"Individual variables divide doctors into groups with different, but constant probabilities of adopting a new drug. Social variables divide doctors into groups whose probability of adopting the drug may initially be equal but are differentially variable: in the more integrated group they increase over time" (Coleman 1966 p.104).

In this study three doctor groups are considered which cover individual and social variables. None of the groups have distinct edges and each doctor may belong to one group for one therapeutic class of drugs and another for a different therapeutic class of drugs. The first group are the Early Prescribers. A member of this group is characterised by his willingness to prescribe without recourse to his colleagues for their opinion. It is suggested that he receives his primary information about new drugs from the drug representative, advertisements and medical journals, building up his own picture of the drug. His prescriptions are the first to be written for a new product.

It is difficult to separate him entirely from the other two groups, particularly when the referral system is considered. A patient is diagnosed by the GP and sent to hospital for investigation and treatment. The patient is duly admitted, investigated, treated and discharged, often with a week or more's supply of medication. The patient returns to the GP who considers the notes sent from the hospital and usually, though not always, prescribes the same product as the patient received in hospital. Thus a script may

arrive from the doctor for a new product early in the product's life incorrectly indicating an early prescriber. Similarly patients discharged from hospital with a particular product may arrive at the doctor's surgery having been referred by that doctor in the first instance. (See Fig. 2).

It is difficult to think of a method which is acceptable and feasible which could elucidate the components of this problem satisfactorily. All prescriptions from a sample of doctors could be studied to find the percentage of new drugs. This should eliminate the problem of consultant-referral.

Group 2 Prescribers

The title '*Group 2 Prescribers*' was chosen to represent that group of doctors who fall between *early-prescribers* and *late-prescribers*.

The title is, unfortunately, lacking in any descriptive quality. As this group will generally be ignored in this study, the title will be retained.

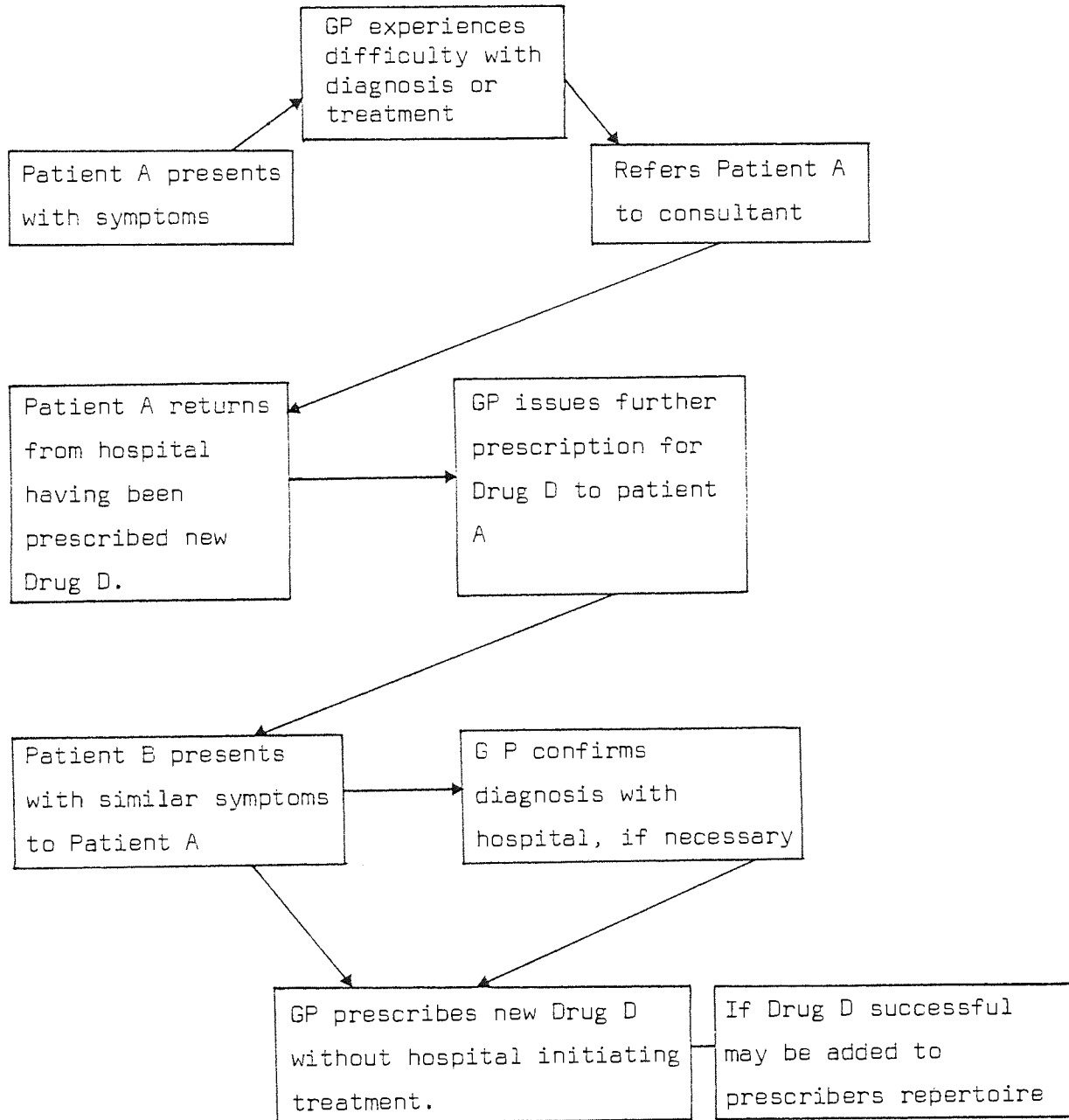
Group 2 prescribers prescribe a new product perhaps after having discussed the possible outcome of treatment with a colleague who may have already prescribed the product. They will be characterised by an extended period of 'evaluation'.

Late-prescribers.

This group will tend to use only familiar products avoiding new preparations unless specifically requested to prescribe them by a consultant after referral (Fig. 2). There may be occasions when a preparation is noted as being a major innovation, filling a gap in therapy, however, the *late-prescriber* is still likely to be relatively late in his prescribing of such an innovation. His threshold is higher, his period of evaluation and trial are longer.

Hospital referral as a source of information about new drugs

Fig. 2.



Personality

The *need* or *ability* of a practitioner to prescribe a new drug soon after its launch may be a function of the doctor's personality and as such difficult to assess objectively.

An early prescriber of a new drug may be characterised by his behaviour in a non-medical environment. This desire for change may alter with age such that the older physician will prescribe less new drugs.

The number of partners a doctor has may be an outward measure of personality. A single practice doctor may view partnerships as a hinderance to using new drugs in that justification of his prescribing may be considered necessary when discussing cases with his partners.

The patient

'Juvenis tua doctrina non promittit opes; plebs amat remedia'.

(Lawrence W. (1819).

The people wanted medicines then and their demand for medicines is still present. The actual size of the demand has not been fully elucidated (Hemminki E. 1975) although Stimson found that eighty percent of doctors answering a questionnaire considered that patients expected a prescription from eighty percent of all consultations in the U.K. A National Opinion Poll study found that only forty three to fifty two percent of patients questioned expected a prescription after a consultation. Doctors are therefore accused of over estimation of patient expectation which may lead to over-prescribing. (Stimson G. 1976). Patient expectations are rarely translated into explicit demands. One of the problems of consultation is that some patients do not feel able to speak freely (Stimson G. 1976). On the other hand reports abound of specific instances where demands have led to prescribing new drugs.

Two women from a group of eighty studied, requested specific named preparations which their present doctors had not previously prescribed for them. The two patients were both given the products without the prescriber apparently seeking or giving additional information (Boreham P. 1978).

With drug A, which is discussed throughout this study, a number of respondents to questionnaire 1 said that they first heard of it from the patient who had in turn heard it mentioned on television.

Dyspeptic patients asked for treatment with "the new wonder drug that was on television" referring to a potent H_2 receptor antagonist (Hoskyns B.L. 1978). One of the reasons the doctor often gives for this apparently irresponsible prescribing is that many patients may return repeatedly to the doctor which may suggest failure of the previous treatment. This leads to the necessity of issuing a prescription for a new product if only to facilitate the removal of the patient from the surgery. On the other hand the fact that a patient does not return to the surgery after treatment may be associated in the prescriber's mind with the success of the treatment (Parish P.A. 1974).

Is the patient to blame? or is it the doctor? The practitioner has the final say as to whether a prescription is issued.

Prescribing 'fashions' influence patient expectation which subsequently determine the 'fashion' of society (Parish P.A. 1973).

Doctors are exposed to advertisements showing situations which, it is implied, can be 'alleviated' or altered by drugs. This is particularly true of psychotropic drugs.

Wolfe has suggested a complete ban on picture advertisements particularly where social problems are considered to be alleviated by drugs (Wolfe 1974).

Patient information

Some authors suggest that information to patients should be increased (Martin E.W. 1973), while others consider that it would do more harm than good (McMahon G. 1975). Greenfield (1974) lays complaints against drug advertising for increasing pressure by public and physicians, to use drugs beyond proper indications.

Information on prescription only medicines is not only discussed in scientific and medical journals. The magazine *Woman's Realm* recently contained a reference to Cimetidine under the title 'Treating an Ulcer'. The postscript to the article contained the following "Kevin was delighted with the treatment and after only a couple of weeks he said he felt much better". *Woman's Realm* Oct. 7th 1978). The drug had been on the market for less than twelve months when this article appeared.

If prescription drugs are advertised, their sales will increase. If promoted to the public, demand for them will increase (Penna R. 1974). Instead of the patient being the passive recipient of evaluated professional information he becomes an information source.

Hospital Drug Information Units

Drug information has been disseminated from hospital pharmacy departments for many years but the setting up of specialised units is relatively new. The London Hospital established one of the first units in the 1960's and the first Regional centre was started in Leeds in 1973. Since then, all but two Regions in England have set up drug information centres.

There are approximately one hundred full or part-time information pharmacists specialising in drug information in hospitals. ^{Dissemination of information} of these local units is encouraged by the Regional centres who provide a back-up service. The Regional centres tend to have more specialised resources than the local units. Many produce bulletins, some

collaborating with medical colleagues although only Newcastle has clinical pharmacologists within the information unit.

The queries are generally from hospital personnel. Only about 4.7% of the 2000 queries received by the West Midlands Centre in 1977 were from general practitioners. Relative isolation and lack of personal contact are two reasons for the low percentage. In one area where a staff pharmacist met local general practitioners, the number of queries from that locality rose sharply. A number of general practitioners said in the questionnaire (Chapter 2) that "no hospital drug information units were available in their area", which, as there was at least one, implies a lack of advertising on the part of the unit.

Of course, only if doctors are convinced of a need for information will they actively search for it. A peripatetic pharmacist as suggested in question 31 of questionnaire 1 may be the answer (see chapter 2). A DHSS sponsored national information unit has been dismissed as being too remote. However, if it was used purely as a producer of specialised bulletins (such as 'drugs in breast milk' or 'paediatric dosages') such a central unit may be able to back up the regional and local units as well as the travelling pharmacist.

The Pharmaceutical Industry

"A pharmaceutical company does not market chemicals, it markets information. Without effective communication there is no transmission of the information and without the information there is no prescription".
(Higgins, D.G. 1975).

The industry makes its impact on drug adoption through a number of channels. These are the representative, direct mail, journal advertising, sponsored symposia and exhibitions, and its own medical information units which can be contacted direct. The industrial sources are second to none for speed in making known the existence of a new drug. The industry often sponsors the drug trials prior to release and publishes the results. It is difficult to determine how unbiased assessment of a drug is possible, particularly under the pressure of day-to-day clinical practice. (Parish P.A. 1973).

Each channel of communication set up by the pharmaceutical industry will be commented upon briefly.

Advertising

Introduction

When the Journal of the American Medical Association (JAMA) produced a "no-advertising" variant only one hundred subscriptions were received. Librarians considered that the advertisements were a legitimate and important part of the journal (Barclay 1974).

Most manufacturers in the UK spend a great deal of time and money on pre-testing advertisements to avoid misrepresentation. Roche use their own research staff, 'outsiders' only being used when the load becomes too great (Toffey W.V. 1974). E.R. Squibb has its own 'eye-camera' to study how doctors' eyes travel through an advertisement. Comprehension tests are then carried out three or four minutes after testing.

Unusual advertisements

Some 'bizarre' advertisements for medicinal products have been seen in the past. One or two unusual 'indications' were reported recently.

"Is your stomach a war victim?" was a 1940 advertisement for a reputable antacid mixture. By 1941 the same product was being recommended as a sensible way to treat rheumatism. Again in 1940, Syrup of Figs was recommended as a defence against children's colds (Editorial Guardian 1977b).

Rather bizarre techniques are still used in advertising. One well known firm in the United Kingdom, advertising one of its products mailed jumping beans to general practitioners. On the envelope was the message "Contains live jumping beans". Inside was the slogan "We can't promise to make your patients jump, but your claudicants will be able to walk further" (Prescott L.F. 1977).

It is wrong to praise research and condemn advertising (Teeling-Smith G. 1968). The cost of innovation must be paid for. The drugs must be sold. Information must be available to the prospective prescriber for decisions to be made (Rucker T.P. 1972).

Possible link between advertising and drug abuse

Advertising exerts extreme pressures on society in the United States (Berger A.A. 1974).

The doctor is subjected to enormous pressure and does not have unlimited time for leisurely reading of journals and the advertisements within them. Many complaints have been levied at the advertiser and certain action demanded. For example, some restriction of analgesic advertisements to reduce abuse (Editorial, Therapie 1974).

The only systematic study of the impact of advertising on drug usage is considered to be that of Kanter (Kanter D.L. 1974). He

believed that advertising was only one factor which could lead to drug abuse. Nationally, a link is difficult to establish. Denmark bans all drug adverts, yet has a considerable barbiturate problem. (Kallir J. 1972).

Other Problems

Greenfield (1974) considered that all drug advertising (including the use of representatives) should be eliminated with a subsequent lowering of costs. The representative or detail man was blamed for the excess prescribing of antibiotics for colds (Rucker T.D. 1972). Has the prescriber completely handed over his evaluative role to the industry who then automatically receive the blame? If there is a problem, is the doctor not finally responsible for his own action and decisions?

In some instances, advertisements do appear to conceal some important fact or interpretation.

In 1974 an advertisement for a new treatment of urinary tract infection was issued. The promotional literature concealed the fact that the product would metabolise into a compound which was generally regarded as being able to produce bacterial resistance and should be restricted. The advert (with no reference to the metabolite) appeared in a very reputable medical journal. (Bendall M.J. 1974).

Herxheimer (1974) showed differences between information given on data sheets for two brands of the same product. Essential storage was only mentioned by one manufacturer. Only one specified the need to take the preparation after meals. Silverman reported on the differences in advertising to the United States and Latin America. The drug in question was chloramphenicol. In the United States, indications were low while contraindications were mentioned extensively. In Latin America, the opposite was noted (Silverman M. 1977). The problems of using

chloramphenicol have been noted and practitioners have no justifiable excuse for ignoring them. The industry takes what it can, it goes as far as the legal system and the prescriber will allow them. Their standards should become more uniform throughout the world but at the same time, medical practitioners should assert their authority and not allow their discriminating role to be usurped.

The influence of drug advertising

If exposure did not show, beyond doubt, that the great majority of doctors are splendidly responsive to current ethical advertising techniques, new ones would be devised in short order. (Garai P.R. 1964).

Advertisements sometimes attempt to influence general practitioners by presenting a picture of normality (Simmons H. 1974). Rather than recommending counselling or social action, drugs are to be the solution. The female is usually shown as the helpless anxious patient, never as the physician (Seidenberg 1974).

There is a need to reprofessionalise advertising (Lauber J.D. 1972). A motto of "The truth well-told" would be appropriate (McLeod P. 1968). The ABPI considered government restrictions on the industry would not achieve higher standards of prescribing (Times 1977), but extension of undergraduate and postgraduate training in clinical pharmacology would help.

On April 28th 1977, Mr Ennals announced new curbs on advertising and promotion of medicines. Prices and profits were justifiably scrutinized by Parliament as a very high proportion of the industry's sales were paid for by the government.

Under the 1968 Medicines Act a statutory instrument has recently been introduced to instruct product licence holders to promote their products in accordance with the specified criteria.

Graphs in advertisements must be relevant to claims made: no claims or suggestions can be made that a medicinal product is better than another unless the claim can be substantiated by clinical experience. The word 'safe' without qualification is not permitted. Other restrictions and requirements are laid out in the instrument (Statutory Instrument No. 1020, 1978).

Ricketts (1977) considered that advertisements had little effect on prescribing. However, a strong correlation was observed between the quantity of drug advertisements received by general practitioners and the amount of the advertised drugs prescribed (Dajda R. 1978). It was impossible to say whether high advertising led to large numbers of prescriptions or high sales led to increased advertising to maintain market position.

Pritchard (1978) found that prescriptions for drugs introduced in the year after a practice stopped receiving promotion, dropped to one quarter of the previous level whereas practices studied where information was retained, remained at constant level over the years.

Summary of Advertising

The style of advertising has, of course, changed greatly over the years and the efforts of the industry to put its own house in order should not be forgotten.

Advertising exists to sell products but when selling becomes "pushing" government controls ought to be applied. It may be true that different countries are given advertisements with different emphasis. Is it only the pharmaceutical industry who are to blame? Are the doctors in Latin America blameless? Are Governments taking their responsibilities seriously? It is very easy to condemn one side without taking account of the other.

It is probable that a "poor" drug could be sold by advertising *for a time*. Eventually the decision to continue prescribing must be the responsibility of the doctor taking information from journals and bodies such as the C.S.M. into account.

Sources of Information for General Practitioners

The sources of information selected by or mailed to general practitioners have each been considered separately.

Direct Mail Information

Direct mail is the unsolicited literature which is sent direct, mainly from pharmaceutical industry to the general practitioner, free of charge. An estimate £6m was spent on these advertisements in 1973 (Stimson 1977) despite the limited therapeutic information which they are reputed to contain. The average general practitioner, assuming he has not removed his name from the mailing list, will receive in the order of thirty-six issues of controlled circulation journals and thirty envelopes containing other direct mail, every month (Editorial Scrip 1977). This is a calculated exposure to 1,331 adverts. per month of which 1,117 are in the controlled circulation journals, one hundred and seventy-four subscription journals and forty by direct mail. The trend seems to be to put more than one advertisement in an envelope although all doctors in a joint practice may still receive individual packages of direct mail. (Revised and new data sheets are always mailed) individually. Direct mail is more often used in the initial awareness stage of promotion than in actually causing the doctor to prescribe (See Chapter 2). It is also used to keep the name of a product in the mind of the prescriber.

The drug-firm representative was cited as being responsible for introducing a new product twice as often as direct mail, but direct mail

was three times more often cited as introducing a new product than journal advertising (Caplow R. 1954).

A recent survey by the Medical Mailing Company showed that nearly eighty-four per cent of direct mail sent to NHS general practitioners was opened (Editorial ABPI News 1979) although the method of assessment was not fully discussed.

Wilson et al found that much of the information sent to doctors as direct mail was opened and he assumed that advertisements were looked at long enough to remind each doctor of the existence of the drugs which were being advertised. (Wilson C.W.M. 1964).

Is the assumption valid? There are few individuals who can discard unopened envelopes addressed to them - it may be easier if a third party such as a receptionist or secretary opened them. On the other hand, once opened and checked, the inhibition is removed. It is possible that direct mail is selectively viewed such that an envelope containing a booklet or a reply card is retained, whilst an envelope opened and containing an advert with no reply card will be discarded. If this is true, the mere fact of an opened envelope is no measure of impact and the number of reply-cards returned cannot be extrapolated to the number of advertisements looked at and remembered.

The Pharmaceutical Representative

The majority of studies in which the influence of the representative or 'detail-man' has been considered, suggest he has his greatest effect when conveying information about new drugs. In other words he has his effect in the 'Awareness' stage of drug adoption. (Ryan B. 1943).

The representative's assignment is to "sell" yet many physicians accept

the information received as objective (Cluff L.E. 1967). It is not suggested that the 'rep' or detail man is necessarily guilty of misleading or peddling bad information to doctors (Stetler 1974) as it is unlikely that he would be readmitted to a doctor's surgery if this were the case.

The representative has however a conflict of interest; a) sales quota must be met, and b) practitioners must be supplied with complete information concerning the appropriate use of pharmaceutical products (Rucker 1976). Waxberg asked doctors known to have prescribed a new drug, what was their initial source of information concerning the product. One hundred per cent of the prescribers were introduced to the drug by "detail men". In one area, where the representative had been away and had not been replaced, no prescriptions for the new product had been issued, indicating the representative's influence in this area (Waxberg J.D. 1973). In Ferber and Wales study, thirty-seven point five percent of physicians cited only one source of information which was used prior to adoption of a product. Of these seventeen percent were citations for the representative. This is almost three times the number of citations for journals or direct mail. (Ferber 1958). Direct mail and journals cannot, of course, be cross examined. The representative not only informs doctors about drugs but also takes information back to the industry about a doctor's response to these products. (Parish 1973). The representative was rated higher than specialists for awareness in every case in a study in 1974 (Moser R.H. 1974).

In 1972 the expenditure on the representative by the Australian Pharmaceutical Industry was forty-two percent of the advertising costs (Mant A. 1975). This seems a reasonable sum considering his apparent influence.

There are about 3,500 medical representatives (Parish 1975) all of whom are trained to carry out their work. The representative apparently sorts his doctors into various categories such as 'innovators'. He is aided by statistics his firm will probably receive from the various agencies (see chapter 5b)

One of the longest commentaries on the role of the representative was carried out for the Office of Health Economics by Market Investigations (P & A) Limited (ABPI report 1975).

Fifty percent of general practitioners considered that representatives should be pharmaceutically qualified and more than seventy-five percent considered a basic scientific education was necessary. A recent comment in the Lancet suggested that representatives should be trained in a specific area of drug treatment, for example cardiovascular, and introduce the prescriber to a variety of drugs in that area. (Lancet Editorial 1974).

No alternatives to the representative were suggested by the report. Hemminki (1977a) concluded that drug detailing was neither necessary nor beneficial for the health services. In 1970, in England there was one representative for eighteen doctors. In Finland the ratio was one to seventeen. In Brazil it was one representative to three doctors.

The representative gives no comparison between different drugs and different treatments and gives biased, sometimes false information (Hemminki E. 1977a). In the U.K. the drug firm representative is expected to discuss his product in the light of currently available products. He is bound to stress the advance his product will bring and is necessarily biased.

Compendia

Long considered that in the USA there were too many compendia already available with often conflicting information. No one source of information

was satisfactory for all individual subjects (Long J.W. 1974). The ABPI Data Sheet Compendium was first issued in 1974. Participation by individual companies was voluntary. Most firms now contribute. Of those firms participating, some have only supplied information on products which are currently being promoted. The Physicians Desk Reference (PDR) was considered to be the most influential single source of information in the USA. (Herman C.M. 1976b). Johnson found however, that for information on *new* drugs PDR was not ideal (Johnston P.M. 1976). This may also be the case with the ABPI compendium which is about six months out of date at the time of distribution. A properly designed compendium can be not only a source of information but also an effective instrument for further education if read.

Journals

There are two major types of medical journals. The official membership or subscription-only type such as the 'British Medical Journal', 'Lancet' and 'Practitioner', and the controlled circulation journals such as 'Pulse', 'Doctor' and 'General Practitioner'. These latter journals are circulated free of charge being sponsored by advertising or the industry, and some by one particular company. Both types contain articles of interest to doctors although some of the controlled circulation journals tend to be more like newspapers. Jenkin (1976) considered non-subscription journals were read by general practitioners, more often than subscription journals. The

value placed on medical journals as a source of information about drugs has been considered by a number of workers. Caplow, in 1954 showed that journal articles were second only to 'detail-men' as a source of information for influencing first prescribing decisions. Coleman et al (1966) did not find this however. In their study, journal articles increased

in importance over time. They also considered that the journal was very important in legitimising the physician's decision to use the drug. In the single practice it is likely that the journal will provide the reassurance given by colleagues in the joint practice.

A regular increase in the mean number of journals purchased was associated with better quality of work in a study in general practice in North Carolina (Peterson O.L. 1956).

Nearly all journals are also a source of advertising. Articles are interspersed with one or two page advertisements. The position of this form of promotion within or on the cover of the journal is very important and selection of a specific position increased the cost of advertising.

Colleagues

Doctor integration has been studied as an influence in the acceptance of an innovation (Coleman, J.S. 1966). The colleague is often only considered a secondary source of information, usually having most influence at the evaluation stage when discussion may be initiated. Winick considered that the meeting with medical colleagues was a 'one-off' event rather than an habitual activity (Winick 1961). Apart from meetings on a formal basis, Coleman et al considered the value of social meetings and integration as a diffusion mechanism. Chance 'off-the-cuff' comments by a physician at a social event concerning the experience of a new drug (often anecdotal) may strongly influence the acceptance of the drug (Czapek 1975). As colleagues are exposed to the same pressures of sales promotion, why do some doctors rely on them as if they were official sources of therapeutic information? The interaction may minimize dependency on commercial sources of information

and knowledge about drugs. This has not, however, been proven (Mant A. 1975). The most likely reason is for the *Group 2 prescribers* who tend to prescribe after the early but before the late prescriber to obtain reassurance from those *early prescribers* who have used the product. In general one doctor gains reassurance from his respected colleagues who have experience. Ferber and Wales in 1958 noted that colleagues were mentioned relatively infrequently as an *initial* source of information about new drugs. When the question of which source *convinced* the doctor to prescribe the rating of the colleague was increased. This leads to the previously stated conclusion that the colleague is more likely to be used as a secondary source of information, i.e. a source of information after the initial awareness of the drug. If one doctor knows of a colleague with a speciality in a particular field it is likely that such a colleague will be contacted prior to the adoption of a new drug in the therapeutic class covered by the colleagues speciality (Wade O.L. 1969).

When two or three individuals are grouped together they develop a standard, each sublimating his differences to a group norm. Individuals turn to and depend upon others when required to form opinions and make decisions in unclear situations (Sherif M. 1965). Whether or not this is true in medicine is debatable. In group practice, though two or three may consider that they have common economical and managerial interests, they may be reticent to discuss particular medical problems. It is probable that the experimental paradigm as outlined by Sherif does fit medical practice to a large extent. A trusted source such as a colleague, helps to reduce the subjective risk associated with a decision (Bauer R.A. 1966). Single practice doctors have chosen their solitary existence in preference to group

practice. The reason why would be interesting. One possible reason could be their desire to use new drugs and new treatments unhindered.

The Pharmacist

The pharmacist has been considered in many studies to require a new role for the future. One such new role lies more actively in giving reliable drug information to physicians. (Hamm N.M. 1973).

Pharmacists must become more clinically aware (Editorial Am.J. Hosp. Pharm. 1975) where clinically implies, among other things "shared jargon". Mantz agrees with this (Mantz B.L. 1975). Some however, consider the pharmacist as only being useful in supplying drug cost information (Mosser R.H. 1974). Pharmacists in the US are trained in the use of information utilization. Burkholder D. 1974; Mantz B.L. 1975). Moser considered that the graduating pharmacist had a greater knowledge of drugs than the graduating medical student (Moser R.H. 1975) but instead of recommending the use of this extra knowledge he recommends that doctors 'catch-up'.

Some workers suggest that there is no-one better qualified than the pharmacist to communicate drug information (Burkholder D. 1974), and if there are not sufficient pharmacists, a team of pharmacologists and pharmacists should educate the drug firm representative to a suitable standard (Editorial Lancet 1976). Pharmacists, according to Miller seem to be a nearly ideal remedy for the most important deficiencies of the drug adoption process (Miller R.R. 1974c).

However, Becker (1971) found that high chloramphenicol prescribers in the USA were more likely to rely on retail pharmacists and detail men as sources of information. The implications being that when the pharmacist is consulted the information received does

not alter prescribing or that the type of doctor who relies more heavily upon retail pharmacists for information is generally incautious! Pate (1977) concluded that information sources may be altered to assist the general practitioner but he should use the many services that the pharmacist makes available to him at present. The actual influence pharmacists have on drug prescribing and drug adoption, has been concluded, in the majority of studies, to be minimal. In some studies the patient has been cited as having a greater effect. It does seem, however, that when 'influence' has been considered, it is only the direct result of physicians' regard for the usefulness of the pharmacist that has been estimated. (Worthen W.B. (1973).

In 1973 seventy-four per cent of prescriptions were written as trade names (Huskisson E.C. 1973). What effect would there be on the industry if all prescriptions were written for generic equivalents, Rosenberg asks the question with regard to the American market, but does not give an answer. (Rosenberg S.W. 1974). The generic option scheme has been widely discussed in the US. This is a system where the physician initials a specific space on the prescription to allow the pharmacist to 'substitute' a generic product even though a branded preparation has been ordered. Whenever a specific brand is considered necessary, the box is not initialled and no substitution is permitted.

Tice considered that in the near future, the US pharmacist would be receiving generic named scripts and would be expected to make judgements (Tice L.F. 1974). A similar comment was made by Fedder (Fedder D.D. 1974). It would be necessary to keep patient profiles to ensure that the same brand of a preparation was supplied to a patient to reduce confusion.

A number of drugs have been considered recently in this light. A brand name can cost many times that of the generic equivalent. Five to ten times the price is not unheard of (Guardian 1977d). The effect this would have on drug adoption is great. The retail pharmacist being in a position to accept or reject a new drug depending on whether or not an equivalent, already stocked, existed, or upon the price or whether or not the doctor has initialled the appropriate 'substitution permitted' section.

If the need for the pharmacist as a major source of information is recognised, then he will have to improve and extend his communicating skills.

The Future of Drug Information

In this final section of the introduction, a few of the ideas put forward for future drug information will be discussed.

In the U.S.A. formularies have been used to reduce the total drug cost, by providing recommendations about therapeutically equivalent drug entities (Meyer M.C. 1974). A relatively non-restrictive formulary should be established with a provision that special approval would be necessary if non-formulary drugs are required.

An effort should also be made to evaluate drugs proposed for the formulary and available from more than one source. Price should be considered *after* the evaluated evidence.

A comment in the Lancet suggested that the BNF should be more regularly updated, redesigned and more cost conscious (Editorial Lancet 1977).

The representative is probably the most influential source of information to the general practitioner, particularly for new drugs.

Lubel (1977) suggested that a doctor or pharmacist should visit general practitioners every six months to inform them about new drugs supplying evaluative information and comparisons with existing preparations. He did not consider *replacing* the representative by the doctor or pharmacist. However, this consideration is discussed in chapter two, question 31 of the questionnaire.

Ormerod (1976) suggested the use of a loose leaf book with one drug per page and clear concise details about contraindications, cheaper alternatives, suspected side effects and so on. The whole page could be replaced where necessary. 'Treatment' is a publication incorporating many of these ideals. Evaluation of its usefulness cannot be made until it has established itself in general practice. Watson (1975) was instrumental in producing file cards which he suggested were an answer to the space shortage and information explosion. Each card was circulated to a list of doctors who had paid a subscription. The card contained evaluated pertinent information on a number of disease states written by doctors. The diseases were discussed with reference to therapy. The information was reevaluated when new drug therapies were introduced. The cards were well received by new doctors and the idea was incorporated into the questionnaire.

The importance of continuing education has been stressed by many professional bodies for many years. Recently some have suggested that the ability to practice should be dependent upon educational standards being maintained. Herxheimer (1976) considered that there was a greater need for continuing education in clinical pharmacology and therapeutics than in any other field of medicine. Pharmacology, learned by doctors ten years ago had probably been forgotten or was of no further use.

Short weekly seminars on different subject areas including case studies, were recommended. Peterson (1956) and Bird (1977) were of the opinion that educational efforts were not always fruitful. Peterson suggested that patient care was diminished by such efforts. What physicians do is not necessarily determined by what they know. There is a relationship between data, information, knowledge and competence but little is known about the relationship between competence and performance. Miles (1977) on the other hand thought that a better knowledge of drugs would lead to more appropriate use of them. Even if doctors were better informed about drugs, for example about similarities between members of a group of drugs, new members would still be prescribed if the advertising was great enough (Editorial - Lancet 1974b).

There have been a number of suggestions for the use of computers in medicine. Some have been in hospitals concerned with primary diagnosis and others as a help to self-audit. Bird (1977) considered that there was a need for the physician to receive instant answers from up-to-date information on basic as well as sophisticated questions.

Bradshaw-Smith, (1977) writing in the controlled circulation journal *General Practitioner* discussed a system used by five partners in Devon. The general practitioners each have a Visual Display Unit (VDU) with which to access administration information and medical records for patients. Confidentiality is maintained by the use of passwords on access. The doctors also have a set of microfiche records which they carry in their cars for house calls. The system is connected to a hospital computer centre and repeat prescriptions and letters to consultants can be generated.

A greater use of computers is likely to be the most significant development in drug information handling in the future. What doctors use and want at present is discussed in chapter 2.

This chapter has considered drug information and has mentioned that there is a problem in its handling. The quantity is great and requires a 'sifting technique' to be developed and used by each practitioner.

The prescriber, the patient and the process of drug adoption have been considered and each major source or group of sources of information has been discussed.

New drugs are necessary to fulfil needs not satisfied by existing drugs (Binns et al 1976). Information is needed from which to evaluate a new drug prior to prescribing it. How the information is used: how drugs are prescribed and adopted. What impact the information has at the various stages of drug adoption are the subjects of the following chapters.

DRUG INFORMATION AND THE PRESCRIBING OF DRUGS

Chapter 2

Questionnaire 1

Information Assessment

Chapter 2

The Questionnaire

Introduction

The general aim of the work was to study the use by practising physicians of drug information at present available, and their information needs for the future. By asking general practitioners, information could be obtained from those people who have first-hand knowledge of the difficulties involved in updating their information concerning drugs. It was also hoped to show where certain sources of information had their main impact.

Why a Questionnaire

In undertaking research of this kind, which attempts to evaluate a doctor's thought processes prior to prescribing, there are certain fundamental difficulties which have to be overcome.

Questions must be formulated and posed. How this is carried out depends on a number of factors such as financial resources and manpower. The two most commonly employed techniques are interviews and mailed questionnaires.

An interview has certain advantages when carried out by a trained interviewer who is seen to be of an acceptable professional standing. It is possible that answers received from a general practitioner during an interview with general practitioners differ from answers given to, say, a sociologist (Waxberg J.D. 1954). Unfortunately, which one would find the 'correct' answers is not possible to say (Moser C.A. and Kalton G. 1971). The mysticism surrounding medicine is understood by the former who breaks down barriers and may reach the truth. This is not always the case with the latter who may be seen as a threat. Speculation

aside, the time involved in interviewing a sample of general practitioners is hard to justify when questionnaires cover much larger areas and elicit similar responses.

There are two major advantages of an interview. Each GP who accepts an interviewer will give at least some form of useable data. A questionnaire can easily be ignored. (The response rate to an interview is generally higher). An interviewer can probe and find exactly how the doctor has interpreted and reacted to a given question. A questionnaire is 'dead', there is no opportunity for probing and no opportunity for further understanding.

The disadvantages of an interview include the time taken to develop the necessary expertise to carry out the probing and the time involved is not easy to justify in terms of added data received. If a team of workers, trained in interviewing techniques are available where each worker is preferably a member of a similar subject group to the interviewee, then interviews should elicit more information than questionnaires.

If a single worker with no training in interviewing is carrying out the investigation a questionnaire is undoubtedly the most useful.*

* (For a full discussion of the relative usefulness of *postal* questionnaires and interviews including the errors which may arise from both, see Moser C.A. and Kalton G. 1971).

A questionnaire was therefore designed to assess the relative usefulness of various sources of drug information in the prescribing process.

The topics covered by the questionnaire fall into fairly well defined areas.

First the respondent was asked to rate a range of drug information sources covering awareness, evaluation and prescribing advice.

Secondly, three specific new products were considered and the source(s) which were used for awareness and evaluation were ascertained. From these results a comparison of sources used in general and those used for actual products was produced. As the products differed not only in their therapeutic class but also in their degree of innovativeness, sources used for the different types could be compared.

Also in this section questions were asked about the companies which manufactured the new products. From this it was hoped to assess whether a GP gained any reassurance from a particular company.

The final section considered specific sources of information for the future. Each general practitioner was asked to consider six statements and asked to express agreement or disagreement with each. (These last six statements are examined in Section 2 page 117).

Responders and non-responders

The point previously made that there is no obligation for a prescriber to complete a mailed questionnaire is very important. The sample who respond may be a biased sample. It has been suggested that only a small well motivated group of prescribers fill in questionnaires. The response to this questionnaire was of the order of fifty per cent. A further mailing sent to different doctors in

the same area received a similar percentage response. This could indicate that if the subject matter of the questionnaire is seen to be sufficiently relevant to doctors in practice then it is not only a small well motivated minority who will respond.

A major obstacle between the researcher and the doctor can often be the receptionist. The doctor must be made aware of the questionnaire's existence, and as much mail is unopened and thrown away by the doctor or receptionist, certain steps must be taken to ensure this awareness is achieved. One recent report has suggested that doctors open the majority of their post themselves (Editorial ABPI 1979).

To overcome this problem a study was instigated where the mailings to three practices (seven doctors) was collected weekly for six weeks. Prime consideration was given to noting which pieces of information were opened and why. (See Table 1).

Table 1

| Practice No. | Average No. of pieces of direct mail, excluding circulation journals received per doctor | Average No. of pieces of direct mail opened per doctor |
|--------------|--|--|
| 1 (3 GPs) | 10 | 1 |
| 2 (1 GP) | 10 | 9 |
| 3 (3 GPs) | 8 | 3 |

The opened pieces of information were examined and a number of similarities were noted.

First, handwritten envelopes were opened more frequently than those which were addressographed or even typed. Secondly, if the

initials 'RSVP' were on the outside, the envelope stood an excellent chance of being opened. One company put these initials on the envelope and began the letter inside with 'you are invited to prescribe.....' In this case the letters were pushed back into the envelope. From this small study it was decided that each questionnaire would have the outer envelope handwritten. (The idea of putting RSVP 'You are invited to fill in this questionnaire.....' was not pursued).

The front page of the questionnaire (see appendix 1) asked for readily available details concerning the prescriber such as the date of full registration in Great Britain. These data were filled in prior to the questionnaire's despatch under the assumption that a partially filled-in questionnaire had more chance of being completed than a completely blank one.

Questionnaire Part 1 - General and specific information

Population and sample

A pilot questionnaire was sent to one hundred general medical practitioners on the Birmingham Family Practitioners' Medical List. The sample was chosen at random from the six hundred practitioners listed.

Fifty-three replies were received of which forty-four were used in the analysis. A modified questionnaire was designed from this pilot which was mailed to doctors throughout the Region.

Sixty were sent to the Salop area; one hundred to doctors in Staffordshire; one hundred among doctors in Coventry, Walsall and Wolverhampton (from a total population of approximately six hundred practitioners). One hundred between Dudley and Sandwell areas; one hundred to Hereford and Worcester and one hundred to doctors in

Warwickshire. All the samples were selected from the current, updated Family Practitioner (FPC) Medical Lists corresponding to the areas mentioned, and represented approximately a one in six sample. In addition to the questions asked concerning drug information, which have already been discussed, details were asked concerning certain characteristics of each prescriber. The characteristics were selected as variables of potential influence again derived from the Sainsbury Report. (Sainsbury 1967). These ten variables are listed below. The first four characteristics were obtained from the Medical register and the FPC Medical List.

1. Number of partners in the practice.
2. The number of years the doctor had been qualified
3. The medical school from which he graduated.
4. Medical qualifications achieved (initially and subsequently).
5. The individual practitioner's list size.
6. Whether or not the doctor was a dispensing practitioner.
7. The number of receptionists employed in the practice.
8. The number of years the doctor had been in the particular practice.
9. Whether or not the practitioner undertook any specialisation.
10. The sex of the practitioner.

Sources of information:

The list of sources (questionnaire appendix 1 List 1) can be subdivided in a number of ways. One is between 'industrial' and 'professional'. This was achieved by selecting 11 sources which emanate directly from the pharmaceutical industry and referring to them as 'industrial'. All other sources were termed 'professional'. (it is not intended to suggest that information leaving the industry

is not professional). These professional sources are colleagues, consultants, medical journals which are clearly medical, but will also include the 'Prescribers' Journal' and the BNF. The media formed an additional category. There were nine 'industrial' sources, ten 'professional' sources and 'the media.' The abbreviations 'Ind' for 'industrial' and 'Prof' for 'professional' will be used in the Tables.

A further subdivision of the sources was into 'active' information and 'passive' information. The grouping into three divisions depending on whether or not the information has to be actively sought by the prescriber. ('Active' does not include journals which, once subscribed to, arrive passively even though the initial selection and payment of the subscription is active.)

The abbreviation for these groups are 'Act' for 'active' and 'Pass' for 'passive'. The consultant, if contacted by the general practitioner must be considered 'active' but when action is taken from information supplied by a consultant's letter, the consultant as a source, becomes 'passive'. This gives the 'Act/Pass' category for a consultant.

A table, indicating the rank order of sources of information as decided upon by the respondents is given (Table 2). Each doctor was asked to rate each source in a given list as very good to very poor (see appendix 1). The order of the various sources in this table is calculated by multiplying each 'very good' rating by 5, each 'good' by 4 etc to 1 for each 'poor' and 0 for a non-response.

As this table does not indicate the most useful sources as seen by the prescriber, a refinement was added which asked each practitioner to specify the five sources he found most useful, in general, in rank order. Table 2 shows a more general detached view of the sources. Some ratings may have been received for sources not used but considered

of good quality. Table 3 however gives a more personal indication of the usefulness of information sources and, as other questions in the questionnaire depend upon a narrow choice of sources for specific instances, this second approach will be used when analyses according to doctor characteristics are considered.

Table 2

"Would you please indicate by circling the appropriate number, how in general, you rate the following as sources of information on pharmaceutical products".

| | |
|--|----------------|
| 1. Mims | Ind, Pass |
| 2. Prescribers' Journal | Prof, Pass |
| 3. Consultant recommendations | Prof, Act/Pass |
| 4. Articles in Medical Journals | Prof, Pass |
| 5. British National Formulary (BNF) | Prof, Pass |
| 6. Professional contacts | Prof, Act |
| 7. Drug firm representatives | Ind, Pass |
| 7. Data Sheet Compendium | Ind, Pass |
| 9. Text-books | Prof, Pass |
| 10. Controlled circulation journals such as GP | Ind, Pass |
| 11. Drug and Therapeutics Bulletin | Prof, Pass |
| 12. Drug firm symposia | Ind, Act |
| 13.. Martindale | Prof, Pass |
| 14. Drug firm exhibitions | Ind, Act |
| 15. Pharmacists | Prof, Act |
| 16. Direct mail (through the post) | Ind, Pass |
| 17. Advertisements in medical journals | Prof, Act |
| 18. Drug firm medical information units | Ind, Act |
| 19. Drug information units, (hospital based) | Prof, Act |
| 20. The media (e.g. newspapers, TV) | X, Pass |

In Table 2, six of the seven 'active' sources of information were ranked in the last eight. This indicates a not unexpected reliance by prescribers, on sources of information which do not have to be sought.

The general practitioner needs to treat patients. Information on a particular therapy may be required while the patient is sitting in the surgery. Telephoning at this stage⁴ could be embarrassing for both parties. A quick concise source of drug information with a certain amount of detail about contraindications, cost and incompatibilities bringing information about new drugs is what is wanted. *Mims* is seen by the majority to fill this requirement.

The other sources in the top five show the doctors need for more detailed reliable information on which to base a prescribing decision or from which to gain reassurance concerning new drugs. Apart from the consultant, all sources in the top five are 'passive'. In the case of the consultants letter, this too is passive.

Table 3

Compiled from answers to the question No. 1a. *"Please give the five sources which you find most useful in general, in rank order"*.

| | |
|-------------------------------------|----------------|
| 1. <i>Mims</i> | Ind, Pass |
| 2. Recommendations from consultants | Prof, Act/Pass |
| 3. Articles in medical journals | Prof, Pass |
| 4. Drug firm representatives | Ind, Pass |
| 5. British National Formulary (BNF) | Prof, Pass |
| 6. Prescribers' Journal | Prof, Pass |
| 7. Professional contacts | Prof, Act |
| 8. Data Sheet Compendium | Ind, Pass |

| | |
|--|------------|
| 9. Drug and Therapeutics Bulletin | Prof, Pass |
| 10. Text-books | Prof, Pass |
| 11. Martindale | Prof, Pass |
| 12. Controlled circulation journals (such as GP) | Ind, Pass |
| 13. Drug firm symposia | Ind, Act |
| 14. Advertisements in medical journals | Ind, Pass |
| 15. Direct Mail (through the post) | Ind, Pass |
| 16. Drug firm exhibitions | Ind, Act |
| 17. Pharmacists | Prof, Act |
| 18. Drug information units (hospital based) | Prof, Act |
| 19. Drug firm medical information units | Ind, Act |
| 20. The media (newspapers, TV) | X, Pass |

The most obvious change in position between the two tables is that shown by Prescribers' Journal. This has moved from second position in Table 2 to sixth position in Table 3. This shows that Prescribers' Journal although thought to be a useful source is rarely used as such. This implies an unrealised potential.

The drug firm representative rises from seventh position in the general table (Table 2) to fourth position in Table 3. If the above reasoning is correct the Representative is used more often by the individual than was considered probable.

Hypotheses were set up which could be tested for statistical significance. To answer these hypotheses the questionnaire was designed. The hypotheses are subdivided by the variables mentioned in the introduction.

Partnership number:

1. Single practice doctors hear about new drugs at the same time as their joint practice colleagues.
2. The emphasis placed on each source of information is different for single practice doctors.
3. As some doctors have chosen to practice alone, their reliance on the industry will be higher than their colleagues.
4. The single practice doctor will prescribe new drugs less often than joint practice doctors.
5. The sources of information chosen by single practice doctors to indicate awareness will be the same as those chosen by joint practice doctors.
6. The source of information chosen for evaluation will be different between the two groups.

Years Qualified:

7. Newly qualified doctors prescribed new drugs more often than older doctors.
8. Newly qualified doctors use industrial sources of information at the awareness stage more than older doctors.
9. The sources of information chosen at the evaluation stage of drug adoption will differ among the subdivision of the "years qualified" variable.

Qualifications

10. Doctors practising near to their university of graduation, will rate university drug information units more highly than their colleagues.
11. More highly qualified groups of doctors use professional sources of information more than their less qualified colleagues.
12. All groups hear of new drugs at the same time.
13. Members of the Royal College of General Practitioners will prescribe new drugs less often than non-members.
14. Sources cited as being useful in evaluation will differ among the groups.
15. Sources used for awareness will be the same among the groups.

List Size

16. General practitioners with a large list size prescribe more new drugs than their colleagues.

Dispensing Practitioners

17. The dispensing practitioner will use industrial sources of information more than his colleagues.
18. Dispensing practitioners will prescribe new drugs less often than their colleagues.
19. The dispensing practitioner will not view the proposed change to pharmacist or clinical pharmacologist as well as the non-dispensing practitioner.

The Receptionist

20. The higher the number of receptionists, the lower the position of direct mail for awareness.

The Specialist

21. The specialist uses more professional sources of information than the non-specialist.
22. The specialist hears of new drugs sooner than the non-specialist.
23. The specialist will choose different sources of information for evaluation than the non-specialist.

Questionnaire Part 1 (b) Specific Uses of Information

The general practitioners were asked which sources they found most useful for finding out about new drugs (awareness), for evaluating a new drug (evaluation), and for gaining advice and information (advice/information). The results are shown in Tables 4, 5 and 6.

Table 4: Awareness

"Which of the sources in List 1 do you find most useful for finding out about the existence of a new drug?"

| | <u>Source of Information</u> | <u>No. of citations</u> | <u>'Activity'</u> |
|-----|--|-------------------------|-------------------|
| 1. | Drug firm representatives | 107 | Pass |
| 2. | <i>Mims</i> | 89 | Pass |
| 3. | Articles in medical journals | 49 | Pass |
| 4. | Direct mail (through the post) | 39 | Pass |
| 5. | Recommendations from consultants | 35 | Act/Pass |
| 6. | Advertisements in medical journals | 33 | Pass |
| 7. | Professional contacts | 19 | Act |
| 8. | Controlled circulation journals such as 'GP' and 'Pulse' | 14 | Pass |
| 9. | Data Sheet Compendium | 8 | Pass |
| 10. | Pharmacists | 7 | Act |
| 11. | The media | 7 | Pass |
| 12. | Prescribers' Journal | 6 | Pass |
| | All others | Less than 5 | |

The first three are the same as shown by Eaton and Parish. (Eaton G. 1976 Table 5). However, Prescribers' Journal falls from fourth position in their table to twelfth position in this. Direct mail is conversely raised from twelfth position to fourth in this.

Prescribers' Journal is more of an evaluated information source about established products than an alerting service for new ones and its high rating in the previous work is difficult to understand. Theoretically, direct mail, being primarily an alerting service would be expected to take a high position in the 'Awareness' table.

Table 3.2 p. 132 in the Sainsbury Report showed direct mail also in fourth position, but *Mims* however, was fifth equal to advertisements in journals. Other than this change the two tables are in very close agreement.

Awareness can be thought of as a passive state through which a practitioner must pass if he is to adopt the new product. (Hassinger E. 1959) (See however Bauer R.A. 1966). Evaluation is a more active stage where information concerning the product has to be sought. This evaluation can use 'passive' information. Knowing whether these sources are being used in an active or passive way would be impossible to say from this questionnaire.

Using the same scoring technique, the sources which were cited as being most useful for finding out about the medical value of the new product were tabulated. (Table 5).

Table 5 Evaluation

"Which of the sources in List 1 do you find most useful for finding out about the medical value of a new drug?"

| <u>Source of Information in rank order</u> | <u>No. of citations</u> | <u>'Activity'</u> |
|--|-------------------------|-------------------|
| 1. Articles in Medical Journals | 93 | Pass |
| 2. Recommendations from Consultants | 86 | Act/Pass |
| 3. Professional Contacts | 52 | Act |
| 4. Prescribers' Journal | 47 | Pass |
| 5. Drug and Therapeutics Bulletin | 34 | Pass |

continued/.....

| <u>Source of information in rank order</u> | <u>No. of citations</u> | <u>'Activity'</u> |
|--|-------------------------|-------------------|
| (continued from previous page) | | |
| 6. Drug firm representative | 23 | Pass |
| 7. <i>Mims</i> | 20 | Pass |
| 8. = British National Formulary | 13 | Pass |
| 8. = Controlled Circulation Journals such as 'GP' and 'Pulse' | 13 | Pass |
| 10. Drug Firm Symposia | 10 | Act |

This table is in agreement with the Sainsbury Report and Table 5 of Eaton and Parish's paper (Eaton 1976). The table shows the changing emphasis from the representative (alerting) to the consultant and colleagues (information and evaluation).

Using the previously discussed 'Industrial' 'Professional' sub-division, the first five sources chosen for Awareness contain three 'industrial' sources. (The first two places are taken by these 'industrial sources'). When Evaluation is needed the first five sources chosen are all 'professional'. This reliance on the industry to bring news of new products but not to do so when evaluation is necessary perhaps shows a degree of healthy scepticism.

The final part of this section which is concerned with specific uses of sources of drug information is where the prescriber turns for advice or information about a new drug. The results are shown in Table 6.

Table 6 Advice/Information

"When you require advice or information about a new drug treatment where do you usually turn first?"

| <u>Source of information in rank order</u> | <u>No. of citations</u> | <u>'Activity'</u> |
|--|-------------------------|-------------------|
| 1. <i>Mims</i> | 114 | Pass |
| 2. Data Sheet Compendium | 73 | Pass |
| 3.= Recommendations from Consultants | 43 | Act/Pass |
| 3.= Professional Contacts | 43 | Act |
| 5. Articles in Medical Journals | 28 | Pass |
| 6. Drug Firm Representative | 21 | Pass |
| 7. Pharmacists | 17 | Act |
| 8. Text-books | 12 | Pass |
| 9.= Drug and Therapeutics Bulletin | 10 | Pass |
| 9.= Prescribers' Journal | 10 | Pass |

Data Sheet Compendium and 'Pharmacists' move up the table in this part but the BNF moves down. In the comments section of the questionnaire a number of prescribers criticised the BNF for its infrequency of publication and suggested at least a yearly edition and a twice yearly production would be preferred by some.

These questions give a systematic view of the way general practitioners use the main sources of information in the drug adoption process.

It was decided to ask these same specific questions about three new medicinal products which came onto the market at the beginning of the project.

Drug A* was seen to be an innovation. It filled a gap in therapy - being hailed as an innovation by the press (both lay and medical). By the end of the study ninety-eight per cent of doctors had prescribed the product.

The remaining two products were "lesser innovations". The therapeutic class to which they belonged had many well established alternatives, some of which had been on the market for over twenty years. However, the chemical structure of these new products was different from any that had been marketed before and this difference played a large part in the advertising. The exact mode of action was not fully understood but eminent speakers suggested that it was in fact an innovation combining increased safety with efficacy. As will be seen from the prescription studies, the acceptance of the new products differed markedly from that of Drug A. It should be noted that drugs B and C are the same chemical entity being marketed by two different companies. Drug C was launched at an earlier date than Drug B and as such should have gained certain ground by the time Drug B was launched.**

* No reference will be made to the products in an attempt to maintain the confidentiality of the products studied. This was agreed by the companies.

** The company which markets Drug C holds the patent for the compound and granted a licence to the larger company which markets the product under its own trade name here called Drug B.

Table 7 shows the sources of information given to the doctors in List 1 arranged in rank order of the Table 4 Awareness and shows the rating they were given for finding out about each drug. (Questions 8, 14 and 20).

Table 7: Awareness

"Would you please state from which source you first heard of 'A,B and C'?"

| <u>Sources of Information</u> <u>in rank order of</u> <u>table 4</u> | <u>DRUG A</u> | | <u>DRUG B</u> | | <u>DRUG C</u> | |
|--|---------------|--|---------------|--|---------------|--|
| | <u>Rating</u> | <u>Percentage</u> <u>of total</u> <u>citations</u> | <u>Rating</u> | <u>Percentage</u> <u>of total</u> <u>citations</u> | <u>Rating</u> | <u>Percentage</u> <u>of total</u> <u>citations</u> |
| 1. Drug Firm Representative | 2 | 14% | 1 | 37% | 1 | 31% |
| 2. Mims | 11 | 0.5% | 6 | 4% | 5 | 4% |
| 3. Articles in Medical Journals | 2 | 14% | 7 | 3% | 5 | 4% |
| 4. Direct Mail (through the post) | 7 | 7% | 4 | 11% | 2 | 21% |
| 5. Recommendations from Consultants | 4 | 12% | 3 | 12% | 4 | 10% |
| 6. Advertisements in Medical Journals | 5 | 10% | 2 | 18% | 3 | 19% |
| 7. Professional contacts | 6 | 8% | 10 | 1% | 5 | 4% |
| 8. Controlled circulation journals | 8 | 2% | 7 | 3% | 8 | 2% |
| 9. Data Sheet Compendium | 11 | 0.5% | - | - | 11 | 1% |
| 10. The Media | 1 | 29% | - | - | - | - |
| 11. The Pharmacists | - | - | - | - | - | - |
| 12. Prescribers' Journal | - | - | - | - | - | - |
| 13. British National Formulary | - | - | - | - | - | - |
| 14. Drug Firm Exhibitions | 10 | 1% | 7 | 3% | 8 | 2% |
| 15. Drug Firm Symposia | 9 | 1.5% | 5 | 7% | 10 | 1% |
| 16. Text-Books | - | - | - | - | - | - |
| 17. Drug and Therapeutic Bulletin | - | - | 10 | 1% | 11 | 1% |
| 18. Drug Firm Medical Information Units | 11 | 0.5% | - | - | - | - |
| 19. Martindale | - | - | - | - | - | - |
| TOTAL | N= 239 | (100%) | N = 103 | (100%) | N = 144 | (100%) |

There are some striking differences which require comment. The most noticeable is the position of the media with regard to prescribers hearing about Drug A. Occasionally, a new medicinal product is hailed not only in the medical press but also in the lay press and television. In the case of Drug A the television gave notice of the product prior to its official launch to the medical profession.

This had a two-fold effect. First, doctors heard of the new product via a novel source of information which pushed the drug firm representative into second position. Possibly more important was the effect this unusual form of 'advertising' had on the public. Armed with the knowledge that a preparation was on the market, patients made demands for the product by name. This was shown to be the case by a number of doctors who added, after citing the media as the first source of news of Drug A, that it was via a patient who had demanded treatment. Since this initial 'public announcement' there have been others. The *Woman's Realm* family doctor suggested the usefulness of the drug and again named it. (*Woman's Realm* 1978).

For a comparison of the numbers of prescribers who have heard of drugs A, B and C, see table 8. This also includes the number who have prescribed the three drugs.

Table 8: Comparison of the Number who have heard of and prescribed the new drugs

| Product | Have you heard of the product | Have you prescribed the product | Did you initiate treatment | Did you use any other source prior to prescribing |
|-----------------------------|-------------------------------|---------------------------------|----------------------------|---|
| A | 96% | 82% | 35% | 52% |
| B | 43% | 18% | 50% | 58% |
| C | 57% | 20% | 50% | 45% |
| New Drug (Self-selected) | - | - | 67% | 63% |

Evaluation. The practitioners were asked which sources they had found most useful. This question was followed by asking which particular source was best if more than one had been cited.

Table 9a shows the comparative responses to the first part of the question and Table 9b shows the second. The list of sources of information are arranged as shown in Table 5.

Table 9a: Evaluation/Information

"....did you use any other source(s) of information before deciding to prescribe the new drugs?"

| <u>Source of Information</u> | <u>Drug A</u> <u>Rating</u> | <u>% of</u> <u>total</u> | <u>Drug B</u> <u>Rating</u> | <u>% of</u> <u>total</u> | <u>Drug C</u> <u>Rating</u> | <u>% of</u> <u>total</u> |
|-------------------------------------|--------------------------------|-----------------------------|--------------------------------|-----------------------------|--------------------------------|-----------------------------|
| 1. Articles in medical journals | 4 | 10% | 6 | 4% | 6 | 8% |
| 2. Recommendations from consultants | 1 | 23% | 1 | 27% | 6 | 8% |
| 3. Professional contacts | 3 | 13% | 4 | 8% | 2 | 16% |
| 4. Prescribers Journal | 10 | 1% | - | - | - | - |
| 5. Drug and Therapeutics Bulletin | 10 | 1% | 4 | 8% | - | - |
| 6. Drug Firm Representatives | 5 | 9% | 6 | 4% | 4 | 12% |
| 7. <i>Mims</i> | 2 | 19% | 3 | 18% | 2 | 16% |
| 8. British National Formulary | 10 | 1% | - | - | 4 | 12% |
| 9. Controlled circulation journals | 8 | 3% | - | - | - | - |
| 10. Drug Firm Symposia | 7 | 4% | - | - | - | - |
| 11. Data Sheet Compendium | 6 | 7% | 1 | 27% | 1 | 20% |
| 12. Direct Mail | 8 | 3% | - | - | - | - |
| 13. Adverts in Medical Journals | - | - | 6 | 4% | 8 | 4% |
| 14. Pharmacists | - | - | - | - | 8 | 4% |
| Others | - | 6% | - | - | - | - |
| Total | | N = 154 (100%) | | N = 26 (100%) | | N = 25 (100%) |

The numbers of citations used to decide upon the positions for drugs B and C were very small (N = 26 and N = 25 respectively) only tentative conclusions can be drawn from the evidence in those columns. The most interesting changes of position are those of the Data Sheet Compendium, *Mims* and Prescribers' Journal. The high rating of the Data Sheet Compendium as a source of secondary information for drugs B and C implies a delay in the products' acceptance. In Table 5 *Mims* was placed seventh for 'Evaluation' of a new drug but placed first for advice/information. (Table 6).

Prior to discussing these differences, a study of Table 9b shows the single most useful source of information. Numbers for drugs B and C are again very small and it should be noted that their statistical significance is not proven. The sources of information in Table 9b are arranged in the order of Table 3.

Table 9b

"If you have stated more than one source in an answer to the previous question, which one source did you find most useful?"

| Source of Information in rank order | DRUG A | | DRUG B | | DRUG C | |
|--|---------------|---------------|---------------|---------------|---------------|---------------|
| | Rank order | % of total | Rank order | % of total | Rank order | % of total |
| 1. Mims | 6 | 5% | 5 | 7% | 5 | 9% |
| 2. Recommendations from Consultants | 1 | 26% | 3 | 14% | 1 | 18% |
| 3. Articles in Medical Journals | 2 | 17% | 5 | 7% | 1 | 18% |
| 4. Drug Firm Representatives | 4 | 12% | 1 | 29% | 1 | 18% |
| 5. British National Formulary | - | - | - | - | - | - |
| 6. Prescribers' Journal | - | - | - | - | - | - |
| 7. Professional Contacts | 3 | 14% | 3 | 14% | - | - |
| 8. Data Sheet Compendium | 5 | 8% | 2 | 22% | 1 | 18% |
| 9. Drug and Therapeutics Bulletin | - | - | 5 | 7% | - | - |
| 10. Text-Books | - | - | - | - | - | - |
| 11. Martindale | - | - | - | - | - | - |
| 12. Controlled Circulation Journals | 9 | 3% | - | - | - | - |
| 13. Drug Firm Symposia | 9 | 3% | - | - | 5 | 9% |
| 14. Advertising in Medical Journals | - | - | - | - | 5 | 9% |
| 15. Direct Mail | 6 | 5% | - | - | - | - |
| 16. Drug Firm Exhibitions | 6 | 5% | - | - | - | - |
| 17. Pharmacists | 12 | 1% | - | - | - | - |
| 18. Medical Units | 11 | 1% | - | - | - | - |
| | N = 93 (100%) | | N = 14 (100%) | | N = 11 (99%) | |

Table 7 Drug A is seen to be unusual having been brought to the doctor's attention mainly by the media. Apart from the media the two most used sources were the representative and articles in medical journals. With Drug B the first choice was the representative and second was advertisements in medical journals. For Drug C the two most cited sources were the representative and direct mail.

The Sainsbury committee studied four new products. They found that the most important single source conveying information about the existence of a new drug was the representative; the second source of information differing from product to product. (Sainsbury 1967).

Generally, articles in medical journals are not designed to be the first source of information about a product but in the case of Drug A there was an editorial leader in the British Medical Journal two weeks after the release of the product which was followed by further articles and many letters on the subject. As the Sainsbury Report (page 137) comments, some sources are more likely to be remembered than others. Direct mail is most probably forgotten sooner than a consultant's recommendation. The questionnaires were sent out up to one year after the release of the products and this should be taken into account when considering the positions. As the media is such an unusual source from which to learn of the existence of a new product it is not surprising that so many doctors remembered it.

'Industrial' information is relied upon more to bring information about the existence of new products than for the products' evaluation.

The first three choices of the most used single source of information to Drug A were all 'professional', namely the consultant recommendations, articles in medical journals and professional contacts (Table 9b), whereas the first three sources of information

giving awareness of the same drug were the media, the representative and articles in medical journals. (Table 7). For Drug B the sources which brought awareness were the representative, advertisements in medical journals and recommendations from consultants. For Drug C they were the representative, direct mail and advertisements in medical journals (Table 7). Sources used for further information concerning Drug B were recommendations from consultants, the Data Sheet Compendium and *Mims*, and professional contacts.

The underlying trend is, therefore, to use 'industrial' information sources for finding out about the existence of a new drug whatever the products but to use more 'professional' sources when the new drug is considered either more hazardous or innovative. The 'industrial' sources are used at this stage if the product is considered to be 'me too'. In other words, the 'me too' product has been 'assessed' previously when the original innovative compound was first marketed. Williamson (1975-b) considered that in the case of the 'me too' product the doctor is allowing his evaluative function to be usurped by the industry who suggest adoption merely ~~on~~ the commercial evidence. From these tables it would seem probable that when a prescriber thinks that a new product is very similar to an established product, or where a new product is a member of a well-known and 'low risk' therapeutic class, he will be more willing to allow his evaluative role to be taken over. In the case of Drug A, a new product, the contraindication of which could not have been known by all the respondents, it is not surprising that the major sources of information chosen prior to prescribing were 'professional'. What is surprising is that 52% of respondents said they used no sources

of information other than the source which made them 'aware' of the product prior to prescribing.

Reassurance in the Manufacturing Company

In order to test the hypothesis that:-

"There is a greater probability of prescribing a new drug if the doctor has reassurance in the company which manufacture it".

A further question asked the doctors for their views on the three companies manufacturing the three new drugs.

Two of the companies had had no expertise in manufacturing drugs in the therapeutic classes concerned.

Each doctor was asked to say if he was 'reassured', 'not reassured' or 'indifferent' to the identity of the company manufacturing the named drug. (see appendix 1). The results were tabulated in Table 10.

Table 10

For the questions which were used to produce Tables 10, 11 and 12

See appendix 1 Questionnaire question 29.

| <u>Product</u> | <u>Reassured</u> | <u>Not Reassured</u> | <u>Indifferent</u> | <u>Non-Responders</u> |
|----------------|------------------|----------------------|--------------------|-----------------------|
| Drug A | 81 (31%) | 41 (15%) | 139 (53%) | 2 (1%) |
| Drug B | 76 (29%) | 37 (14%) | 147 (56%) | 3 (1%) |
| Drug C | 60 (23%) | 41 (16%) | 159 (60%) | 3 (1%) |

The majority, in all cases were indifferent to the company from which the new product was manufactured.

To test if reassurance in the company leads to a greater propensity to prescribe new drugs, reassurance was cross-tabulated against whether or not the new drug had been prescribed. (Table 11)

Table 11 Drug A

| | Prescribed Drug A | | Not Prescribed Drug A | |
|----------------------------|-------------------|--------|-----------------------|--------|
| Reassured by Company X | 67 | (31%) | 9 | (27%) |
| Not reassured by Company X | 32 | (15%) | 6 | (18%) |
| Indifferent to Company X | 117 | (54%) | 18 | (55%) |
| | N = 216 | (100%) | N = 33 | (100%) |

The highest proportion of prescribers (and non-prescribers) were indifferent to the company who manufactured Drug A. However, it should be noted that there were twice as many prescribers who were reassured by the company than who were not reassured by the company. The same procedure was carried out for drugs B and C. The results are shown in Table 12.

Table 12 Drug B and C

| | Prescribed the corresponding drug | | Not Prescribed the corresponding drug | |
|----------------------------|-----------------------------------|---------|---------------------------------------|--------|
| <u>Drug B</u> | | | | |
| Reassured by Company Y | 16 | (34%) | 23 | (36%) |
| Not reassured by Company Y | 4 | (8.5%) | 6 | (9%) |
| Indifferent to Company Y | 27 | (57.5%) | 35 | (55%) |
| | N = 47 | (100%) | N = 64 | (100%) |
| <u>Drug C</u> | | | | |
| Reassured by Company Z | 18 | (34%) | 22 | (24%) |
| Not reassured by Company Z | 12 | (23%) | 8 | (8%) |
| Indifferent to Company Z | 23 | (43%) | 63 | (68%) |
| | N = 53 | (100%) | N = 93 | (100%) |

Similarly, with B and C the highest proportion of prescribers and non-prescribers stated that they were indifferent to the company which manufactured the product. Again there were higher proportions of prescribers who were reassured by the company than who were not.

Statistical consideration

Referring to the hypothesis in conjunction with Table 11, seventy six respondents were reassured by the company who manufactured Drug A of which sixty-seven (88%) had prescribed it. Similarly, there were thirty-eight respondents who were not reassured by the company of which thirty-two (84%) had prescribed it. No significant difference was observed at the 5% level of significance. The group who indicated their indifference were added to the group who were not reassured and this combined 'division' was compared to the reassured 'division' and again no significant difference was noted.

In Table 12 the results for Drug B were in accordance with the results from Drug A. Forty-one per cent were reassured and had prescribed Drug B while forty per cent were not reassured and had prescribed it. There was no significant difference at the 5% confidence limit between the numbers of respondents who prescribe the drugs and are reassured by the companies who manufacture them, and the number who prescribe the drugs and who are not reassured by the companies. However, with Drug C there are eighteen respondents who have prescribed the drug from a total of forty who were reassured (45%) compared with twelve who had prescribed Drug C from a total of twenty who were not reassured by the company ie,(60%). This does constitute a significant difference. A chi-square test carried out on the Table gives an absolute probability of 0.00872.

If the 'not-reassured' group is combined as before, with the indifferent group, the chi-square value becomes insignificant (exact probability of 0.1762).

The anomalous result may have arisen for a number of reasons, however, as it stands it shows that with this new product there is a greater percentage of general practitioners who have prescribed the new drug and yet are not reassured by the company who have manufactured it. This is possible and further work on different drugs is necessary.

It is concluded that there is no correlation between the prescribing of the new drugs chosen and reassurance in the companies which manufacture them.

The majority of prescribers are indifferent to the companies which manufactured the new drugs. One point which has not been developed is that of company expertise. If a company has expertise in a particular therapeutic area, and has products established in that area, a new product issued by that company in that therapeutic class is likely to gain greater acceptance by prescribers due to the company's reputation or standing.

The conclusion must be modified to account for this possibility such that 'if a new-drug whether a 'me-too' or an innovation is developed by a company which has not previously developed drugs in the therapeutic class concerned, any reassurance given by the company to the prescriber will show no correlation.

The set of six specific statements (sections 30 to 35 appendix 1) are considered in the comments section to the questionnaire 2. page 109.



To answer the first twenty hypotheses (page 50) a number of basic sorts were carried out on the data using SPSS. Each variable was selected in turn and a full analysis, as before, was carried out.

The following tables, which are intended to show the difference in emphasis shown by the separate divisions of each variable, consist of a list of sources arranged in the order of Table 3.

This is followed by the rating each source was given by each division of the variables.

Practice Size

Introduction

The DHSS report presented by Sir Keith Joseph and Peter Thomas (Committee Report 1971) concerning Group practice in England and Wales suggested that "a number of 'basic units' should be amalgamated into group practice if they are to provide cover for one another, make economic use of accommodation and equipment and be able to work effectively with other services". Five or six doctors were thought to be the optimal size for a group. The Cohen Report (Cohen 1954) drew attention to the increase in efficiency and quality of service which could be attained by general practitioners working in groups from common surgery premises with the support of ancillary staff. This report was followed by the setting up of the Group Practice Loans Fund to recognise and encourage this form of practice. A special payment is made to three or more doctors (two in rural areas) who practise in close association from a common main and central surgery and employ ancillary staff. The expenses of providing premises and ancillary help were partly met by direct reimbursement. From the

* defined basic units as a doctor, supported by nurses and secretarial staff, who all relate their work to a defined population.

Dawson Report of 1920 through the reports of the 1940's there is the conclusion (often apparently axiomatic at the commencement of the report) that group practice is the most efficient and beneficial form of medical care.

According to an editorial by Lord Cohen (Cohen 1965), group practice differs from partnership in that it employs ancillary help of the secretarial, nursing receptionist or almoner type. Specialisation of the doctor members is encouraged. Williamson considered that group practice doctors would show more competent prescribing (Williamson P, 1975a) and this was validated by an American study (Peterson O.L. 1956) which showed higher competence in making a diagnosis by doctors practising in a group. The position of single practice is then one of a 'cinderella' class of the profession. This conclusion is opposed by Fox (1960) who considered the need for a personal practitioner with the one patient one doctor attitude. "Whenever the partnership number exceeds two or three (cf the five or six suggested by Josephs) the practice's feet are set on the slope that leads from 'personal medicine' to 'group medicine' and the proper place for group medicine is in the hospital". (Fox T.F. 1960). Two or three practitioners are a useful association to share costs and ensure personal twenty-four hour cover. More than this becomes a rootless clinic.

With these reports and comments in mind, the questionnaire variable 'partnership number' was divided into single practice (which for some analyses was further subdivided into 'no-contact single practice' and 'contact single practice', these latter practitioners being non-partners in a health centre or group). The other division was a partnership of two or more. Where it was considered relevant partnership of two were looked at separately.

Hypothesis 1: "Single practice doctors hear of new drugs at the same time as their joint practice colleagues." (See questions 7, 13 and 19 appendix 1 questionnaire 1).

Table 13 Drug A

| Have you heard of this preparation | Single practice | | Joint practice | |
|------------------------------------|-----------------|-------|----------------|-------|
| Yes | 28 | (90%) | 225 | (97%) |
| No | 3 | (10%) | 7 | (3%) |

Table 14 Drug B

| | | | | |
|-----|----|-------|-----|-------|
| Yes | 14 | (45%) | 98 | (42%) |
| No | 17 | (55%) | 134 | (58%) |

Table 15 Drug C

| | | | | |
|-----|----|-------|-----|-------|
| Yes | 19 | (61%) | 130 | (56%) |
| No | 12 | (39%) | 102 | (44%) |

Using standard χ^2 test (see appendix 2) there was no significant differences noted at the 5% level of significance. The hypothesis is not rejected.

Hypothesis 2."The emphasis placed on each source of information is different for single practice doctors."

Table 16

Rating of each source of information

| Sources of drug information arranged in the order of Table 3. | Rating of each source of information | |
|---|--------------------------------------|----------------|
| | Single Practice | Joint Practice |
| 1. <i>Mims</i> | 1 | 1 |
| 2. Recommendations from consultants | 2 | 3 |
| 3. Articles in medical journals | 5 | 2 |
| 4. Drug firm representatives | 4 | 4 |
| 5. British National Formulary | 3 | 5 |
| 6. Prescribers' Journal | 5 | 6 |
| 7. Professional contacts | 10 | 7 |
| 8. Data Sheet Compendium | 8 | 8 |
| 9. Drug and Therapeutics Bulletin | 12 | 9 |
| 10. Text Books | 11 | 10 |
| 11. 'Martindale' | 13 | 11 |
| 12. Controlled circulation journals | 7 | 13 |
| 13. Drug firm symposia | 14 | 12 |
| 14. Advertisements in medical journals | 14 | 14 |
| 15. Direct mail (through the post) | 9 | 17 |
| 16. Drug firm exhibitions | 14 | 15 |
| 17. Pharmacists | 18 | 15 |
| 18. Drug information units (hospital) | 14 | 18 |
| 19. Drug firm medical information units | 20 | 19 |
| 20. The media (newspapers, TV etc.) | 19 | 20 |

There are a number of sources rated differently by the two groups.

Single practice doctors rate direct mail, controlled circulation journals and the BNF significantly higher (proportion test) than their joint practice colleagues. The preference for the BNF is at the expense of articles in medical journals. This indicates a conservative approach, relying on established information about established products and preparations. From this it might be tentatively suggested that single practice doctors are less likely to be early prescribers of new drugs (hypothesis 4). Joint practice doctors rate professional contacts, Drug and Therapeutics Bulletin, Pharmacists and articles in medical journals, higher than single practice doctors. (see also hypothesis 3).

Hypothesis 3. "Reliance on the industry will be higher for single practice doctors than for joint practice doctors". As was stated in the introduction, some of the sources of information in the list (List 1 appendix 1) can be arbitrarily termed 'professional and some can be called 'industrial' (see page 45) Information about drugs, issued by the industry is aimed at selling a product. As was previously suggested, group practice doctors are considered to show more competent prescribing. It may be suggested, therefore, that the sources of information preferred by single practice doctors would be 'industrial'.

If a table corresponding to the first ten choices of information source is drawn up for each division of each variable, then an industrial/professional score can be calculated. A score of +10 is given if the first choice is 'professional' and -10 if the source is industrial down to +1 if the tenth choice is 'professional' and -1 if the tenth choice is 'industrial'. The cumulated score for each variable division is the measure of 'industrial/professional emphasis'.

The score for single practice doctors is +5 while that for joint practice is +15 suggesting a higher preference by single practice doctors for industrial sources of drug information. The hypothesis is therefore not rejected. Why should this be? There are no partners or professional contacts available to the single practice doctor during his working day. He must seek his information from elsewhere. The representative is not, as might have been expected, raised to a higher position by single practice doctors. This implies that they do not rate 'interactive' sources of information any higher than joint practice doctors generally (Table 16) or for awareness (Table 20). Their decision to practice alone seems to endorse this proposition.

As was previously stated, single practice doctors rate direct mail and controlled circulation journals significantly higher than joint practice doctors. This latter group, rate articles in medical journals, Drug and Therapeutics Bulletin and professional contacts significantly higher than single practice doctors, showing the greater emphasis by this latter group, on industrial sources of information.

The prescriber must have *sufficient* information about a new drug in order to decrease the risk he perceives is involved in prescribing it. He must be assured that the product offers advantages and is at least as *safe* as already existing products. The reassurance he requires can largely be obtained from discussions with his colleagues and from the medical press. The single practice doctor does not usually have the opportunity to discuss new drugs with colleagues, to the same extent. He prefers 'industrial' information but also rates the BNF higher than joint practice doctors. It is therefore suggested that:-

Hypothesis 4. "The single practice doctor will prescribe new drugs less often than joint practice doctors." (see questions 9, 15 and 21 appendix 1).

Table 17 Drug A

| Have you prescribed this preparation | Single practice | Joint practice |
|--------------------------------------|-----------------|----------------|
| Yes | 24 (86%) | 193 (86%) |
| No | 4 (14%) | 32 (14%) |
| TOTAL WHO HAD HEARD OF 'A' | 28 | 225 |

Table 18 Drug B

| | | |
|----------------------------|----------|----------|
| Yes | 4 (28%) | 43 (44%) |
| No | 10 (72%) | 55 (56%) |
| TOTAL WHO HAD HEARD OF 'B' | 14 | 98 |

Table 19 Drug C

| | | |
|----------------------------|----------|----------|
| Yes | 6 (32%) | 47 (36%) |
| No | 13 (68%) | 83 (64%) |
| TOTAL WHO HAD HEARD OF 'C' | 19 | 130 |

With Drug A the percentage of single practice doctors who had prescribed the drug was exactly the same as the percentage in joint practice. With Drug B, however, the percentage of single practitioners who had prescribed the new preparation was lower (though not significantly lower) than the percentage in joint practice who had prescribed it. With Drug C the difference was insignificant. Because of the difference noted with Drug B, a

proportions test was carried out between the number in single practice who had prescribed and the number in joint practice. This was insignificant at the 5% significance level. A further test between the number in single practice who had prescribed Drug B and Drug C was insignificant as was a final test between the numbers in joint practice who had prescribed Drug B and Drug C.

No firm conclusion can be drawn. However, basing the hypothesis on the innovatory drug, Drug A it can be stated that the number of partners does not seem to influence the prescribing of new drugs.

It may also be suggested that sufficient information is obtained by both groups in order to enable them to make a prescribing decision. Hypothesis 5. "The source of information chosen by single practice doctors to indicate 'awareness' will be the same as those chosen by joint practice doctors."

Any doctor who does not wish to receive mailings, including controlled circulation journals, may remove his name from the mailing list. Because of the preference already noted for industrial sources of information, there would seem to be a possibility that industrial sources of information would be cited more by single practice doctors. However, awareness is fundamentally the 'industrial stage' in the adoption process. The industry has the product and under our system of marketing, the onus is on them to make the availability of the product known to the prescriber. (Mailed data sheets are an absolute minimum). Therefore, it is considered most likely that whether or not a particular source is preferred as general drug information, the industry will be relied upon most heavily to bring awareness to both single and joint practice doctors. The emphasis placed on each source may differ. The first five sources of information

selected for awareness in the general questionnaire are shown in Table 4 page 52. These sources have been reconsidered in Table 20 which also indicates the number of citations given by single practice, partnerships of two and partnerships of three or more.

Table 20: Awareness

| First five sources cited in Table 4 | Number of citations (and percentage) | | | | | |
|-------------------------------------|--------------------------------------|-------|---------------------|-------|------------------------------|-------|
| | Single practice | | Partnerships of two | | Partnership of more than two | |
| 1. Drug firm representative | 11 | (21%) | 22 | (24%) | 74 | (26%) |
| 2. <i>Mims</i> | 16 | (30%) | 15 | (17%) | 58 | (20%) |
| 3. Articles in medical journals | 5 | (9%) | 10 | (11%) | 34 | (12%) |
| 4. Direct mail | 6 | (11%) | 9 | (10%) | 24 | (8%) |
| 5. Consultant recommendation | 2 | (4%) | 9 | (10%) | 23 | (8%) |
| Others | 13 | (25%) | 25 | (28%) | 74 | (26%) |
| | N = 53 (100%) | | = 90 (100%) | | N = 287 (100%) | |

Chi-square = 6.1 with 10 degrees of freedom not significant at the 5% level of significance.

From this the hypothesis is not rejected. *Mims* does appear to be used more by single practice doctors as compared to the other two groups for awareness. (although the difference is insignificant when tested using the proportions test). Conversely, the consultant is cited less often by the single practice doctors.

Evaluation of a new product involves active searching for information and assessment of written evidence. The passive awareness stage showed no difference in the use of information. The active evaluation stage might be expected to reflect the doctors choice of information sources.

Hypothesis 6. "The sources of information chosen for the evaluation of a new drug will depend, to some extent, upon the number of partners in the practice".

The first five sources of information used to evaluate a new drug listed in Table 21 are taken from Table 5.

Table 21: Evaluation

| First five sources cited in Table 4 | Number of citations (and percentage) | | | | | |
|-------------------------------------|--------------------------------------|--------|---------------------|--------|------------------------------|--------|
| | Single practice | | Partnerships of two | | Partnership of more than two | |
| 1. Articles in medical journals | 9 | (19%) | 19 | (21%) | 65 | (25%) |
| 2. Consultant recommendations | 11 | (23%) | 15 | (17%) | 59 | (23%) |
| 3. Professional contacts | 4 | (8%) | 15 | (17%) | 33 | (13%) |
| 4. Prescribers' journal | 2 | (4%) | 11 | (12%) | 34 | (13%) |
| 5. Drug and Therapeutics Bulletin | 3 | (6%) | 7 | (9%) | 22 | (9%) |
| Others | 19 | (40%) | 22 | (24%) | 44 | (17%) |
| | N = 48 | (100%) | 89 | (100%) | 257 | (100%) |

Chi-square = 17.02 with 10 degrees of freedom. Though the table gives a value which is not significant at the 5% significance level, the section marked 'others' shows a significant difference. Two elements produce the difference: *Mims* and the representative. Neither of these sources were included in the first five for evaluation. However, these are considered and the significance shown in Table 22 and 23.

Table 22: The representative

| Source for evaluation | Number of citations | |
|-----------------------|---------------------|----------------------------|
| | Single practice | Partnership of two or more |
| Representative | 6 | 17 |
| | N = 48 | 346 |

Using the proportion test, single practice doctors cite the representative significantly more often than joint practice doctors for evaluating a new drug.

Table 23 *Mims*

| Source for evaluation | Number of citations | |
|-----------------------|---------------------|----------------------------|
| | Single Practice | Partnership of two or more |
| <i>Mims</i> | 5 | 15 |
| | N = 48 | N = 346 |

Using the proportions test there is no significant difference indicated.

As has been stated previously, the representative provides an interactive form of drug information and his primary aim is to sell a product. He is used no more often by single practice doctors than by joint practice doctors as far as general sources of information are concerned (Table 16) or for awareness (Table 20), but in evaluation he is used significantly more by the single practice doctors.

The difference stems from the difference between awareness (general) and evaluation (personal). The industry will ensure that each possible prescriber will find out about a new product. The consumer-physician does not need to do anything positive at this stage. To evaluate, a second opinion is generally used. The joint practice doctor has his colleagues, the single practice doctor must normally rely more heavily on representatives.

The Age of the Physician

Rogers and Shoemaker (Rogers E.M. 1971) analysed three thousand research findings in the Diffusion Documents Center at Michigan State University. Age was used as an independent variable in two

hundred and twenty eight studies but no conclusion could be reached as to the effect this variable had upon prescribing. Twenty per cent of the studies showed early adopters were younger than average, thirty percent indicated that they were older and the remainder showed no difference.

Mapes (1977b) showed that age was not related to prescribing habits. However, Becker (1971) found that younger physicians were less likely to prescribe chloramphenicol inappropriately and Coleman (Coleman K et al 1970) found that young doctors tended to rate the more old-fashioned products less well than older doctors. The Sainsbury Report (Sainsbury 1967) looked at age and compared it with a number of other variables. They showed that younger doctors tended to be in larger partnerships. They were also shown to prescribe more new products than the older doctors. When a new preparation was specified, more young doctors had heard of it but the same proportion of young and old had prescribed it.

A greater proportion of younger doctors felt that there was enough information in drug firm literature on which to base a prescribing decision. However, this same group of doctors had considered removing their names from the mailing list more often than their older colleagues.

Fewer representatives were seen by younger doctors and they were more sceptical of the representative's comments.

The concept of an older prescriber becomes apparent from these comments. In general he prescribes less new products but certain innovations are prescribed at the same rate as young doctors. He prescribes less and cheaper preparations in unit time. His use of

information differs at the awareness stage relying more heavily on professional sources than his younger colleagues.

Older doctors see more representatives and rely on their comments more than younger doctors. Finally they tend to work in smaller practices. From these reports hypotheses 7 - 9 were proposed.

In Coleman Katz and Menzel's study (1966), 'medical age' was used. This was defined as the number of years which had elapsed since graduation. This variable was used in this study.

Studies where the 'age' of the prescriber is considered seem to assume that time is static seeming to imply that a prescriber once labelled 'young prescriber' remains as such throughout his career.

The results from the studies seem to show a process is involved where caution increases with age, and desire to know and try all new products decreases with age.

A newly qualified doctor has to build up his own opinions about representatives tempered with comments which he may have received in medical school. His view of the industry in general will differ from his 'older' colleagues; opinions forming after personal experience.

This is born out by the score of +27 for newly qualified doctors using the industrial/professional scoring technique previously described and +11 and +13 for the older two groups of doctors. Indicating a preference, in general, for more professional sources of information by the newly qualified doctors.

Hypothesis 7. "Newly qualified doctors prescribe new drugs more often than older doctors." In the proceeding chapter a further measure of new drug prescribing will be considered. At this stage the three drugs A, B and C will be analysed referring them to the variable 'years qualified'.

Tables 24 to 26 show the variable years qualified divided into three subdivisions.

1 represents 0 to 5 years qualified

2 represents 6 to 30 years qualified

3 represents 31 and more years qualified.

All tables are cross-tabulated with the new drugs A, B and C.

Table 24 Drug A

| Age Division of General Practitioners | <u>Have you prescribed Drug A?</u> | | |
|--|------------------------------------|----|-------|
| | Yes | No | Total |
| 1. 0 - 5 yrs. | 19 | 2 | 21 |
| 2. 6 -30 yrs. | 62 | 9 | 71 |
| 3. Over 30 yrs. | 136 | 35 | 171 |

A chi-square test on the table shows that there is no significant difference among the various sub-divisions at the 5% significance level. Using the proportions test and grouping age groups 2 and 3 together for one analysis, 1 and 2 for a second analysis and finally comparing only 1 and 3 there were no significant differences noted.

Table 25 Drug B

| Age division of General Practitioner | <u>Have you prescribed Drug B?</u> | | |
|---|------------------------------------|-----|-------|
| | Yes | No | Total |
| 1. 0-5 yrs | 8 | 13 | 21 |
| 2. 6-30 yrs | 16 | 55 | 71 |
| 3. Over 30 yrs | 23 | 148 | 171 |

The chi-square test and the proportions tests carried out as above were significant at the 1% significance level.

This shows that for Drug B the different age groups prescribed the drug differently. In which way was the difference noted? Using

chi-square a measure of the expected value for each 'cell' is calculated. This showed that younger doctors (as defined as those who had been qualified for 15 years or less) prescribed the new drug significantly more than was expected. The deviation being greater for those doctors who had been qualified for 5 years or less. Conversely, the older doctors prescribed the drug significantly less.

Table 26 Drug C

| Age division of General Practitioner | <u>Have you prescribed Drug C</u> | | |
|---|-----------------------------------|-----|-------|
| | Yes | No | Total |
| 1. 0 - 5 yrs | 4 | 17 | 21 |
| 2. 6 - 30 yrs | 16 | 55 | 71 |
| 3. Over 30 yrs | 33 | 138 | 171 |

Using the chi-square test there was no significant differences noted among the results. Using the proportions tests as described above there were no significant differences noted.

Drugs B and C are the same chemical entity differing only in name, company which markets them and time that they have been available.

Drug B showed the significant difference. This drug had not been on the market for as long as its counterpart Drug C, so it may be that differences are minimised with innovations such as Drug A or when a preparation has been on the market for a particular length of time as in the case of C.

Hypothesis 8. "Newly qualified doctors use industrial information at the awareness stage more than their older colleagues."

As with the variable 'partnership number' the citations of each of the top five sources of information chosen for 'awareness' as shown in Table 4 p 52 were compared for each subdivision of the variable 'years qualified'.

Table 27 Awareness of *stage* of the variable

| First five sources cited in Table 4 | Number and percentage of citations | | | | | |
|-------------------------------------|------------------------------------|--------|---------|--------|---------|--------|
| | 1. | | 2. | | 3. | |
| Drug firm representative | 8 | (23%) | 74 | (26%) | 25 | (22%) |
| <i>Mims</i> | 5 | (14%) | 58 | (21%) | 26 | (23%) |
| Articles in medical journals | 9 | (26%) | 27 | (10%) | 13 | (12%) |
| Direct mail | 2 | (6%) | 25 | (9%) | 12 | (11%) |
| Consultant recommendation | 3 | (8%) | 20 | (7%) | 12 | (11%) |
| Others | 8 | (23%) | 75 | (27%) | 24 | (21%) |
| | N = 35 | (100%) | N = 279 | (100%) | N = 112 | (100%) |

The chi-square test on the table shows no differences at the 5% significance level. The hypothesis is therefore rejected.

Looking at the source 'articles in medical journals' only, the proportions test was carried out in subdivision 1 comparing it with the combined division of 2 plus 3, a significant difference was noted, which indicated that articles in medical journals are used more by newly qualified doctors at the awareness stage than by older doctors.

Using the Industrial - Professional scoring techniques outlined under hypothesis 3 (page 72) the scores for each sub-division of the years qualified variable were calculated. These gave +27 for sub-division 1 the newly qualified doctors, +11 for sub-division 2 and +13 for sub-division 3. This implies that newly qualified doctors rely more heavily on professional sources of information than do their older colleagues. This finding is in agreement with Wilson et al (1963).

Hypothesis 9 "The sources of information chosen at the evaluation stage of drug adoption will differ among the sub-division of the years qualified variable."

The first five sources of information chosen for evaluation were

selected and the citations given by each sub-division of the variable were calculated (see Table 28). The sources shown are as indicated in Table 5.

Table 28 Evaluation

| <u>First five sources cited in Table 5</u> | <u>Number and percentage of citations</u> | | | | | |
|--|---|-------|--------------|-------|--------------|-------|
| | 1 | | 2 | | 3 | |
| Articles in medical journals | 8 | (22%) | 63 | (23%) | 22 | (19%) |
| Consultant recommendation | 6 | (16%) | 50 | (18%) | 30 | (27%) |
| Professional contacts | 4 | (11%) | 31 | (11%) | 17 | (15%) |
| Prescribers' Journal | 4 | (11%) | 33 | (12%) | 10 | (9%) |
| Drug and Therapeutics Bulletin | 10 | (28%) | 18 | (7%) | 8 | (7%) |
| Others | 4 | (11%) | 80 | (29%) | 26 | (23%) |
| | N = 36 (100%) | | N=275 (100%) | | N=113 (100%) | |

Chi-square = 26.9 with 10 degrees of freedom. This is significant at the 1% significance level. There are three areas from which the major differences arise.

Consultant recommendations are used more at this stage by the older doctors, Drug and Therapeutics Bulletin is used more by newly qualified doctors and the section marked 'others' also show a difference.

Considering this 'others' section, *Mims*, the representative and controlled circulation journals show the greater differences. These were each analysed by the proportions test but no significant differences were noted.

It is concluded that at the evaluation stage newly qualified doctors use Drug and Therapeutics Bulletin significantly more than their older colleagues. (Since 1976, Drug and Therapeutics Bulletin has been given free to each final year student at medical school.)

This journal was first published in May 1963, it can therefore be suggested that comments concerning its content would have been given to students at medical school in the following year and as its reputation increased so would dissemination of information about it. Newly qualified doctors are much more likely to have heard favourable reports and had the opportunity of using Drug and Therapeutics Bulletin in the library than their doctor colleagues. It would be interesting to see if the percentage citations given in sub-division 1 is maintained as the doctors become sub-division 2 and eventually 3.

The consultant is used more by sub-division 3 which are doctors who qualified more than thirty years ago than by either of the other two sub-divisions. This is also in agreement with Wilson et al (1963). The general practitioner refers his patients to a consultant when specialist treatment or advice is required. The reputation of the consultant in the eyes of the general practitioner will only increase over time as more patients are seen. The newly qualified practitioner needs time to evaluate the worth of the consultant's advice and therefore he is used less often. By referring patients to a particular consultant a personal-relationship can be developed which will increase the likelihood of contact when a problem of new drug therapy is encountered.

Education : "Education should provide basic therapeutic skill and maintain them but its success varies between countries and Universities" (Hemminki E., 1975).

There are at least two components to the education variable. First there is the medical school which was attended. Secondly the qualifications which the doctor has obtained, initially and subsequent to graduation.

Various conflicting results have been obtained. Lee et al concluded that there was little if any demonstratable differences which could be

referred to the medical school in which the doctor trained. (Lee J.A.H. 1965). Garner, however, suggested that different prescribing patterns exist which seem to be influenced by physician speciality and school of graduation (Garner D.D. 1972).

Joyce concluded that higher educational qualifications were associated with lower prescribing of drugs of all kinds (Joyce C.R.B. 1967). Mapes agreed with this, linking membership of the Royal College of General practitioners with conservatism. (Mapes R.E.A. 1977a) but Rogers suggested that earlier knowledge of a new drug was associated with "more education" (Rogers E.M. 1971).

There seems to be a somewhat conflicting relationship between qualifications and innovativeness.

The University could act as an unbiased information source for all health care professionals. In an American survey, 87% and 91% of doctors and pharmacists showed interest in such a service (Johnston P.M. 1976). It will be interesting to see how this compares with the current research.

In this study, education was broken down into two variables, medical school attended and qualifications obtained. The first division was further sub-divided into attendance at local universities and qualifications were divided into 1) first degree only, 2) membership of the Royal College of General Practitioners (MRCGP and Fellowship) and 3) specialist, which included membership of the Royal College of Physicians Fellowship of the Royal College of Surgeons. Also doctors of medicine (MD).

University attended:

Hypothesis 10

"Doctors practising near to their university of graduation will rate university drug units higher than their colleagues." (see questionnaire appendix 1 question 33).

Table 29

| <u>University attended</u> | <u>Score for 'units'</u> |
|----------------------------|--------------------------|
| Near University | 0.74 |
| Others | 0.75 |

The scores were calculated by multiplying each 'strongly agree' response to question 33 of the questionnaire by 5, each 'agree' by 4 down to 'strongly disagree' by 1. To standardise the scores the total was divided by the total possible, i.e. by the number obtained by multiplying the total number of respondents in each sub-division by 5.

It was concluded that there was no difference between the two groups.

Hypothesis 11. "More highly qualified groups of doctors use professional sources of information more than their less-qualified colleagues." Using the professional/industrial scoring technique previously described, the doctors who qualified from local universities scored exactly the same as their colleagues. However, those doctors with 'lower' qualifications (groups 1 and 2) scored less than those with MRCP, FRCS or MD (group 3).

Table 30 Industrial/Professional Score

| <u>Qualifications</u> | |
|-----------------------|-----|
| First Degree | +13 |
| MRCGP | +11 |
| MRCP, FRCS, MD | +34 |

This indicates a greater use by more qualified doctors, of professional sources of information.

Hypothesis 12

"All groups hear of new drugs at the same time."

Considering Drugs A, B and C the number who have heard of the preparation is crosstabled against qualifications. Table 31.

Table 31

| Drug | Number (and percentage) who have heard of the preparations. | | | | | |
|------|---|-------|--------------|--------|-------------------|-------|
| | <u>First degree</u> | | <u>MRCGP</u> | | <u>Specialist</u> | |
| A | 217 | (96%) | 22 | (100%) | 14 | (93%) |
| B | 99 | (44%) | 8 | (36%) | 5 | (33%) |
| C | 130 | (56%) | 11 | (50%) | 8 | (53%) |

There is no difference at the 5% significance level. The hypothesis is rejected.

Hypothesis 13

"Members of the Royal College of General Practitioners will prescribe new drugs less often than non-members."

Table 32 shows the number and percentage of doctors in each group who have prescribed Drugs A, B and C.

Table 32

| <u>Drug</u> | Number (and percentage) who have heard of and who have prescribed each preparation | | | | | |
|-------------|--|-------|--------------|-------|-------------------|-------|
| | <u>First degree</u> | | <u>MRCGP</u> | | <u>Specialist</u> | |
| A | 187 | (87%) | 18 | (82%) | 12 | (86%) |
| B | 40 | (41%) | 5 | (62%) | 2 | (40%) |
| C | 46 | (36%) | 4 | (36%) | 3 | (20%) |

A chi-square performed on the complete table indicated that there was no significant differences among the groups for each drug considered separately. It would therefore be apparent that specialisation and further qualifications do not correlate with the lower prescribing of new drugs.

Hypothesis 14

"Sources cited as being useful for evaluating a new drug will differ among the groups." The sources chosen for awareness are those shown in Table 5 page 53.

Table 33a Evaluation

| First five sources cited in Table 5 | Number of citations (and percentages) | | |
|-------------------------------------|---------------------------------------|-----------|------------|
| | First degree | MRCGP | Specialist |
| Articles in medical journals | 76 (23%) | 9 (24%) | 6 (22%) |
| Consultant recommendations | 78 (23%) | 4 (11%) | 4 (15%) |
| Professional contacts | 44 (13%) | 4 (11%) | 4 (15%) |
| Prescribers' Journal | 19 (6%) | 5 (14%) | 4 (15%) |
| Drug and Therapeutics Bulletin | 22 (6%) | 9 (24%) | 3 (11%) |
| Others | 98 (29%) | 6 (16%) | 6 (22%) |
| N = | 339 (100%) | 37 (100%) | 27 (100%) |

Chi-square = 23.8 with 10 df which is significant at the significance level of 1%.

Two sources make up the difference. These are Prescribers' Journal and Drug and Therapeutics Bulletin. These prove to be significant when using the proportions test. Doctors with a first degree only use Prescribers' Journal significantly less than their more qualified colleagues. Doctors with an MRCGP use Drug and Therapeutics Bulletin significantly more than their colleagues. As the numbers in groups 2 and 3 are small, firm conclusions are difficult to make, however,

it is suggested from these results that better qualified doctors use more professional sources for evaluation than do their less qualified colleagues.

Hypothesis 15 "Sources used for 'awareness' will be the same among the groups."

Table 33 gives the first five sources for awareness as first shown in Table 4.

Table 33 Awareness

| First five sources cited in Table 4. | Number (and percentage) of citations | | | | | |
|--------------------------------------|--------------------------------------|--------|--------------|--------|-------------------|--------|
| | <u>First degree</u> | | <u>MRCGP</u> | | <u>Specialist</u> | |
| Drug firm representative | 92 | (22%) | 8 | (19%) | 7 | (28%) |
| <i>Mims</i> | 81 | (19%) | 6 | (14%) | 2 | (8%) |
| Articles in medical journals | 37 | (9%) | 6 | (14%) | 6 | (24%) |
| Direct mail | 35 | (8%) | 3 | (7%) | 1 | (4%) |
| Consultant recommendations | 85 | (20%) | 5 | (13%) | 2 | (8%) |
| Others | 91 | (22%) | 14 | (33%) | 7 | (28%) |
| N = | 421 | (100%) | 42 | (100%) | 25 | (100%) |

Chi-square = 15.1 on 10 degrees of freedom. This indicates no significant difference. However, both *Mims* and articles in medical journals show interesting trends. These two were further tested using the proportions test. It was found that the use of articles in medical journals was significantly different among the groups. The specialists used these more for finding out about new drugs than did the first-degree-only doctors. Again it should be noted that numbers in groups 2 and 3 are small but it can be suggested that doctors with higher qualifications use more professional sources of information for finding out about new drugs.

List Size:

The number of patients a doctor agrees to treat is known as his 'list' size. This varies greatly among doctors. General practitioners are paid a per capita fee related to list size, not number of patients seen. It is an approximate measure of work load although the number of patients seen in a day is the accurate measure. This variable and the length of the working day was shown to be correlated with the number of drugs prescribed (Hemminki E. 1974). Even these variables do not show the total picture as another aspect is the amount of 'effort' involved in treating each patient, also number of referrals may be important. The larger the general practitioner list, the lower his prescribing rate per patient (Ministry of Health 1964). This was also suggested by Wade who stated that doctors with small practices prescribe twice as much per thousand of their patients as doctors with average or large practices. There was also some evidence to support the hypothesis that a doctor with a low list size had a greater propensity to accede to patient demands. (Wade D.L. 1976). Wilson et al suggested that general practitioners with a large number of patients on their list, prescribed brand named products, the name of which had been impressed upon them by advertisements. They suggested that this happened because there was little time for them to devote to examining relative costs. (Wilson C.W.M. 1964).

Less frequent prescribers of chloramphenicol had larger, more 'hurried' practices. (Becker M.H. 1971). They were judged to be 'person-orientated and progressive.' (Joyce C.R.B. 1967). Mapes (1977a) found that the tendency to prescribe better known, perhaps out-moded preparations was related to the high number of prescriptions issued.

All seem to be agreed that the list size is inversely proportional to the number of prescriptions written and that better prescribing comes from a low rate of prescription writing. However, the high list size doctor is more likely to prescribe brand names.

It is therefore hypothesised that a doctor with a high list size will prescribe the new drugs to a greater extent than a doctor with a low list size.

In chapter 4, an accurate measure of list size was obtained from the Prescription Pricing Authority. At this stage, the response to the question 'what is your individual list size?' will be considered.

Hypothesis 16

"General practitioners with a large list size prescribe more new drugs than their colleagues".

Considering the new drugs A, B and C, only a chi-square test showed no significant difference among the high, medium and low list size practitioners. A portion of the table is given in Table 34 which shows the number and percentage of prescribers in each division of the variable 'list size,' who have heard of and prescribed the new drugs A, B and C.

Table 34

| <u>New drug</u> | Number (and percentage) who have heard of and prescribed the new drugs | | | | | |
|-----------------|--|-------|--------------|-------|---------------|-------|
| | List size 0 - 1500 | | 1501 to 3000 | | 3001 and over | |
| A | 20 | (74%) | 137 | (88%) | 56 | (89%) |
| B | 6 | (40%) | 28 | (41%) | 13 | (52%) |
| C | 8 | (42%) | 34 | (38%) | 10 | (28%) |

The hypothesis is therefore rejected.

A further look at List Size will be made in chapter 4.

Whether or not the Practitioner Dispenses: *scoring techniques: 10/10/69*

The so-called 'Doctors Charter' in 1965 stated that "every rural family doctor should be free to dispense for his patient if he so wishes and remain free to do so". In non-rural areas doctors dispense only if patients have serious difficulty in obtaining any necessary drugs or appliances from a chemist by reason of distance or inadequacy of communications. (the validity of these latter points being decided by the Family Practitioner committee).

Mr Kenneth Robinson, the then Minister of Health, said "Few doctors can provide as wide a range of drugs as the average pharmacy or have the turnover to ensure freshness and quality. It can hardly be in the patient's best interest if the doctor's judgement about treatment may be coloured by the drugs he happens to have in stock, rather than what he believes to be best for his patient". (quoted in Editorial Pharm. J. 1969).

If the statements are accepted, what can be inferred from these comments?

First, that new drugs will be used less by dispensing practitioners. The choice of treatment is theirs. To stock a new product represents a financial outlay which must be justified to a greater extent than if the doctors prescriptions were to be dispensed by an 'outsider'!

Within the Region the different areas had different numbers of dispensing practitioners, this ranged from 48% of the total to nil. Only one area contained no dispensing practitioners.

Hypothesis 17

"The dispensing practitioner will use industrial sources of information more than his colleagues."

Using the same industrial/professional scoring techniques shown previously, the dispensing practitioners scored +17 while the non-dispensing practitioners scored +11. This implies that the dispensing practitioner uses professional sources more than the non-dispensing practitioner.

On reflection, this would seem to be the more likely. The dispensing practitioner will be expected to wait to hear of new products from evaluated sources. His decision to stock new products must come after consideration as it involves financial outlay. A further hypothesis may be formulated from the result.

17a "Dispensing practitioners use different sources of information to evaluate a new drug".

Using the same technique as previously described, no significant difference was noted among the citations of the first five sources for evaluation. Hypothesis 17a is therefore rejected.

Hypothesis 18

"Dispensing practitioners will prescribe new drugs less often than their colleagues."

Looking at the new drugs A, B and C.

Table 35

New Drug Number (and percentage) of doctors who have heard of and prescribed the new drugs

| | <u>Dispensing</u> | <u>Non-dispensing</u> |
|---|-------------------|-----------------------|
| A | 41 (80%) | 172 (89%) |
| B | 9 (47%) | 38 (42%) |
| C | 10 (34%) | 42 (36%) |

Using Chi-square test there was no significant difference at the 5% significance level. The hypothesis is rejected.

Hypothesis 19

"The dispensing practitioner will not view the proposed change to pharmacist or clinical pharmacologist as well as the non-dispensing practitioner." (see also question 31 questionnaire 1 appendix 1).

A score for each sub-division of the variable was obtained by multiplying each 'strongly agree' by 5, down to each 'very poor' by 1. The total was then divided by the possible total (number of respondents multiplied by 5). The two scores were presented as a percentage. Dispensing practitioners scored 61%, non-dispensing practitioners scored 64.3%.

A chi-square performed on the numbers of respondents selecting each 'rating' showed no significant difference although using the proportions test there were significantly more of the non-dispensing practitioners who were indifferent to the proposed change.

Hypothesis 20

"The higher the number of receptionists the lower the position of direct mail for awareness."

The top five sources chosen for awareness in table 4 are shown again in Table 36 with the number of citations given by each division of the variable 'number of receptionists' (1 is equivalent to one receptionist or two part-time receptionists. 2 is equivalent to two or three receptionists and 3 is equivalent to 4 or more receptionists.

Table 36 Number of Receptionists

| Top five sources chosen in Table 4 | Number (and percentage) of citations | | | | | |
|---------------------------------------|--------------------------------------|-------|------------|-------|------------|-------|
| | 1 | | 2 | | 3 | |
| Representative | 21 | (28%) | 56 | (27%) | 30 | (22%) |
| Mims | 15 | (20%) | 44 | (21%) | 26 | (19%) |
| Articles in medical journals | 6 | (8%) | 24 | (12%) | 18 | (14%) |
| Direct mail | 7 | (9%) | 17 | (8%) | 12 | (9%) |
| Consultant | 8 | (10%) | 16 | (8%) | 10 | (8%) |
| Others | 19 | (25%) | 50 | (24%) | 38 | (28%) |
| | N = 76 (100%) | | 207 (100%) | | 134 (100%) | |

Using chi-square there was no significant differences.

Specialisation

Doctors were asked to self-designate themselves specialist or non-specialist in response to the question "As a general practitioner do you specialise in any particular field of medical practice?"

One hundred and sixteen practitioners said that they did specialise and one hundred and forty-five practitioners said that they did not.

The specialist, like the practitioner who has higher qualifications, may be expected to use professional sources of drug information more than the non-specialist. He may be expected to keep up to date more and know of new drugs sooner than the non-specialist. He may, however, regard new drugs with suspicion and therefore may be expected to prescribe them less often.

Hypothesis 21

"The specialist uses more professional sources of information than the non-specialist"

Using the industrial/professional scoring technique previously described, a score of +19 was obtained for the specialist and a

score of +12 for the non-specialist. This implies that the specialist uses more professional sources than the non-specialist.

In this particular case, the difference was mainly due to the specialist high rating of the BNF (second) as opposed to the non-specialist position (sixth) and the specialists' low rating of the representative (sixth) as opposed to the non-specialists' higher rating (third).

Hypothesis 22

"The specialist hears of new drugs sooner than the non-specialist".

See table 37.

Table 37

| New drug | Number (and percentage) who have heard of A,B or C | |
|----------|--|----------------|
| | Specialist | Non-specialist |
| A | 111 (96%) | 140 (97%) |
| B | 51 (44%) | 60 (41%) |
| C | 67 (58%) | 82 (57%) |

A chi-square on each individual drug showed no significant difference for specialists or non-specialists. Therefore the hypothesis is rejected.

Hypothesis 23

"The specialist will choose different sources of information for evaluation than the non-specialist."

As before, the first five sources of information chosen for evaluation shown in Table 5 were selected. The number of citations given by specialists and non-specialists were compared and are shown in Table 38.

Table 38

| <u>First five sources</u> | <u>Number (and percentage) of citations</u> | | | |
|-----------------------------------|---|-------|-----------------------|-------|
| <u>Chosen for evaluation</u> | <u>Specialist</u> | | <u>Non-specialist</u> | |
| Articles in medical journals | 38 | (21%) | 55 | (23%) |
| Consultant recommendations | 35 | (19%) | 51 | (21%) |
| Professional contacts | 22 | (12%) | 29 | (12%) |
| Prescribers' Journal | 24 | (13%) | 23 | (10%) |
| Drug and Therapeutics Bulletin | 14 | (8%) | 19 | (8%) |

Using the chi-square test there was no significant difference among the chosen sources.

Discussion and Conclusions of Chapter 2

Summary of hypotheses: The Prescribers

Twenty-three hypotheses were set up and discussed. The rating of sources of information used at the awareness and evaluation stages of drug adoption, were tested statistically under each sub-division of each variable heading. In all cases for which a specific hypothesis was not formed, no significant differences were found.

The additional section about information used for advice and further information was also studied. There were no significant differences noted for any of the variables at any stage (awareness evaluation or advice) other than those specifically mentioned previously.

The hypotheses, where significant differences were noted among the sub-division are listed below.

1. Single practice doctors use industrial sources of information more than joint practice doctors (hypothesis No. 3).
2. Doctors who have been qualified longest use the consultant more often than newly qualified doctors (hypothesis No. 8).
3. Newly qualified doctors use Drug and Therapeutics Bulletin more than their colleagues.
4. Newly qualified doctors use more professional sources, in general.
5. The more qualified the doctor is, the greater his use of professional sources of information (hypothesis No. 11).
6. The Prescribers' Journal is used more by the most highly qualified doctors.
7. Members of the Royal College of General Practitioners use Drug and Therapeutics Bulletin more than their colleagues.

8. The most highly qualified practitioners use articles in medical journals more often than their colleagues for finding out about new drugs.
9. Dispensing practitioners use more professional sources of information than their colleagues.
10. "Specialists" use more professional sources of information generally.

The industry may consider it useful therefore to concentrate on the older single practice doctors with a first degree only, who do no dispensing and who do not specialise. For the remainder of prescribers the information available from industrial sources is either treated sceptically or is not of the type preferred.

The Drugs:

The drugs B and C were chosen because although they are the same chemical entity, they are marketed by different companies and have been on the market for different lengths of time.

Drug B is the newer of the two products having been launched in the UK some six months after Drug C. The manufacturers of Drug B were granted a licence from the company who market Drug C which, in the UK, is the smaller of the two companies (in terms of promotional resources including representatives).

From the previous work, (page 87) it was shown that the companies who market these particular drugs do not differ in the way they evoke reassurance from general practitioners. In two respects Drug B differed in the way it was prescribed by specific subdivision of particular variables. The differences were in 'partnership number' and 'years qualified'.

First Table 18: Drug B page 74 - there are more joint practice doctors who have prescribed the product than single practitioners. The difference did not prove to be significant. Secondly newly qualified doctors prescribed Drug B significantly more than was expected (conversely older doctors prescribed the drug significantly less). Those doctors who prescribed Drug B were compared with doctors who had prescribed Drug C in each subdivision of the 'years qualified' variable. There was no significant difference found using the proportions test.

The significant difference noted in 'Table 25: Drug B' must be produced by younger doctors prescribing more and older doctors prescribing less than was expected. It is suggested that this difference will be eliminated with time.

An interesting factor is seen in all of the tables where prescribing of Drugs B and C have been considered. Although the number of respondents who had heard of Drug B (112) was less than the number who had heard of Drug C (149), the percentage who had prescribed Drug B was higher (42%) than the percentage who had prescribed Drug C (36%). (This percentage was calculated as the proportion of doctors who had prescribed the drug from the total who had heard of it and not from the total number of respondents). This higher percentage could be due to a number of factors. First there is the differing marketing strategies employed by the two companies. Secondly the company who manufacture the product Drug C has brought the name of the parent compound to the attention of the doctor. They have established the usefulness, or otherwise, of the product as an aid to therapy. The concept of treatment with the novel compound had already been suggested to doctors and the hurdle which this represented had been eliminated prior to Drug B's release. With Drug A the innovation treated a condition previously very difficult to treat successfully, without resorting to surgery. The company had pioneered a new concept of biological function, manufacturing a preparation which interfered with the body's production of natural secretions. In cases where these secretions caused severe problems, the new drug alleviated the effects by reducing the cause. It is concluded that the adoption of Drug A differs from the adoption of Drugs B and C mainly because of its 'innovativeness,' and the difference between Drugs B and C arises mainly from the length of time the product has been available.

The Sources of Information :

The questionnaire contained a list of information sources as previously described. This list is shown in appendix 1 questionnaire 1. In the pilot study, a shorter list was given with a section marked 'others' where additions, not previously considered could be added. These additions were incorporated into the modified questionnaires which were then circulated throughout the region. No respondent to the pilot questionnaire added postgraduate refresher courses to the list and therefore it was not included in the modified main version. Following the subsequent comments of one general practitioner, the final one hundred questionnaires were mailed with the addition of 'postgraduate refresher courses' to the list of information sources.

From the responses it was realised that postgraduate refresher courses were considered to be a very important source of general drug information.

Using the scoring technique previously described, a score was obtained from the forty-nine respondents to the final batch of questionnaires. This was 'scaled-up' to give an approximate score for postgraduate refresher courses. It was placed second and its omission from the major part of the questionnaire must be considered as unfortunate.

The more personal use of sources was then considered and this placed postgraduate refresher courses again second.

For awareness this source was not used to any extent. This result was as expected. To evaluate a product, however, postgraduate refresher courses were placed fourth, slightly higher than the Prescribers' Journal. Finally, for advice, the source was placed tenth, equal to the Prescribers' Journal.

From the previous work it can be seen that postgraduate refresher courses fit very well into the concept of awareness as an 'industrial stage', and evaluation as a 'professional stage'.

General practitioners cannot be relied upon to add new sources of information to a pilot study. It is recommended that any future questionnaires contain, in the pilot work, an exhaustive list of sources of information which can be narrowed down for the main study. The way sources of information were used showed the greatest differences among the practitioners. Some sources were shown to be used more by certain types of doctors, e.g. newly qualified. Others were found to be used at certain stages in the adoption process. (This fact helps to support the existence of the process).

Industrial sources defined as those sources which emanate from the pharmaceutical industry were used at the awareness stage and professional sources, basically defined as drug information sources other than industrial, were preferred for evaluating a new product.

The complete list of sources was considered for each subdivision of each variable. A chi-square test was carried out, giving the estimated values of each 'cell' and certain sources of information were selected for further analysis. These further sources were each tested by the proportion test. (Outlined in appendix 3). Within the variable partnership number, single practice doctors were shown to rate direct mail, the BNF, controlled circulation journals and the consultant, significantly higher than joint practice doctors, (this latter point was in agreement with Wilson et al (1963).

Newly qualified doctors rated Drug and Therapeutics Bulletin significantly more than older doctors whereas doctors who had been qualified longest rated the representative, *Mims*, the consultant and text-books higher than newly qualified doctors.

Doctors qualifying from a 'local' University (local to their practice area) rated the Data Sheet Compendium and *Prescribers' Journal* significantly higher than other doctors. This latter group rated colleagues and articles in medical journals significantly higher than the 'local' doctors.

Doctors who have 'higher qualifications' rate articles in medical journals more highly than their colleagues. The 'first-degree' doctors generally rate sources of information higher than their more highly qualified colleagues, perhaps implying less discernment. Whether or not a doctor is a 'dispensing doctor', did not appear to influence his choice, or rating of sources of information.

The 'specialist' (self-designated) rated the BNF and *Prescribers' Journal* significantly higher than non-specialists who rated the representative and the consultant more highly.

Area Differences :

Lee et al concluded that the main influence on a doctor's prescribing was the town in which he worked (Lee J.A.H. 1965) and Martin in 1950 also found striking regional differences in prescribing (quoted in Stolley P.D. 1969). In this study, the questionnaire was mailed to general practitioners in six areas of the West Midlands Region excluding the pilot study (Area 1). Differences were noted and are discussed below.

The questionnaires were mailed at slightly different times.

Area 2 was mailed first and the one hundred questionnaires for Area 7 were sent out six months later. This first set of questionnaires were sent out four months after the launch of Drugs A and B and hence ten months after the launch of Drug C. Any differences with regard to time should therefore be minimised with Drug C.

The number of respondents who had heard of each preparation was calculated and a chi-square test was carried out on the 'Area Tables'. There were no significant differences noted for any of the three drugs.

The number of respondents from each area who had prescribed the products were then considered. With both Drug C and Drug A there were significant differences noted at the 1% significance level. Drug B showed no significant difference. With Drug C the number of prescribers in the final batch, Area 7 was significantly more than in any of the other areas. This cannot wholly be accounted for by the later distribution of the questionnaire. The previous batch (Area 6) sent out one month earlier showed no difference from the batches which had been mailed at the beginning of the study. Similarly with Drug A significantly more had prescribed the preparation in Area 7 than in any other area. The previous batch was again considered and showed no significant difference from the batches that had gone before.

For Drug B however, Area 7 had prescribed slightly less than other areas. It should be noted that in each case, Area 2, the first sample sent out after the pilot, had the lowest number of prescribers for each drug.

The numbers (expressed as a percentage) who have heard of and who have prescribed Drugs A, B and C grouped by area, are shown in Table 38a.

Table 38a

Percentage who have heard of and prescribed** Drugs A, B and C.

| Area | Drug A | | Drug B | | Drug C | |
|------|----------|------------|----------|------------|----------|------------|
| | Heard of | Prescribed | Heard of | Prescribed | Heard of | Prescribed |
| 1* | 90% | 87% | 34% | 0 | 50% | 16% |
| 2 | 93% | 76% | 32% | 31% | 54% | 18% |
| 3 | 90% | 94% | 42% | 31% | 45% | 30% |
| 4 | 92% | 75% | 49% | 47% | 56% | 32% |
| 5 | 100% | 92% | 42% | 50% | 42% | 31% |
| 6 | 100% | 77% | 49% | 54% | 64% | 30% |
| 7 | 100% | 98% | 41% | 32% | 70% | 58% |

The time between sending out the questionnaire to Area 1 and Area 7 undoubtedly helped to produce the differences. However, by studying Table 38 differences are noted which should have been minimised by the time-delay. For example, consider the section Area 7 'prescribed Drug C'. The difference in prescribing habits among different areas should be the subject of a specific study. These differences have been shown to exist. Why they exist requires further study. Area 2, the most rural area has the lowest percentage of prescribers overall.

* The pilot study, the remaining areas are numbered sequentially corresponding to chronological order of despatch.

** The prescribed percentage is that number of doctors who have prescribed the drug, expressed as a percentage of those who have heard of it.

The responses to the six statements previously described and shown, as questions 30 to 35 of the questionnaire 1 appendix 1 were considered, grouped by Area, and, using the chi-square test, there were no significant differences noted at the 5% significance level.

In conclusion, questionnaires are one method of obtaining data about general practitioners, but unambiguous questions are essential to minimise the subjectivity. Where drug information is used and how different groups of doctors use it, has been considered.

Methodological Considerations

The relative advantages and disadvantages of questionnaires as compared with interviews has been discussed. Some particular practical points were raised by the questionnaire and it may be useful to gather these points together here.

The questionnaire was mailed at intervals to the different areas. This involves an extra variable, time. It would seem more useful particularly if Area differences are to be considered, to mail all questionnaires on the same date.

The list of possible information sources in the questionnaire (List 1) needs to be virtually exhaustive. If significant sources are omitted, it cannot be assumed that a pilot study will elucidate them. Important sources may even be overlooked in this way.

Section 2

Comments from General Practitioners on Questionnaire 1

As previously stated, the general practitioner questionnaire 1 was sent to one hundred randomly selected general practitioners in each of the several Health Areas comprising the West Midlands Region. (See introduction to questionnaire page 44). The final page of this questionnaire asked the practitioner for comments on future drug information sources. In all, there were one hundred and eighty-three questionnaires which were returned with added comments. These are summarised with an analysis of answers to questions in the questionnaire relevant to the comments. In order to balance the arguments, author's comments have been added where relevant.

General Introduction

Many of the comments either restated approval or disapproval of points raised in the questionnaire or indicated a general satisfaction with the sources already available.

While some thought that information required was there if the time and trouble were taken to find it, others stated that the volume was overwhelming and led to everything being thrown away.

The gullibility of the prescriber whether general practitioner or consultant was mentioned usually in the context of the representative's visit. A certain resentment of what was thought of as 'attempted brainwashing' by the industry was apparent. Bias of information was thought probable by many, because drug firms are in the business of selling drugs. The impartiality of future sources was considered essential.

New drugs should be restricted to hospital clinics for longer than at present, although information about them should arrive at the general practitioners' desk as soon as possible after product

release. Patients for whom new-drug therapy was indicated would presumably be referred to hospitals for treatment and surveillance. A feeling of frustration was voiced by one or two when they considered that they relied for information about new therapies on sources representing commercial pressure and manipulation. New drugs were seen to be superceded by newer drugs and some wondered if any advantages could be gained for patients by changing from one to another when the risk of possible interactions and other hazards were noted. Drug-firm meetings with clinical experts who had used the product, should continue to be encouraged. Lunches paid for by the industry were looked upon as bribery by some and a pleasurable way of learning by others. Some expressed their approval of such lunches but also said that they would be happy to give them up for "better" information.

Meetings with representatives and clinical experts with groups of practitioners, in the surgery, arranged at regular intervals were praised.

One comment emphasised the problem of lack of space and time which perhaps sums up the current predicament. Information must be easily accessible, concise, reliable and as impartial as possible.

A number of practitioners stressed the need for more detailed accounts of side effects, drug interactions and contraindications whereas one said it would be preferable to have a resume of side effects supplied, presumably grading the most clinically significant.

It was considered, by one practitioner, that major therapeutic advances would percolate through to the few sources of information to which he felt justified in restricting himself. This may be the reason why he considered no major advances had been made since he qualified.

Those practitioners who qualified more than twenty years ago commented on the favourable change in the way drug information was presented, although further improvements were not discounted.

"Professional" sources of information

The Department of Health and Social Security (DHSS)

Six of the respondents referred to legal or governmental control and/or mentioned the DHSS by name.

Two thought that future drug information sources should be free from government control of any kind.

The DHSS mail to all doctors irregularly, coloured leaflets showing histograms of the comparative treatment costs of commonly prescribed preparations. These histograms attempt to show how generic prescribing, in particular, can lead to cheaper prescribing.

One respondent considered such material "silly nagging," while two considered them useful. The remaining two, thought all future drug information should come from the Department of Health. This move, it was considered, would produce "unbiased" information.

Hospitals

Three of the six respondents referring to hospitals or clinics mentioned that new drugs should not come into general practice as rapidly as they are considered to do at present. One of the comments was "New drugs should be far less readily available to general practitioners."

The remaining three comments were concerned with hospitals as a source of therapeutic information. One considered that the hospital consultant was the first-choice source of information, another thought that drug information could usually be obtained from the hospital pharmacist, a fact that should, he comments, be more widely acknowledged and advertised. The third wished to see a hospital pharmaceutical bulletin circulated to general practitioners regularly. It does

seem unfortunate that such a wealthy store of information as the hospital, is not contacted more often by general practitioners. Advertising these sources and services is one possible answer to the problem but the effort required of the practitioner, especially if lacking a personal contact, is considered too great.

The consultant

A complete chapter of this work is concerned with the consultant and his influence on prescribing. This section deals only with comments appended to the general practitioner questionnaire 1. A number of practitioners commented on the usefulness of the consultant as a source of drug information. Two were slightly critical. One considered that it was wrong for consultants to initiate drug trials without the prior consent of the patients. The general practitioner, it was added, was expected to continue the treatment started by the consultant. The other respondent who was critical, wanted consultants to use trade names more often.

There were seven favourable comments regarding consultants. Two practitioners were prepared to rely entirely on consultants and the British National Formulary while the other preferred to see how the local consultant used the product prior to his own possible use.

Colleagues

Comments by, and discussions with, colleagues about new drugs, were looked upon as very useful by all who mentioned them.

Some suggested that they would not use new drugs until they had heard about them from colleagues. One said that most information from those who had not used the product, was of little if any value.

Post-graduate refresher courses

To enable the prescriber to choose easily sources of information in response to specific questions in the questionnaire, a list was

provided (List 1 appendix 1). The list was chosen by referring to the Sainsbury Report (Sainsbury 1967) and by permitting doctors, in the pilot study, to add to or remove those sources given. Unfortunately, postgraduate refresher courses were not included and none of the pilot study respondents added them. There were, however, comments concerning them. It can be noted that the final one hundred questionnaires sent out had postgraduate refresher courses added to the list.

Two prescribers commented that the extended stay courses were of most use and one considered that lectures at postgraduate centres with "entertainment up to the standard of drug firms" would, in the long term, save the National Health Service money.

Journals

Six prescribers mentioned journals. Two thought there were too many and that it was almost impossible to go through them all. This led, inevitably, to the complete collection being discarded. One suggested a single journal containing a section on therapeutics. The other commented that journals were the best way of bringing new drug information to the attention of the busy practitioner.

The Prescribers' Journal

There were seven comments which referred to the Prescribers' Journal. These were all favourable but each wanted some change.

These changes can be summarised as follows. Expand the journal to contain a regular "Topic" perhaps even replacing the BNF. An index should be arranged in disease-state order. The dissemination should be increased and in particular it should be published more frequently.

Martindale: (The Extra Pharmacopoeia)

Annual supplements were suggested by one to increase its usefulness. Such a source of information, it was added, was useful for all general practitioners.

Text-books, on the whole, were criticised for their lack of currency.

Drug and Therapeutics Bulletin

This publication was ranked eleventh by practitioners, as a general source of information on pharmaceutical products.

There were six further comments. One wanted the frequency of publication (at present fortnightly) to be increased. One approved of the sceptical approach although another did not like the dogmatic style. The others wanted the bulletin to be more up-to-date and discuss new drugs earlier.

Industry and Industrial Sources

Although some specific forms of information issuing from the pharmaceutical industry are of questionable use, the picture given by the seven prescribers who commented generally was for no government interference in the industry.

The importance of the absolute independence of the drug firms was stressed.

Limiting advertising would reduce competition which in turn would cut profitability, research and eventually exports.

One suggestion was to pool information produced by the pharmaceutical industry, without state intervention, making it accessible from a local unit. This may be looked upon as an extension of the Data Sheet Compendium. One respondent, however, stated that personal and printed matter from drug firms were worse than useless.

Symposia, as arranged by some pharmaceutical companies, during lunch hours and after evening surgery, were praised by one prescriber.

Direct Mail

Direct mail is defined as unsolicited publicity material which generally arrives through the post from the pharmaceutical industry. It has a two fold use. An alerting service informing the doctor

of a new product, new dosage, new indication or some other change. It also acts as a 'reinforcement' to an already established product.

There were ten comments concerning direct mail. One thought it was a useful source of information if it was not overdone. The remainder considered that it was wasteful. Five suggested its abolition, the others thought that the volume should be reduced.

In the questionnaire it was rated fourteenth as a source of general drug information.

Clinical Trials*

There were eight comments about clinical trials. Three were highly critical of reports of trials carried out. One suggested that trials should be restricted to hospital specialists. However, another respondent stated that the system involving general practitioners was excellent in every way. It is perhaps unfortunate that financial inducements are used when arranging clinical trials. An independent assessor prior to the trial may assist in sorting out any 'promotion only' trials

* Note: There are at least two types of clinical trial. First there is the industry promoted trial prior to having the product licence granted. The detailed protocol is vetted by the C.S.M.

Secondly, the individual general practitioner can initiate a trial for a new product by contacting the individual company. These trials, though discussed and advised by the industry are "at the mercy of the medic".

The other respondents stated that they wanted more well conducted double blind trial statistics to appear on publicity with numbers of patients, country of origin (which was not always the U.K.) and methodology clearly stated.

Compendia

There were eleven comments on the Data Sheet Compendium which was

eighth in the table of sources of general information concerning new drugs. (Table 2).

One considered it was useless and extremely expensive, five considered it useful and had reservations about the problem of timeliness. One of these five wanted clinical trial information (with the proviso mentioned under 'Trials') while two wanted all manufacturers and all their products mentioned in the compendium.

There were six who considered the Data Sheet Compendium to be the best single source available at present.

The Media

Ten practitioners mentioned the media, all in very strong terms. The general theme was that the medical profession should be made aware of all new products prior to any press or media release. Patient demand was mentioned as being directly related to comments in the popular press and on radio or television.

Sometimes, it was suggested, informed comment was anticipated by the media prior to release to practitioners.

Audio-Visual Forms

Five general practitioners mentioned films as a source of information coming from industry, all being in favour. Slides and tapes were also mentioned favourably. One suggested a video tape to be made available to general practitioners, at low cost, as a learning aid and perhaps keeping up to date with recent advances.

Summary of general sections

In these sections criticism was made of information on new drugs in the form of direct promotion. Reliance on this information was expected but not always justified in the general practitioners opinion.

The industry was, however, generally regarded with favour and

research was to be encouraged. Unfortunately when associated with the raising of money for research and development, the concept of totally impartial information, like the concept of totally safe drugs, remains an unlikely ideal.

The 'professional' sources of information such as the consultant and other medical colleagues in particular, were highly regarded. The Prescribers' Journal might increase its usefulness if it took note of the comments made and increased its circulation (to include pharmacists perhaps) and its frequency. The full potential of this source does not yet appear to have been fully realised. Although evening or one day post-graduate meetings were not mentioned the extended stay courses were. These should be encouraged. Communication among colleagues is greatly enhanced between and after sessions.

The following section is related to the six considered statements mentioned in the introduction (Ch.1). Each statement is examined alongside the general comments relevant.

The B.N.F.

The statement considered here is shown at 'section' 30 of the questionnaire appendix 1.

"The British National Formulary (BNF) would be more useful as a source of current information to doctors if it was produced annually". The respondents were asked to rate this (and the other five) statements by indicating whether they strongly agreed, agreed, were indifferent, disagreed, or strongly disagreed. The responses were:- Two hundred and sixteen in favour (ninety strongly agreed), fifty-eight were indifferent, twenty-four were against and five were strongly against.

There were fifteen comments specifically mentioning the BNF. Six thought the suggestion of yearly publication would go some way to increasing its usefulness. Three thought that even yearly was not sufficiently frequent and a minimum of twice yearly was suggested. The

remaining six comments referred to the content and format. One thought the more frequent BNF should lead to the inclusion of prices even if these were approximations and only accurate at the time of publication. It was also thought useful to include more trade names.

The lay-out was criticised by two practitioners. One did not like the position of 'treatment of disease' at the beginning of the book, and preparations at the end. The other was concerned that the format should not change as it took time to get used to any revisions. One respondent considered that the new-style representative (see next section) should sell the more-frequent BNF (which is at present distributed free to all general practitioners) and encourage usage of its preparations. He suggested that a cash incentive for doctors who prescribed over a certain proportion of BNF preparations should be seriously considered.

The Medical Representative

See 'Section' 31 of the questionnaire appendix 1. The statement concerning the representative was:-

"The drug firm representative should be replaced by a pharmacist or clinical pharmacologist visiting doctors by appointment on a regular basis bringing together information about all new drugs brought out in the time between visits".

One hundred and forty-eight were in favour (fifty-one strongly agreed). Forty-seven were indifferent, seventy-two disagreed and thirty-five strongly disagreed.

These results contrast to the rating of the representative (seventh) and the pharmacist (fifteenth) as general sources of drug information (see Table 2). This may be because few general practitioners have other than minimal contact with a pharmacist at present. It may be because of a general mistrust of the pharmaceutical industry and a desire to

have more 'passive - professional' sources of information. The comments concerning the representative and the pharmacist could be grouped under four general areas. First there were those practitioners who liked the system as it was. Secondly there were those who preferred the proposed change. Thirdly a group who wanted the proposed change in addition to the representatives usual visit. Finally, there was a miscellaneous group. Fifty respondents commented on the drug firm representatives at the end of the questionnaire. Fourteen were happy with the system as it operates, some were suspicious of the possible government control involved in a "state-representative" (sic).

General practitioners mentioned that communication with the representative was two way and that criticisms and reservations they had about a new drug, as well as points in favour of those products could be discussed. Such criticisms or compliments were, it was pointed out, easier over a 'drug-firm' lunch!

What constitutes a good representative was difficult to define from the comments though generally males were preferred who knew and respected the prescribers' pharmacological knowledge and who did not act merely as salesmen. They sometimes became personal friends.

One of the representatives' major functions was to make doctors aware of new products. One or two doctors would prefer less frequent visits, some said they enjoyed visits by representatives and set aside time each week to see them.

The odd ball-point pen or jotter was considered acceptable but further 'inducements to prescribe' were criticised.

It was suggested that the abolition of the drug firm representative would lead to a steady reduction in research and development. Competition would also decline. The proposed alteration in the 'detailing' of new products might, however, encourage research as significant advances would be rewarded by being brought to the attention of the practitioner by

the more professionally acceptable pharmacist or clinical pharmacologist.

One respondent was wary of the self-proclaimed neutral observer. He stated that it was easy to sort out the important points from the highly motivated representative selling a particular product. The bias was apparent which might not be the case with the 'state-rep'. It was also suggested that he would be very dull.

One prescriber considered that pharmacists were attempting to control drug prescriptions and suggested that "they should be stopped", adding 'know your limitations'.

The comments in favour of the proposition were again varied. Twenty-four general practitioners made comments in favour of a pharmacist or clinical pharmacologist and against the representative. In general, concern was expressed at the frequency of the representatives' visits and the difficulty in assessing the relevant information, bearing in mind the representatives' primary function of selling drugs. It was stated that the representative was too ready with information which 'smacked of brainwashing'. A visit as proposed in the statement at three to six monthly intervals at the instigation of the general practitioner (who could make it more frequent if required) was preferred.

If joint meetings with general practitioners and hospital doctors were possible, an exhibition might be arranged with stands for all new products marketed since the last such event.

In this way, 'unbiased' information was hoped for.

The remaining comments all approved of the change proposed in the statement.

Six respondents wanted the pharmacist or clinical pharmacologist in addition to the drug representative. One thought that the representative added variety, another stated that their conversation was lively and that he would miss the lunches.

One agreed with the statement but considered that much would depend upon the pharmacist or clinical pharmacologist's 'employer'. Department of Health advisers were thought to give strange advice at times.

The remainder of responses fell into a miscellaneous group. Some thought that the representative would be a more useful source of information if he was trained by pharmacists or pharmacologists and visited less frequently. One general practitioner thought that no one should visit the surgery until the new preparation was well tested. One final respondent thought that representatives were useful and that the job gave an outlet to failed graduates!

Summary

There were more practitioners in favour of the representative being replaced, than against. If this rather radical approach is not possible, a better training for the representative would seem to be indicated. The doctor is sceptical of the information received in many cases. This may or may not be substantiated.

It may be worthwhile highlighting the previously mentioned point of the pharmacist or pharmacologist visiting at about six monthly intervals with drug firm exhibitions at similar intervals concentrating on new drugs only.

The drug firm representative is often the first source of drug information when a new product is released. Increase the credibility of the source of drug information and the effectiveness of that source is also likely to increase.

Card Index. see section 32 appendix 1.

An updatable card index type drug information system arranged under disease and approved name of product, paid for at least in part by the user, would be preferable to direct mail (through the post unsolicited drug firm literature) .

One hundred and seventy-three strongly agreed or agreed, fifty-seven were indifferent and seventy-three were against or strongly against.

There were comments from some general practitioners in the questionnaire stating that they agreed in general but would not be prepared to pay.

Of the thirteen comments appended to the questionnaire concerning a card index, all were in favour although two again had reservations about cost. One mentioned that "doctors already subsidise the NHS for their patients to a scandalous degree."

Two gave specific comments, one that all data sheets and information sheets were better sent in the same size and format, convenient to file orderly for further reference. The other asked that idiosyncrasies of particular drugs be picked out clearly on the file cards.

Information Units (See section 33 appendix 1)

The statement posed, regarding information units was:
"An independent local drug information unit, probably based in hospital or university (pharmacy or medical department) which could be contacted by telephone, would be a very useful adjunct to the information sources currently available."

One hundred and eight-six agreed or strongly agreed, thirty-nine were indifferent and thirty-five were against or strongly against.

This is in sharp contrast to the position of hospital drug information units, and industry drug information units as sources of general drug information. They occupied the last two positions (18th and 19th) see table 2.

The fact that these services exist for the use of general practitioners as well as pharmacists and hospital personnel should

be much better advertised. There is a certain amount of effort required to contact the units but from the responses above, the majority of GP's would appear to be prepared to make this effort.

There were nine responses to the questionnaire concerning drug information units, all were in favour of the system proposed. Three made specific suggestions concerning such a unit. One suggested that a quarterly sheet updating the BNF should be issued by an independent drug unit to deal with new drugs only. The other two thought the unit should also be encouraged to give seminars about new drugs mentioning particularly, side effects and interactions.

Generic Prescribing. See section 34 of the questionnaire, appendix 1.

The statement is as follows:-

"The generic name of a medicinal product, followed by the manufacturer's name should replace the present use of trade names in drug advertising."

In response there were one hundred and thirty-three in favour (fifty-three strongly in favour) forty-six were indifferent and eighty-one were against (seventeen strongly).

This preference for generic prescribing should be pursued further.

There were twenty-four comments from doctors about the use of trade names.

Eight were in favour of 'generic-only' prescribing. Two of these considered there was a need to make the generic name less complicated and one thought competition for NHS contracts would lower the price of trade-named products to that of generic equivalents. 'standards' must, of course, remain comparable.

Of the three who were against the idea, two believed in the

absolute independence of the drug firm and the other considered that adding manufacturers' names would be very bulky.

Other comments concerned using both trade and generic names when reference to drugs was made in the BMJ and similar medical journals. There were also general comments expressing satisfaction with the present system but willing to change if the generic name could be more concise and perhaps more descriptive.

Restriction of prescribing

Four practitioners mentioned the possible restricting of prescribing. Two were completely opposed to any form of restriction, one commented "how can the ministry know best" the other said there was a danger that the government would direct prescribing which would not be acceptable. Two mentioned that there were too many drugs used which led to many being wasted with several firms producing the same products. The limiting of drugs prescribable should restrict such duplication. It was stressed that any system must be acceptable to the medical profession.

It is relevant to comment on two points.

First, the patent life of drugs (recently increased) protects a novel product from copies for a period depending on the time between filing of the complete specification and the time of marketing the product. The shorter this time, the longer the company has to recoup its research expenditure and bring in capital for future research. Secondly, there has been a recent suggestion whereby prescriptions for trade-named products could be substituted, by pharmacists, for a generic equivalent if one is available. The comment was that the general practitioner should sign a space on the prescription if he did not want substitution. This puts the onus on the prescriber. The system at present in use in certain states of America requires the prescriber to initial a box if he does want substitutes which may be a more acceptable alternative. It gives the opportunity to

those who remember a trade name only but would like a generic equivalent to have substitution.

Desk Reference. See section 35 appendix 1

"A desk reference published monthly, laid out like *Mims* but with a cross reference between the generic name of the product and its proprietary equivalents, would be a better single source of drug information than those at present available."

It should be noted that when this questionnaire was distributed, *Mims* and Data Sheet Compendium did not contain a non-proprietary index. Since the questionnaire analysis, such an index is now present in both publications. With *Mims* this index was at first annual but is now issued with each monthly edition.

The responses to the above statement were two hundred and nine in favour (sixty-five strongly agreed), twenty-six were indifferent and twenty-five were against, (four strongly).

There were thirty-eight comments at the end of the questionnaire concerning *Mims*. All considered it a most useful source. Sixteen mentioned the need for a cross reference. These practitioners should be well satisfied with the recent changes. One said he used *Mims* only for prices. Eight were happy with the system as it was, two of these thought *Mims* was easily the best single source of information.

The remaining prescribers had specific suggestions. Four wanted a cross reference for therapeutic information between the BNF and/or *Mims* Magazine and/or a journal such as Prescribers' Journal. This would permit further reading where considered necessary.

Four mentioned that the information in *Mims* was too brief. This should be increased to show relative advantages of drugs. (Often it must be admitted, this would be subjective and difficult to assess.)

One commented that the increased cost due to bulk etc., could be offset by decreasing the frequency to six times a year. Unfortunately, such a saving would not be forthcoming as decreasing frequency would naturally decrease revenue from advertisements. Another prescriber suggested that the increased clinical trial information should be added but said it should only appear in *Mims* every six months or so. The industry should not be solely responsible for *Mims* production* (including production costs) was the opinion of one respondent. Unfortunately he offered no satisfactory alternative. One practitioner requested the return of the paediatrics section of *Mims*.

In summary, *Mims* is obviously an excellent source of information. If its size and scope were increased, it is possible that this usefulness would be decreased. The cross reference to other sources could be a solution.

Greater liaison should be encouraged between the editors of *Mims*, the BNF and The Prescribers' Journal to cross reference their data. This would allow doctors to rapidly retrieve information about products at the level which they wanted.

" *Mims* Monthly Index of Medical Specialties is a magazine of an independent company Haymarket Publishing Limited distributed free to general practitioners and financed by advertising revenue".

Cost

Four practitioners mentioned the cost of products. All thought cost was an important factor when considering prescribing.

One thought comparative price indications were necessary. One wanted less confusing information about drug costs and the fourth thought prices should be included in the BNF and Prescribers' Journal.

Future - New Ideas

Six prescribers added comments outside the content of the previous sections. Three of these mentioned the potential use of computers. One mentioned the use of a local system at present still under test and available only to hospitals. This has easy access via therapeutic classes to specific products eventually to dosage contra-indications etc. This depends greatly on the accuracy and acceptability of the stored material. One prescriber wanted this system plus suitability of drugs with regard to the age and sex of the patients.

'Mims on pocket calculator' was also suggested, although how this might be achieved has not been considered. Two said a regular list of new products with independent assessment was what was wanted. One GP made two suggestions, first there should be colour coded data sheets corresponding to pharmacologically similar preparations within the classifications contained in the expanded *Mims* (see *Mims* section), secondly a new method of dealing with repeat prescriptions which would include patient registration with a pharmacist of the patient's choice. The pharmacist would keep records and would build up a set of data which would also include 'over-the-counter' preparations.

Conclusions and Summary

These sections have dealt with the one hundred and eighty-three sets of comments as appended to a mailed questionnaire sent to doctors in

the West Midlands Regional Health Authority region. It is not easy to coordinate all the comments but the following summary brings out the current trends and suggests possible ways in which the general information sources on drugs for general practitioners could be improved.

Although the information given to prescribers has expanded and improved considerably in form and content over the years, there is still room for further improvement. More apparent impartiality is wanted with reduction to a minimum of direct mail. Any future information source should take into account the lack of space in most surgeries and the increasing work load of the general practitioner. Hospital drug information units must advertise their existence more forcefully and be prepared to serve the requirements of hospital and general practice personnel. This may necessitate the use of a number of different types of staff in each unit to answer clinical as well as pharmaceutical questions.

The representative is a very important source of information but many prescribers would prefer a pharmacist or clinical pharmacologist visiting the surgery less frequently as under the system proposed.

Generic names were preferred by the majority, simplifications could and should be made to encourage generic prescribing.

It is difficult to envisage on the one hand the pharmaceutical industry completely free of government control and yet on the other to restrict, by these same controls, all of its methods of drug promotion.

The patent law might be extended* in some way so as to cover a drug innovation in a different way to other innovations. (innovation here meaning novel in some specific way). If the patent life starts from the day of launch, this may permit extended trials to be conducted in hospitals, as was suggested. If this was coupled with a 'ban' on pre-launch promotion it may go some way to aiding the situation.

An updatable card index was welcomed. All future drug information should be filable, i.e. be of a uniform shape, size and format, perhaps with colour coding as cross reference. The data sheet compendium was generally well approved of but could have certain modifications.

Mims was the single most useful source available to general practitioners. By adding a cross reference index of proprietary to generic drug names, an advance has been made. A further advance could be made by cross referencing named drugs in *Mims* to the Prescribers' Journal and the BNF and *Mims* magazine. Greater liaison should be encouraged among the editors of *Mims*, BNF and Prescribers' Journal to enable prescribers to find further information on specific products at the depth they feel necessary at a particular instance.

The BNF should be available at more frequent intervals, possibly twice or more a year.

Information should always be supplied to physicians and other relevant professionals, prior to its release to the press. Advertising of prescription only medicines on television or in the newspapers should be prohibited in future.

*(There is a facility at present to apply for a patent extension but there is little evidence of its successful use).

The amount of information available concerning each new and established medicinal product is immense. The depth, quality and impartiality is there if the prescriber has the time, desire and need to find it. It would be apparent from these comments that the desire and need are there but the time is not. Information producers must realise this and provide concise, accurate and speedy information in a form which is acceptable to the prescriber. It is this acceptability which is obviously lacking in many of the forms of information at present available.

Chapter 3

Prescription Analysis

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Chapter 3

Prescription Analysis

INTRODUCTION

In the introduction, consideration was given to the general aspects of drug adoption and drug information. The questionnaire (Chapter 2) focused attention on the use doctors made of drug information generally and in relation to the adoption of three new drugs. This chapter deals with the objective measurement of drug adoption in a community of physicians.

Whether or not a doctor has prescribed a new product can only be ascertained objectively by analysing prescriptions issued.

Various studies in the United Kingdom have used prescription analysis to a lesser or greater extent in their research (Lee J.A.H. 1965, Parish P.A. 1976). The first major study to rely on this methodology was that of Coleman, Katz and Menzel. Two hundred and sixteen doctors in four cities of one contiguous area were considered in the study. Auditing of their prescriptions in all pharmacies in the area was carried out during *three day sampling periods at approximately monthly intervals*. All prescriptions written during those three days for one hundred and twenty-five prescribers for a new drug and the drugs it was intended to replace, were collected for sixteen months.

The study focused on those characteristics of the doctor which were likely to relate to his introduction of the new drug.

Winick attempted to reproduce Coleman's work but found striking differences in the results (Winick C. 1961) Menzel replied to this publication with a discussion of the methodological differences between the two studies, (Menzel H. 1963) concluding that the greatest difference was that Winick used subjective recall (doctors memories) to find the time of first use of a new drug.

In the United Kingdom, National Health Service prescriptions are stored in batches corresponding to areas after being priced. The general process of prescribing, dispensing and payment is as follows. The patient visits his doctor. A decision is taken to prescribe a drug. Except for dispensing doctors the written prescription is given to the patient who takes it to a pharmacy. The pharmacist fills the prescription and dispenses the product to the patient. *(Although Mapes states that the pharmacist then prices the materials he has supplied (Mapes R.E.A. 1977b) this is not the case.)* The prescription, once dispensed is stored until the end of the month and arranged into 'doctor-order' by the pharmacist. The completed previous month's bundle is sent to the Prescription Pricing Authority (PPA) local office in the first few days of the succeeding month. The prescriptions are retained in their 'Chemist Contractor' bundle and are individually priced at the PPA. The chemist contractor is then paid, via the Family Practitioner Committee, for the materials used and his professional services. The prescriptions, once dispensed, are stored on the premises of the PPA for approximately six months unless there is any query.

It is appropriate here to briefly describe the functions of the Prescription Pricing Authority (PPA) and its main exercises relevant to this study. The routine operations of the PPA divide into three main categories: pricing, coding for national statistics and prescription investigation. (Tricker R.I. 1977). Most investigatory work is carried out in a series of exercises known as the 'PD cycle'. Only the PD2 exercise will be described being the only one relevant to the current work. The PD 2 is carried out in Newcastle and provides every general practitioner (or partnership) once every twelve months, with a statement

of the number and cost of the prescriptions the doctor (or the partnership collectively) has issued during one month. The scrutiny is so arranged that doctors are unaware of the month in which their prescribing will be examined and so that their prescribing is not examined for the same month in successive years. This exercise involves the assembly of all the prescriptions written by doctors in the Areas under review, (they may have been dispensed anywhere in the United Kingdom), and the collation of the prescriptions in doctor order. This usually involves over two million prescriptions each month and the activity is tedious and requires much space. Once assembled, the doctors' bundles are analysed and costed again (each script had been previously analysed in the local office) to give data on total ingredient cost, total number of items prescribed and the total cost. These are then recorded together with the number of patients on the doctor's list and the average cost per prescription and per patient, is calculated. These are then compared with the average for the FPC area, and the ratio of the individual general practitioner's costs to that of his area, is calculated. The information is then sent to the DHSS and to FPC's who in turn send the relevant extracts to the doctors.

The figures for all the general practitioners in the Area are examined by DHSS Medical Division and where the doctor's costs are significantly greater than the local average, a request may be made to the PPA for a further more detailed analysis to be carried out.

The basic unit of information stored in the local branches of the PPA is of course the prescription. On each form, information is available as to the preparation prescribed, its name, strength, dosage form and dose; the prescriber's name, address and code number; the pharmacy's name, address and code number; the patient's name, address,

sex, and occasionally age; the date on which the prescription was issued and the date it was dispensed.

Here then is an ideal reservoir of prescribing information, a reservoir which has remained largely untapped.

Confidentiality is always an essential quality of a study of prescriptions and it may be the fear that this cannot be maintained which has inhibited much research being carried out.

It is surprising that Williamson was unable to elicit the support of the PPA or local pharmacies for his study (Williamson P.M. 1975 p. 190) as Lee had carried out such research in 1961 (Lee J.A.H. 1965).

Some workers have obtained useful information from the Heriot-Watt data base (Unit for Research into Drug Usage). This consists of a cohort of doctors in England and Wales (approximately 700 at present) who became principals for the first time between 2nd July 1969 and 1st July 1970. (Parish P.A. 1976 introduction). The aim of using the cohort of doctors was to see if there were discernable patterns of prescribing and if so to follow the developments of these patterns. The doctors in the cohort were sent questionnaires and were interviewed as well as having prescription analyses carried out on their one month prescription sample (see later).

The Medical Sociology Research Centre at Swansea has published papers using this data base and much research has been carried out upon it. When the present research was undertaken, it was decided that, like Williamson, one compact Family Practitioner Area would be studied. The study was outlined and forwarded to the DHSS for approval.

In the time taken to gain this approval two prescription studies were started.

Hospital prescribing

The three drugs chosen and discussed in chapter 2 were again considered for direct comparison. An experiment was designed to follow the acceptance of the new drugs in the hospital environment. A 5" x 3" record card was attached to each bottle of the new tablets A, B and C and those who dispensed the products were asked to record the date when prescribed, the name of the prescriber, quantity dispensed and the ward type (surgical, medical etc.) While this was being carried out, prescriptions held in two hospital pharmacies in the area were studied and the date of first prescribing for each product was noted. Similarly the date of first purchase was taken from the invoices held in each pharmacy. Due to administrative difficulties within the hospital and the justifiable failure of the dispensing staff to record complete details, the experiment ground to a halt. If a similar method is attempted in future, it is strongly recommended that all individuals who may be involved with the work are properly briefed and included in discussions. The data gathered was discarded due to its lack of completeness.

A second study was begun to look at the prescribing of one general practitioner. It was hoped that acceptance of new drugs and discarding of other preparations would be clearly shown. Williamson again suggested the technique of asking doctors to write duplicate prescriptions for a period. In the present study one general practitioner wrote a duplicate script at each consultation. When no prescription was issued to the patient, a note marked "Nil" was returned. The specific aim of the work was the production of an index, in drug name order, of all products prescribed. The index was intended to act as a further information source for the general practitioner.

Each patient was listed once only on each 'drug-card' and a code informing the user as to whether the patient had had the product before, was added. In the event of an interaction being noted, all patients at possible risk could be quickly identified. The index was updated for twelve complete months and is intended to be kept in the surgery for updating by receptionists. Its usefulness is still to be established.

Each new preparation adopted by this practitioner was noted. Unfortunately, it was soon found that the prescriber in this study was far from average. Forty per cent of his consultations produced no drug treatment. He received no drug literature and saw no drug firm representatives. This unusual example may be useful for future research but not in this project.

Three major hypotheses were postulated.

Hypothesis 24

"An early prescriber of a drug in one therapeutic class will also be an early prescriber of drugs in other unrelated therapeutic classes".

Hypothesis 25

"A high prescriber in one specific therapeutic class of drugs will be more likely to prescribe a new drug in that therapeutic class than a low prescriber."

Hypothesis 26

"The number of *different* drugs prescribed in a particular therapeutic class is related to innovativeness".

To attempt to answer these hypotheses, prescriptions had to be monitored in sufficient numbers .

The DHSS approved the project and various local bodies, including the Prescription Pricing Authority agreed to the work.

It was decided to follow these same three drugs which were studied in the questionnaire in order to produce an objective comparison.

Methodology

At the pricing stage of the dispensing process, prescriptions for the three new drugs were pulled out of each chemist contractor's bundle and placed on top of the group 1 bundle (script charge paid) and the group 2 bundle (exempt from payment) which together with scripts for the contraceptive tablet (no charge), form the individual chemist contractor's composite monthly bundle.

The six hundred thousand prescriptions issued each month by the contracted NHS doctors were then stored (still in the chemist contractor bundles) until the analysis was possible.

Untying each bundle, taking the relevant scripts, noting the relevant information, replacing the scripts and retying the bundles took approximately five working days each month.

Details taken are shown in figure 3.

The doctor's name was taken once only alongside his code number. All subsequent prescriptions issued by this doctor were identified only using the code. A listing of doctor names and corresponding code numbers was updated each month.

The tablet code was a single letter differentiating between approved and generic names of the preparation.

Figure 3.

Details taken from National Health Service Prescriptions

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------|---------------|---------------|-------------|---------------|---------------|-------------------------------|
| Date | Doctor's name | Doctor's code | Tablet code | Tablet number | Pharmacy code | Other preparations prescribed |

A running total of each preparation was maintained using the tablet numbers. For easy referral, the pharmacy code (corresponding to the chemist contractor was taken. Any other comments such as a doctor from another FPC Area or the names of other preparations dispensed, was added in the last ten spaces of the coding form. This process of drug monitoring was continued for fifteen consecutive months.

Two distinct areas of study were now possible. The consideration of early and late prescribers, and the way new drugs are adopted in a community of physicians.

In all, nine million forms were monitored in the local office and approximately twenty thousand prescriptions were recorded over the fifteen month period. The initial work to show the adoption of three new drugs in the community was carried out on the total population of general practitioners whose prescriptions had been *dispensed* in the Birmingham FPC Area. This included doctors who had written prescriptions in other Areas and whose patients had brought them into Birmingham for dispensing. There were seven hundred and twenty doctors in this total population. A first refinement of the sample used data only from doctors whose names appeared on the Birmingham FPC Medical List. This included approximately sixty doctors who had arrived in the Area after the 'cut-off' date for *early-prescribers* of Drug A, and would naturally preclude the possibility of their inclusion in the list of *early-prescribers*. It was therefore decided to remove their names from the primary list of prescribers which would go forward into the 'early' and 'late' analysis. The final sample contained four hundred and thirty-four prescribers who had had their names included

on the Birmingham FPC Medical List from at least the date of the beginning of the survey. This group accounted for the issue of fifteen thousand prescriptions over the fifteen months for the three new drugs.

Data analysis

Computer 'sorts' of the data were carried out so that variables 1,2,3, 4 and 6 (in Figure 3) were selected in turn as the major variable upon which a sort could be based. Within a sort on one variable there was a 'sub-sort' on another such that a sort could be in date order and within date order drug-code order. All data for all drugs dispensed on a specific date would then be sorted alphabetically giving the number of times Drug A was dispensed by each doctor on each day, at a glance.

Another major sort was in 'doctor-name order' and within name order, drug order which gives a simple view of how many dosage units of Drug A were dispensed by Dr X over the period of the study.

In the 'early' and 'late' study (chapter 4) once an appropriate date had been selected as representing the point where *early-prescribers* became *Group 2 prescribers*, the date order, and within date, drug order sort was used. The date was selected on the printout and all doctors who had prescribed the drug in question by that date were listed.

A graphical representation of the adoption of an innovation (Drug A) is shown in Fig.4 & 4a. The date of first use of each drug by each doctor was found from the data. The number of doctors who had prescribed each drug for the first time in each month was plotted to give figure 4. Figure 5 is the same data expressed as a proportion (cf Coleman J.S. 1966 p. 26).

The composite picture as compiled by Rogers (1971 p. 182)

Figure 4.

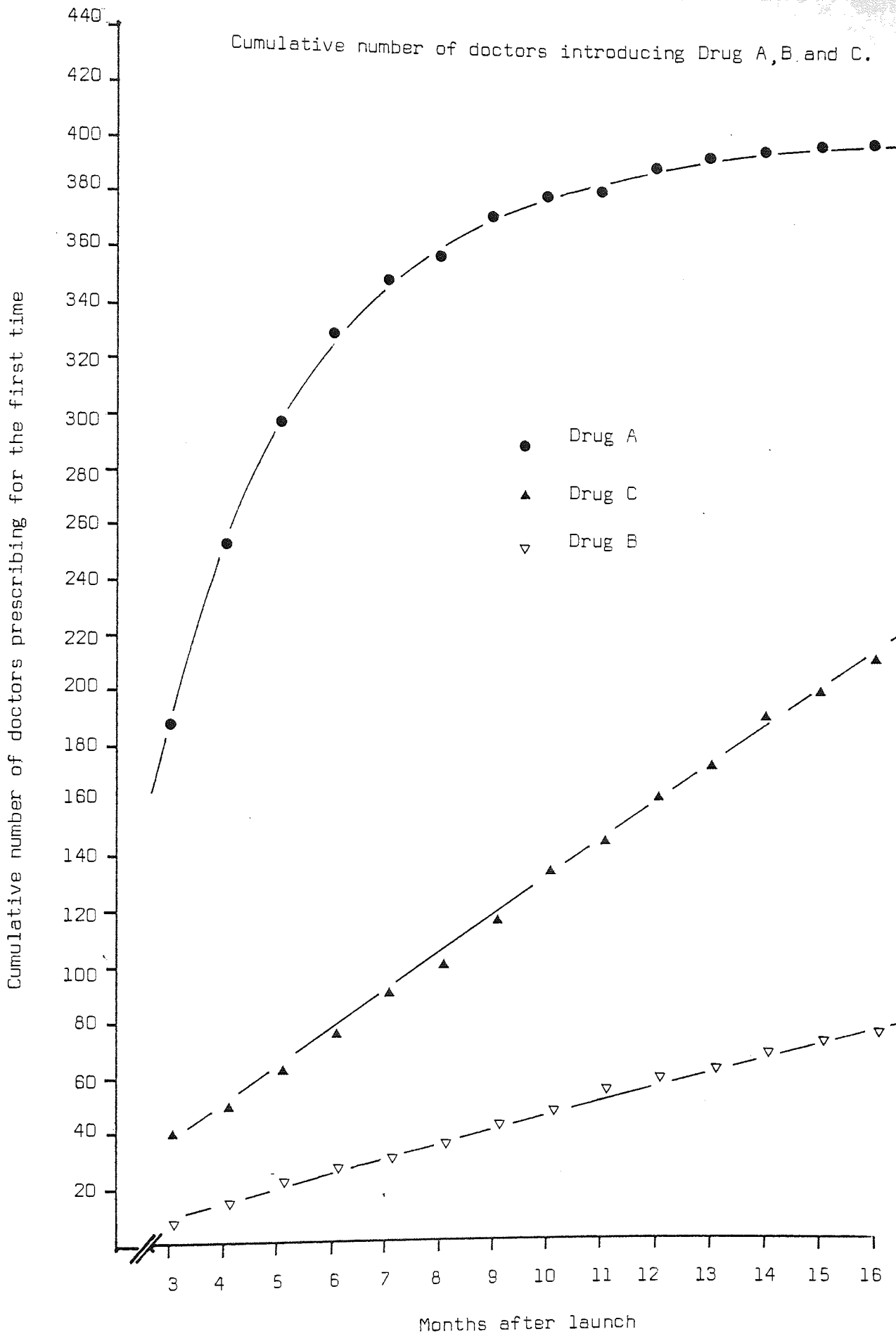


Figure 4a.

Graph showing the number of new prescribers of Drug A each month.

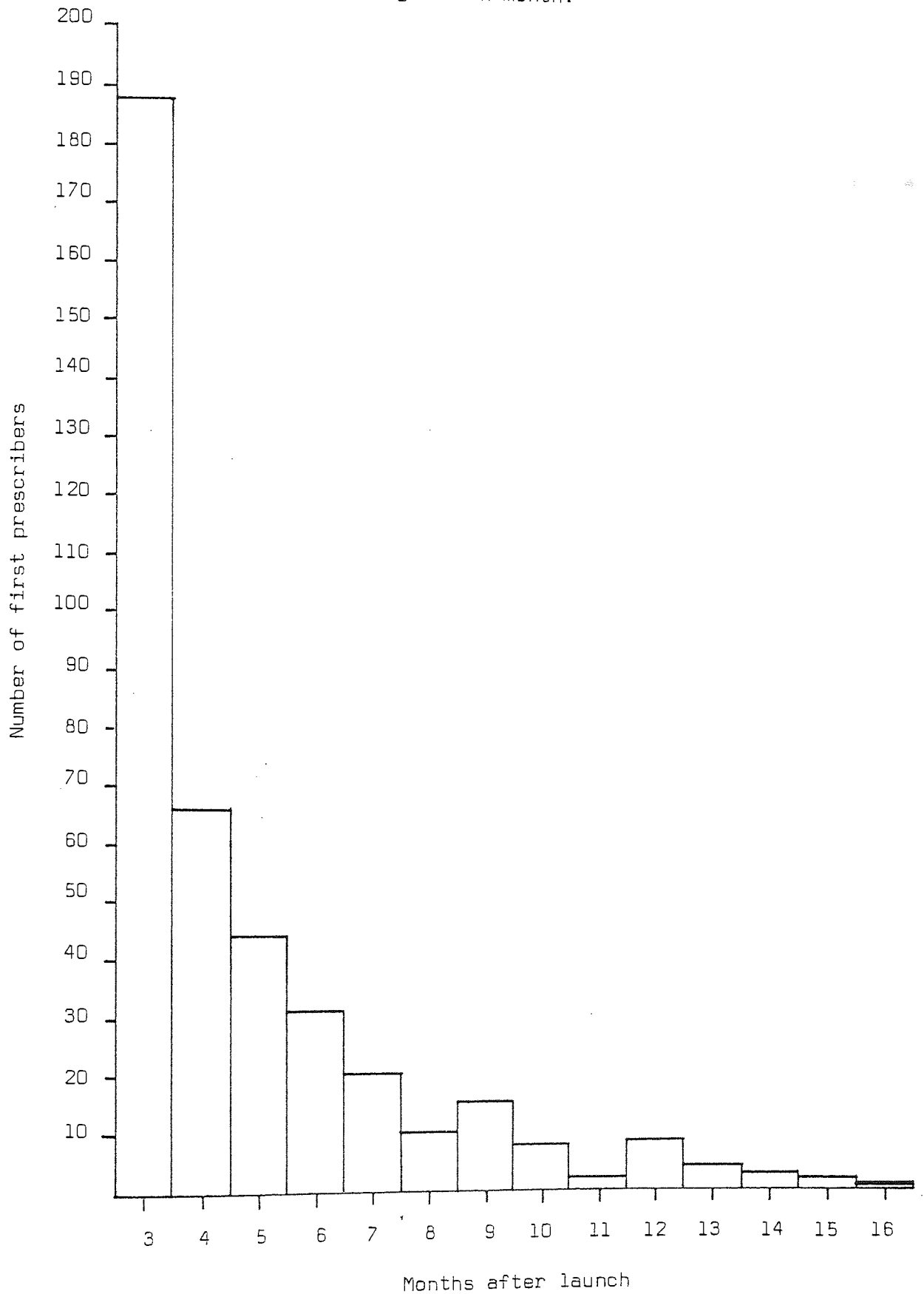


Figure 5.

Cumulative proportion of doctors introducing Drug A

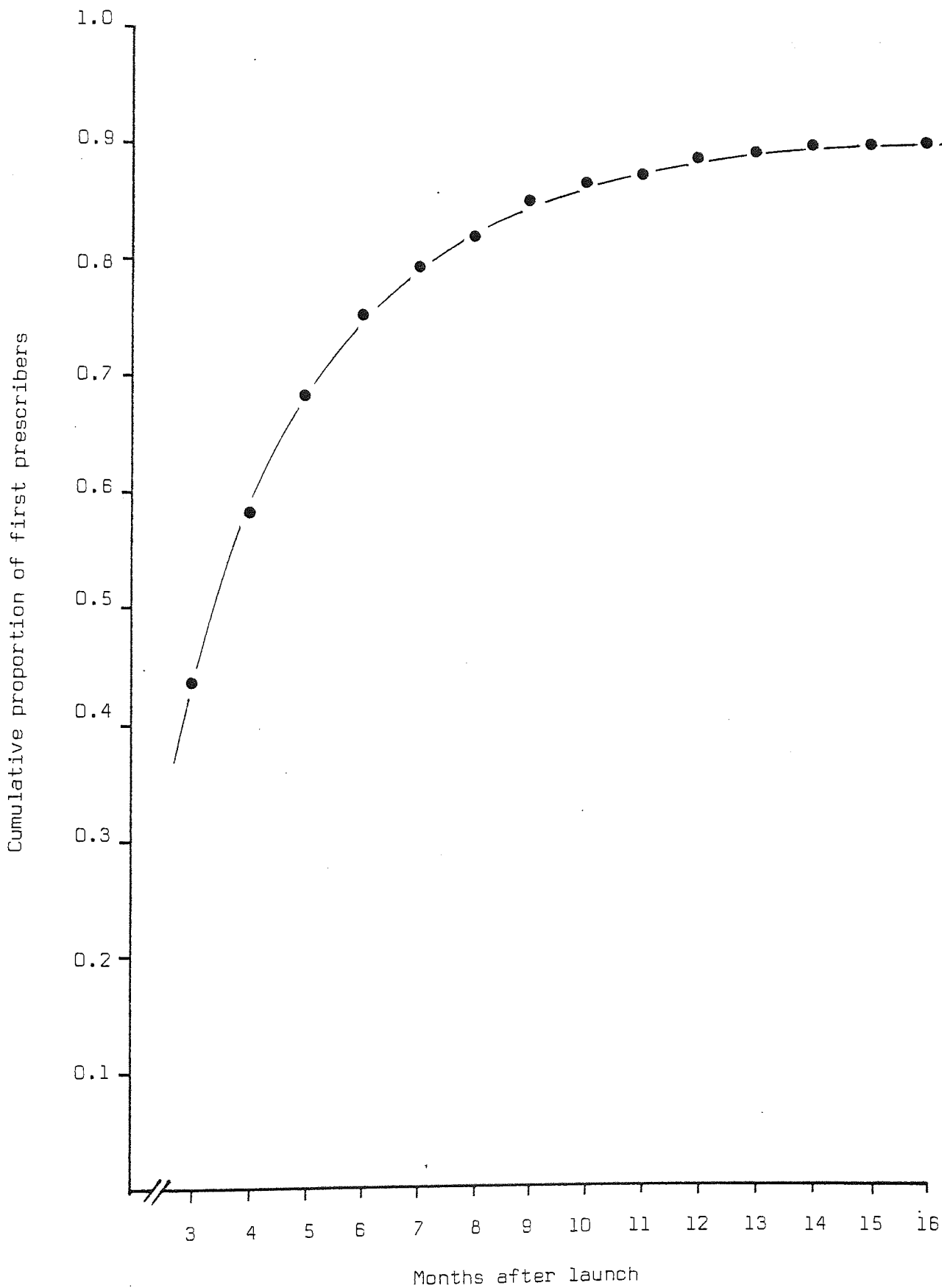
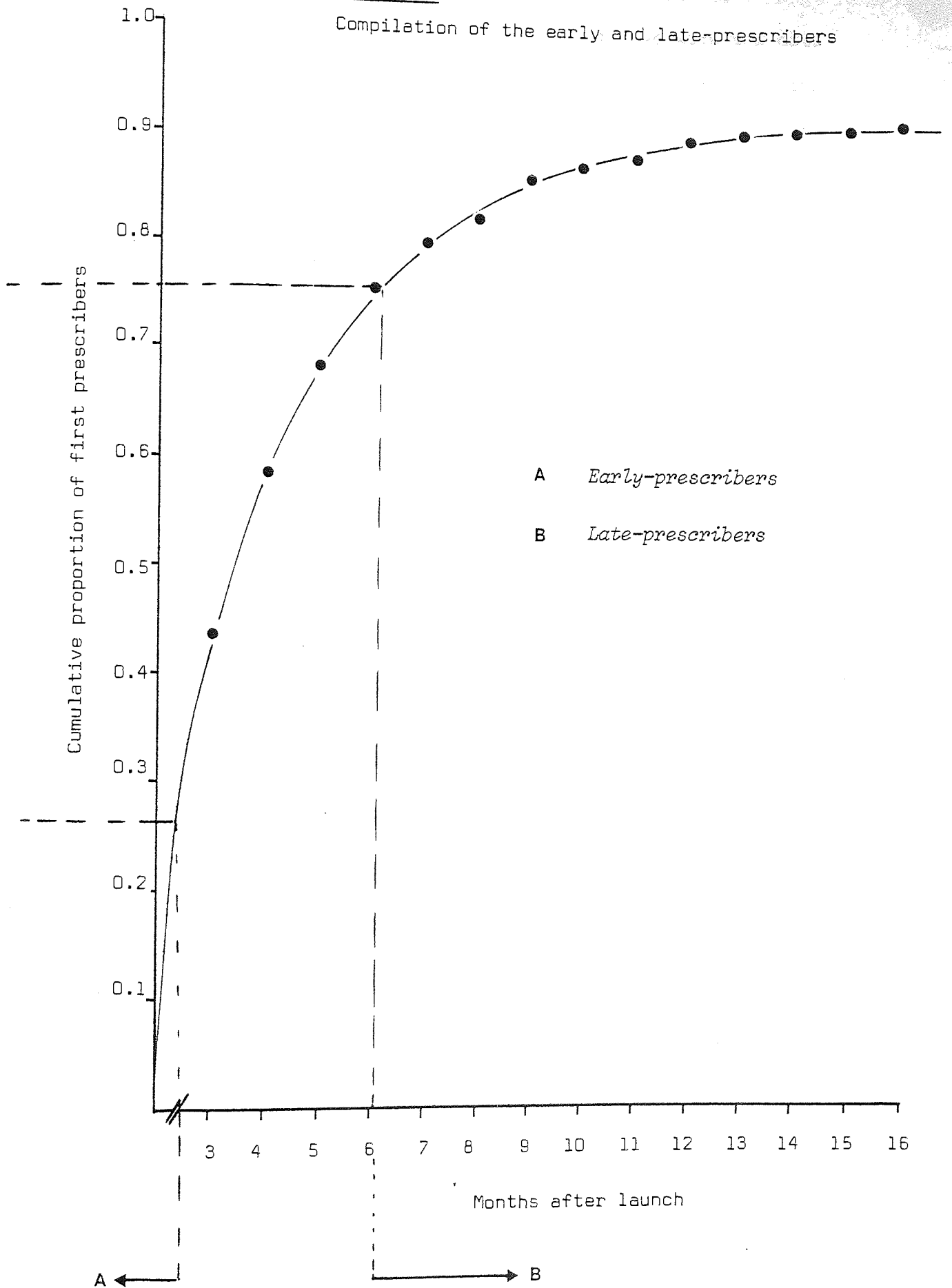


Figure 6.
Compilation of the early and late-prescribers



shows an 'ideal' 'bell-shaped' curve which represented the diffusion of an innovation. This was not obtained with the data for Drug A. This innovation had been used by over 50% of doctors threemonths after the product's launch which was the first date for which figures were available. Had a 'bell-shaped curve' been obtained, Roger's method for identifying the *early-prescribers* would have been used. It was decided to use this cumulative curve (Figure 4) and select the first and last 25% of doctors and call them 'early' and 'late' prescribers, respectively. The final selection was obtained as shown in Figure 6. Thus all doctors who had prescribed the preparation prior to a specific date corresponding to the first quartile of figure 6 and those who had not prescribed the preparation prior to a specific date corresponding to the final quartile of Figure 6 were selected.

This procedure was also carried out for drugs B and C.

The three drugs represented only two therapeutic classes. In order to test hypothesis 24, three more new preparations in different therapeutic classes were selected. These three drugs were monitored for the final three months of the fifteen month study and all doctors who had prescribed them were classified as *early-prescribers*.

Drug A gave the most interesting picture of drug adoption representing, as it does, the acceptance of a therapeutic innovation. The early and late prescribers of Drug A, as previously defined, were each sent a questionnaire. This new questionnaire is shown in appendix 2 and was designed, drawing on the experience of the previous studies. The analysis was carried out to detect differences between the two groups and is discussed fully in the following chapter.

The single practice doctor who prescribed few preparations in a particular therapeutic class was a later prescriber than either single

practice doctors who prescribed heavily in the therapeutic class or joint practice doctors (Coleman J.S. 1966).

In the sample of 434 doctors considered in this study, 117 practised as single practice doctors. Eighty-nine of these were *no-contact* (nc) doctors while the other twenty-eight were 'non-partners' of a group of doctors (s). Figure 7 shows the data for single (s) no contact (nc) and joint practice doctors as a proportion of first time prescribers of drug A against time. (cf Figure 21 Coleman J.S. 1966 Appendix 4).

In Figure 7 the curve for single practice (s) doctors is unexpected. The number of prescribers in this 'class' totalled only 27 and the large proportional increase between months 7 and 8 are due to the addition of only two new prescribers. As the single practice doctors have been defined as non-partners in a group practice, they have been added to the data for the joint practice doctors to produce Figure 8.

Coleman used shared and non-shared offices as the variables. However, the principle of information transfer networks is the same.

Figure 8 shows that a greater proportion of joint practice doctors used the drug sooner than no-contact doctors. This is in agreement with Coleman's findings. Coleman goes on to show that integration is the most important single factor in influencing drug adoption. His views are validated from the different shapes of his graphs 21, 22 and 23 (these graphs are reproduced in appendix 4). These figures divided doctors into 'integrated' and non-integrated' and measured their acceptance of the new drug. The only measure of integration and non-integration in this work is the variable 'partnership number'. (See Figure 8). These two curves, though spatially displaced are

Figure 7.

Graph to show the effect of "partnership number" on the prescribing of Drug A.

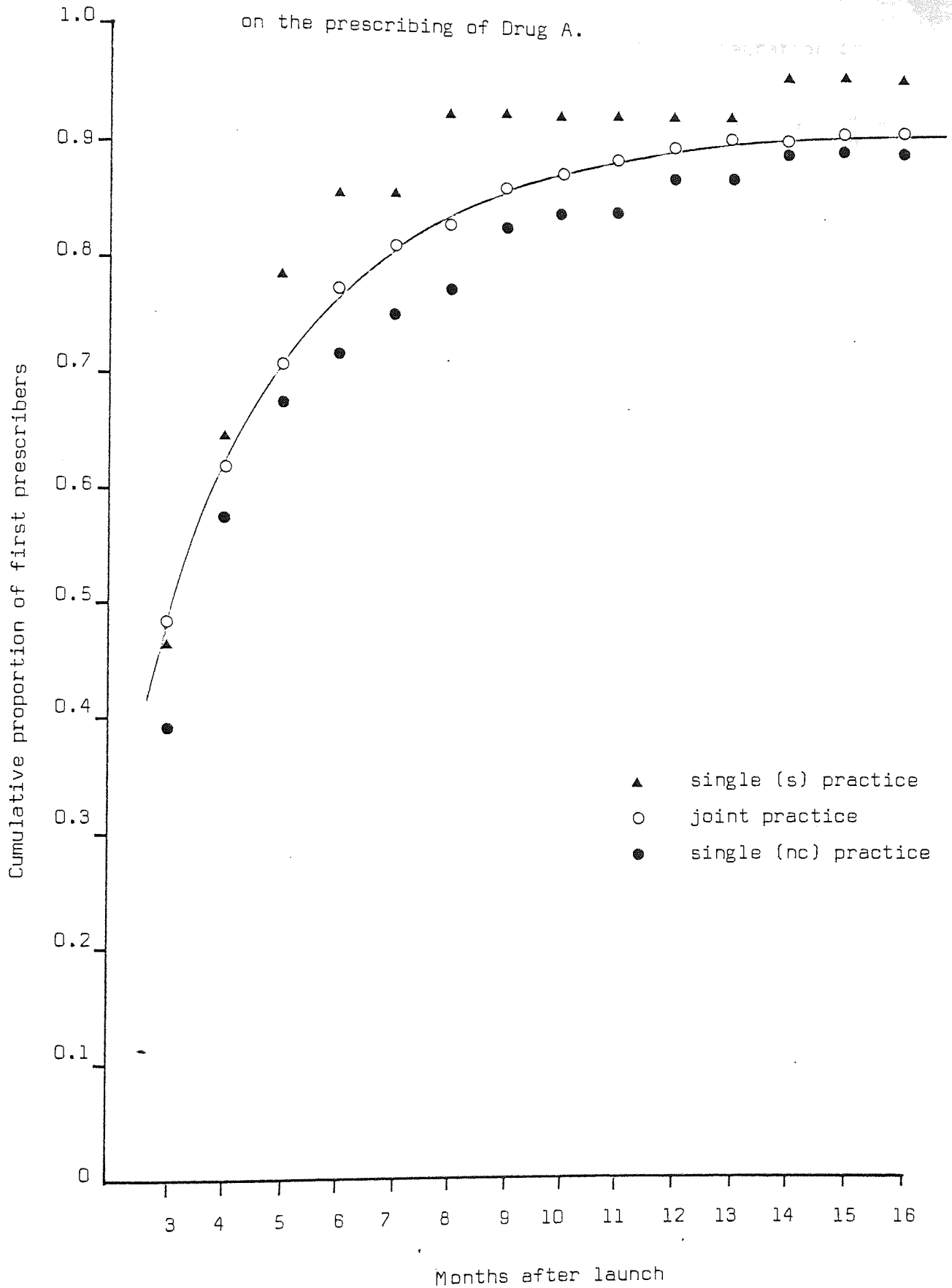
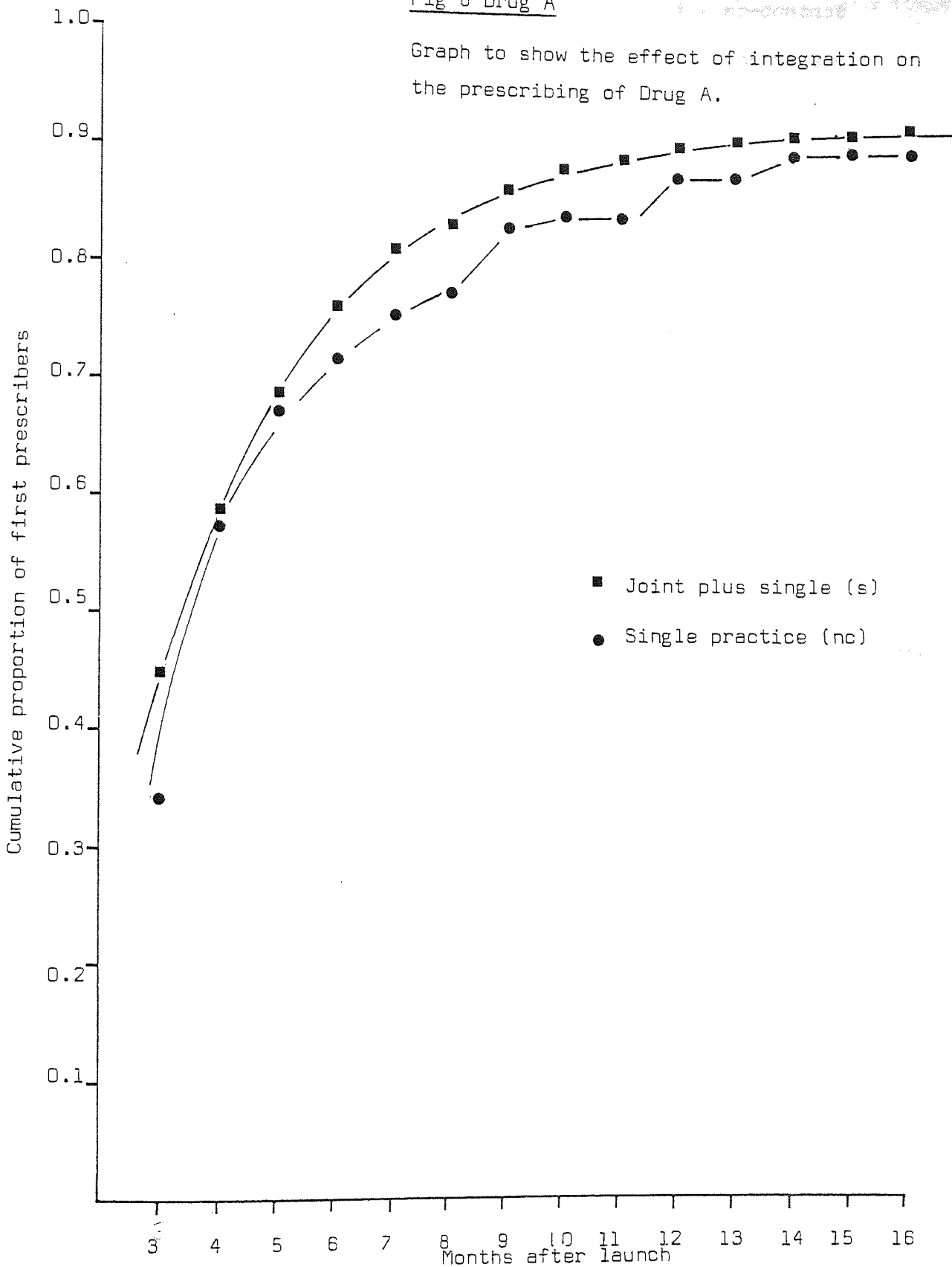


Fig 8 Drug A

Graph to show the effect of integration on the prescribing of Drug A.



of comparable shape and it should be noted that the *no-contact* doctors show a 'stepped' increase at about the ninth month after launch. This will be considered again later.

From Figure 8, the divergence of the *no-contact* doctors at the fifth month would seem to agree with Coleman's theory that there are two theoretical models of the diffusion process. The obvious difference between the two groups is their degree of integration. The sudden increases during the ninth, twelfth and fourteenth month after the drug's launch, which is shown only in the *no-contact* group is an interesting anomaly. (See also Figure 4a).

The company manufacturing the product was contacted and asked for any comments. The marketing department examined their own market research data and also demonstrated this increase, although which particular group of doctors was producing the increase was not possible to ascertain. The company maintain that although advertising was increased and altered at about the sixth month after launch, no specific changes in field personnel were made.

From Figure 8 and from the knowledge that prior to prescribing, risk must be decreased to an acceptable level, the step increase noted must be considered to be due to increased visiting by the company representative. In chapter 2 it was shown that single practice doctors rate representatives significantly higher than joint practice doctors for evaluating a new product.

One more visit by the representative may offset possible perceived risk in prescribing new drugs. One more threshold may be reached and one more new prescriber may be initiated. The representative's influence in the joint practice context will be

diluted due to the additional possibilities of lowering the perceived risk by other 'more acceptable' means. It would seem likely, therefore, that there was increased representative activity between the eighth and ninth month after launch which showed greatest influence in the isolated doctor situation. The company cannot verify or counter this possibility.

Coleman concluded that there are two processes of diffusion; a contagious or 'snow-ball' effect for joint practice doctors, and an individual process for single practice doctors. Considering Figure 21, (Coleman J.S. 1966 p. 83) (See appendix 4) very little difference other than spatial difference can be noted - both appear to be a chain reaction. Figure 23 shows a greater difference and may indicate a two system process.

Figure 8 in the current work could not be said to be direct evidence of such a two part process - both curves follow very similar paths. It is the stepping effect which is anomolous and it would be interesting to know whether, finding *no-contact* prescribers reaching saturation early, caused the company to suggest more frequent representative visits to these doctors. This increased detailing, thereby caused the curves to again follow similar paths. Direct evidence for this is not available.

Is there some other common factor which links *no-contact* doctors together which may be the cause of the differences (even if the difference may be only small)? If Coleman's samples were so different, was there another underlying variable which may have been responsible apart from the isolation variable? Future studies may answer these points.

The three major hypotheses of this study were outlined on page 136. In order to test the first, three drugs in three different therapeutic classes to the first three drugs of study, were considered. All

early-prescribers were selected and compared. The results form an additional section to chapter 6. (See page 239).

The second and third hypotheses could not be answered using information from the data gathered at the PPA. In order to test them, an investigation using the PD2 exercise as outlined on page 132 was undertaken.

As was stated, the prescriptions issued by all practitioners in a particular month in a particular Area are studied annually. Notification that the Birmingham Area sample was being considered was given by the local PPA. This sample of approximately 600,000 prescriptions, in 500 doctor-order bundles was stored at the 'head-office' of the PPA in Newcastle. Each doctor was considered separately. Initially details of his location, list size, prescription number, name, code number and position in the partnership, where appropriate, were taken.

Each bundle was then untied and sorted into five 'therapeutic' groups. These groups corresponded to the groups represented by the six drugs now under study. (Drugs A, B and C in the first study were in two therapeutic classes, and the new drugs D, E and F in three more classes). In addition, all new drugs were removed from the bundles and noted. (*New drugs here were defined as those preparations which had an inverted triangle included in their entries in the edition of Mims corresponding to the sample month*). The prescriptions in each of the five bundles so produced were counted and the number of *different* preparations were also counted. Account was taken of the possibility that two or more items in two or more of the therapeutic classes under study were written on the same prescription form. Account was also

taken of prescriptions for new drugs which were also members of one or more of the therapeutic classes being studied.

The total number of prescriptions and the total number of different items issued in each of the five therapeutic classes was added to the previously gathered data on preprinted coding forms.

The whole study lasted for sixty ten hour days and was carried out in the Newcastle office. The list of doctors was reduced to four hundred and thirty-four as before. The two files, one from the local office and one from Newcastle, were next merged.

A frequency distribution for each therapeutic class using the total numbers of preparations issued in each group was produced. The median value was calculated and the doctors who came within the group, one standard deviation unit higher than this value were termed *high-prescribers*; those who came within the standard deviation unit on either side of the median value were termed *medium-prescribers* and the remainder were called *low-prescribers*. This differentiation was added to a file maintained for each prescriber in the sample which had been produced as the study progressed.

This file contained the doctors name; sex; year of graduation; qualifications; school of graduation; list size and registered patient number from the PD2; number of new preparations issued in the sample month; *high*, *medium* and *low* definition for each therapeutic class; number of different preparations in each therapeutic class and number of partners in the practice. These details were compared with *early* and *late-prescribing* for each preparation in turn. These results are considered in chapter 6.

Drug totals for A, B and C

The total number of dosage units issued for each of the three

new drugs for each month was calculated and a plot of the cumulative figure versus time was prepared. (Figures 9 and 10). The plot for drug A can fairly be described as the plot of the adoption of an innovation. It differs from the plots for B and C and indicates that information transfer is also of two types, depending upon the drug in question. An innovation is accepted via a contagion effect, information rapidly spreading among the prescribers who probably discussed results with colleagues socially as well as professionally.

For Drugs B and C the plot shows a slow increase indicating a singular lack of contagion. The process is probably one to one via the representative or discrete 'packages' of information. The 'uniqueness' of the products B and C does not appear to have captured the imagination of the prescribers to the point where they impress its usefulness upon their colleagues.

The assumed asymptote of figure 4 for Drug A was 402, an increase in only one prescriber. When the number of prescribers each month was subtracted from the asymptote and plotted on three-cycle semi-logarithmic paper with the date as the abscissae, a graph approximating to a straight line was obtained. (See Figure 11). It is therefore suggested that if a graph is obtained by the above method for a new drug corresponding to formula 1, then this new

$$\text{Formula 1 (exponential)}$$
$$\left(y_{x=\infty} - y \right) = \left(y_{x=\infty} - y_{x=0} \right) e^{-kt}$$

drug can be defined as an 'innovation' or it has been accepted as an innovation by the community of prescribers. It is also concluded that the *drug* in question is the single most important factor in influencing the adoption of a new preparation. It may be the way

the preparation is viewed by the community rather than necessarily being some intrinsic quality of the compound.

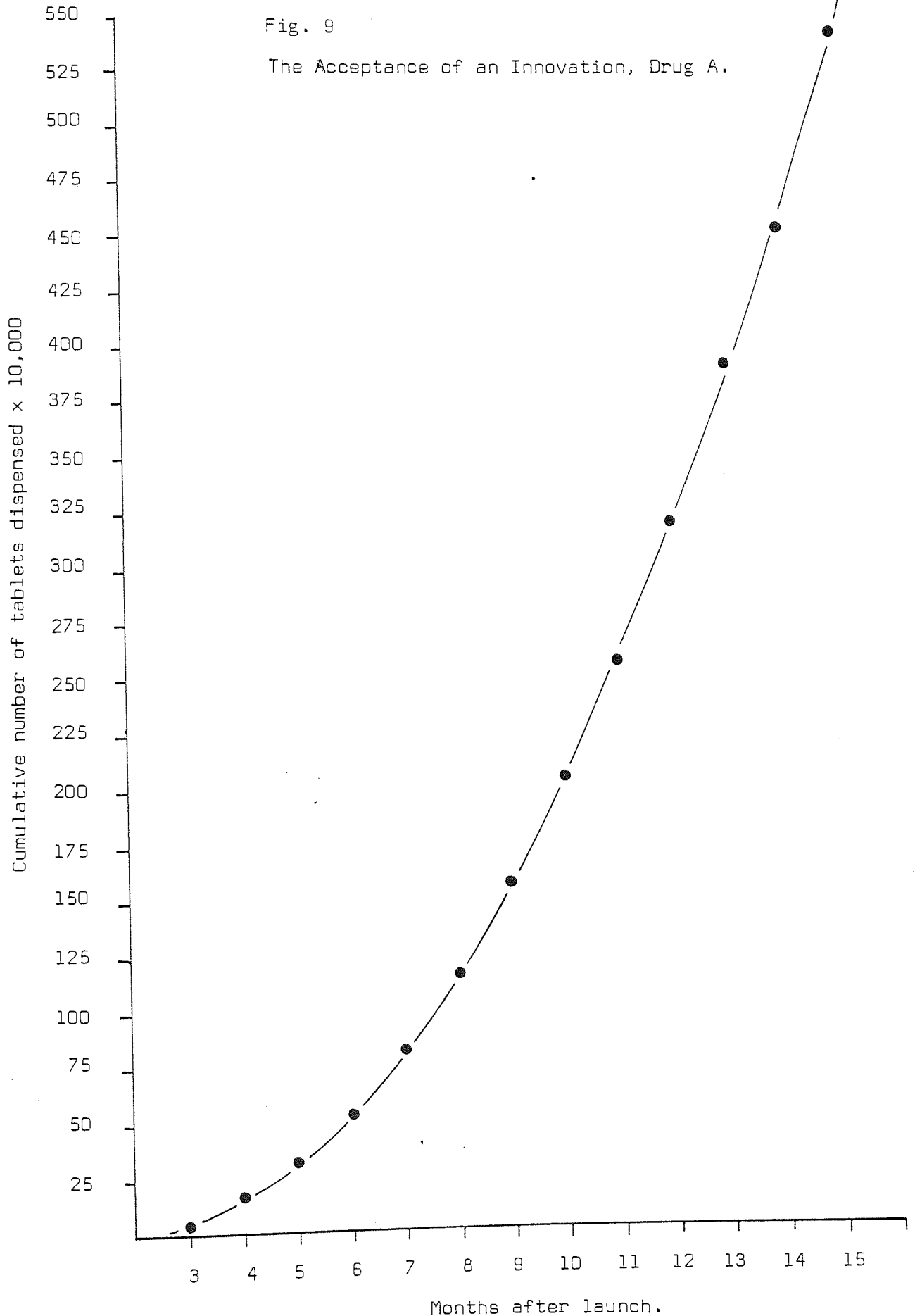


Fig. 10

The Acceptance of Minor Innovations
Drugs B and C.

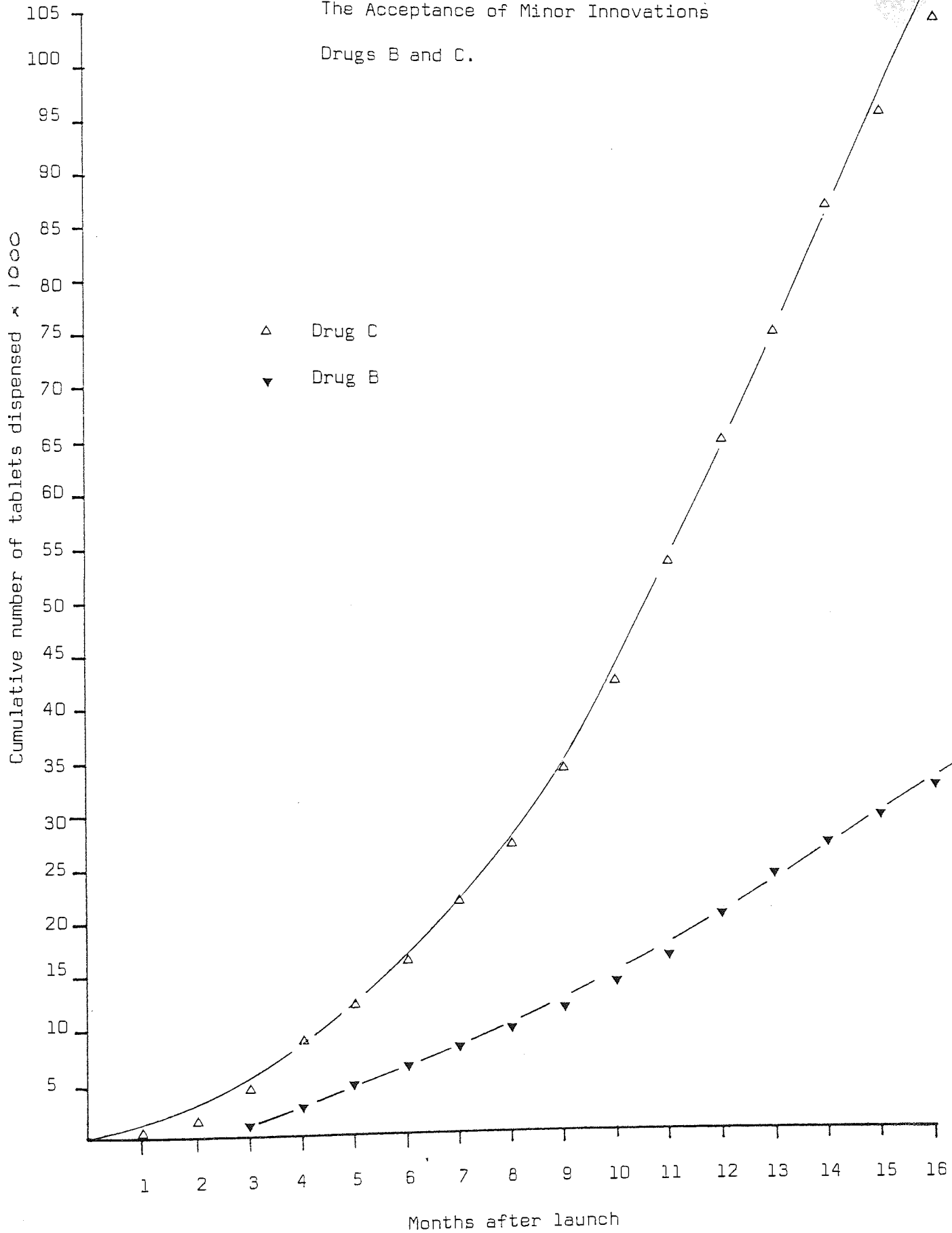
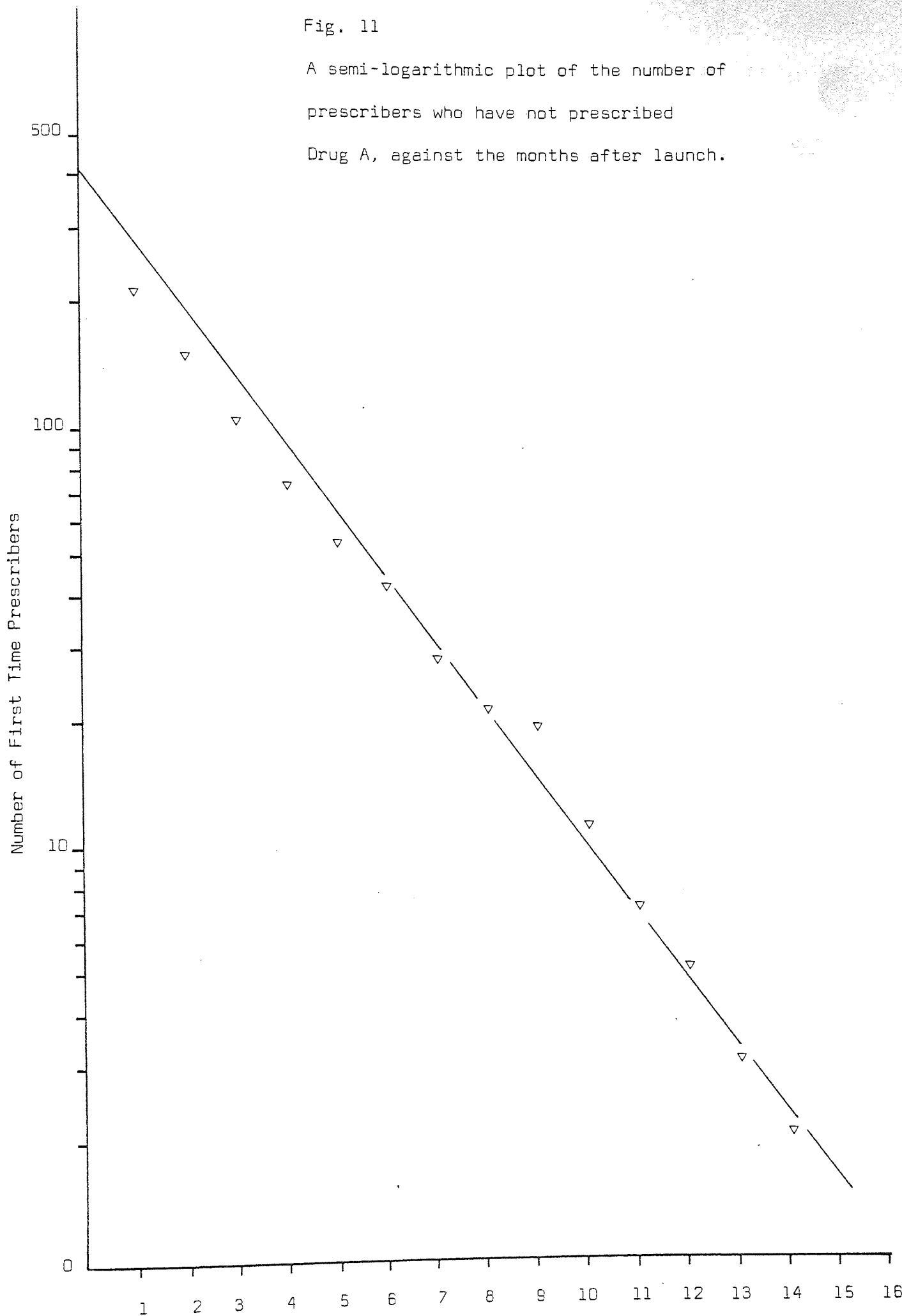


Fig. 11

A semi-logarithmic plot of the number of prescribers who have not prescribed Drug A, against the months after launch.



Chapter 4

Early and Late Prescribers

In the previous chapter a method of selecting early and late prescribers was outlined. The basic principle was to monitor new drugs for a period of time using prescriptions issued by general practitioners. A plot of the cumulative number of new (first time) prescribers against the date on which the first prescription was issued, was produced (Fig. 6).

The first quartile was taken as representing *early-prescribers* and the last quartile as *late-prescribers*. (This included some who had not prescribed the preparation within the duration of the study, and who, for some of the study, have been considered separately).

The data obtained by this method (See Figure 6) was used to obtain the names of the prescriber, using one of the basic sorts corresponding to date order and within date, doctor order. A questionnaire was designed to attempt to highlight any differences between the two groups of *early* and *late-prescribers*. As can be seen from appendix 2, questionnaire 2 is a modification of questionnaire 1. The list of possible information sources has been expanded and there are sections more concerned with the way information is handled.

Each doctor in the *early-prescriber* group and each in the *late-prescriber* group were sent the questionnaire and approximately fifty per cent responded. Certain details concerning each prescriber were noted from the Family Practitioner Committee Medical List and the General Medical Council Medical Register. These details were added to record cards and certain analyses were carried out using them.

A straight comparison using the proportions test, 'T' test or chi-square test (see appendix 3) was carried out between the early and late groups, and differences were noted.

Two variables, "list-size" and "prescriptions issued per month" were obtained from the PD2 study of the Prescription Pricing Authority described in the previous chapter.

With a response rate of 50% a certain confidence could be assumed as to the representative nature of the sample. However, as certain details of each prescriber were known for the two complete groups, variables could be compared between responders and non-responders. The variables chosen were sex, educational qualifications the number of years qualified and the 'partnership number'. Responders in the *early-prescribers* category were compared with the non-responders in the same category; similarly with the *late-prescribers*. Tables 39 to 42 give the results in tabular form. The 'Z' value gives the statistical significance (if Z is greater than 1.96 then it can be concluded that there is a significant difference at the 5% significance level between those who responded and those who did not.)

Table 39

| | | <u>Sex of doctor</u> | | | |
|-----------------|--------|--------------------------|---------|-------------------------|---------|
| | | <u>Early-prescribers</u> | | <u>Late-prescribers</u> | |
| | | Number | Percent | Number | Percent |
| Respondents | Male | 40 | 87% | 38 | 76% |
| | Female | 6 | 13% | 12 | 24% |
| Non-respondents | Male | 35 | 79% | 32 | 80% |
| | Female | 9 | 21% | 8 | 20% |

Z < 1.96 therefore no significant differences at the 5% level were noted.

As in chapter 2, the educational qualifications were divided into MB ChB or equivalent. Member or Fellow of the Royal College

of General Practitioners and specialist qualifications such as MD, FRCS or MRCP. Table 40 shows the comparison as before.

Table 40

Education

| | | <u>Early-prescribers</u> | | <u>Late-prescribers</u> | |
|-----------------|-----------------|--------------------------|---------|-------------------------|---------|
| | | Number | Percent | Number | Percent |
| Respondents | MBChB or equiv. | 38 | 83% | 42 | 84% |
| | MRCGP | 5 | 11% | 7 | 14% |
| | Specialist | 3 | 6% | 1 | 2 |
| Non-respondents | MB ChB | 39 | 89% | 34 | 85% |
| | MRCGP | 3 | 7% | 3 | 7.5% |
| | Specialist | 2 | 4% | 3 | 7.5% |

$Z < 1.96$. No significant differences were noted.

The number of years a doctor has been qualified is a factor to be considered. The average number of years the *early* and *late-prescribers* had been qualified was calculated for the responders and the non-responders.

Table 41

Years qualified

| | <u>Early-prescribers</u> | <u>Late-prescribers</u> |
|---------------------------|--------------------------|-------------------------|
| Respondents | 21.43 | 22.12 |
| <i>standard deviation</i> | 9.24 | 11.99 |
| Non-respondents | 21.8 | 25.42 |
| <i>standard deviation</i> | 9.56 | 12.02 |

Using the 't' test $t < 1.96$. No significant differences were noted.

Table 42

| | <u>Partnership Number</u> | | | | |
|-----------------|---------------------------|--------------------------|---------|-------------------------|---------|
| | <u>Number of partners</u> | <u>Early-prescribers</u> | | <u>Late-prescribers</u> | |
| | | Number | Percent | Number | Percent |
| Respondents | 1 | 10 | 22% | 8 | 16% |
| | 2 | 9 | 20% | 13 | 26% |
| | 3 or 4 | 19 | 41% | 19 | 38% |
| | 5 or more | 8 | 17% | 10 | 20% |
| Non-respondents | 1 | 10 | 23% | 8 | 20% |
| | 2 | 15 | 34% | 13 | 32% |
| | 3 or 4 | 16 | 36% | 15 | 38% |
| | 5 or more | 3 | 7% | 4 | 10% |

Z < 1.96. No significant differences between the two groups were noted.

Four variables were used as a guide to the representative nature of the respondents as a sample of the population of *early* and *late* prescribers. From the results it can be concluded that results from the sample of questionnaires will be representative of the *early* and *late-prescribers'* population from which they were received.

The drug chosen for this part of the study (Drug A) was a major innovation. It can be argued that results obtained will only represent similar drugs. To see if there was a difference between *early* and *late-prescribers* of an innovation and other new drugs, the data for drugs B and C outlined in the previous chapter were studied.

Table 43

Sex of doctor

| Drug | Sex | <u>Early-prescribers</u> | | <u>Late-prescribers</u> | |
|------|--------|--------------------------|---------|-------------------------|---------|
| | | Number | Percent | Number | Percent |
| A | Male | 75 | 83% | 70 | 78% |
| | Female | 15 | 17% | 20 | 22% |
| B | Male | 18 | 90% | 15 | 75% |
| | Female | 2 | 10% | 5 | 25% |
| C | Male | 36 | 82% | 36 | 82% |
| | Female | 8 | 18% | 8 | 18% |

In all cases of comparison (A to B, B to C, and A to C), Z was < 1.96. No significant differences were noted.

Table 44

Qualifications

| Drug | Qualifications | <u>Early-prescribers</u> | | <u>Late-prescribers</u> | |
|------|--------------------|--------------------------|---------|-------------------------|---------|
| | | Number | Percent | Number | Percent |
| A | MB. Ch.B or equiv. | 77 | 85% | 76 | 84% |
| | MRCGP | 8 | 9% | 10 | 11% |
| | Specialist | 5 | 6% | 4 | 5% |
| B | MB Ch.B or equiv. | 18 | 90% | 19 | 95% |
| | MRCGP | 1 | 5% | 0 | 0% |
| | Specialist | 1 | 5% | 1 | 5% |
| C | MB. Ch.B or equiv. | 35 | 79% | 40 | 91% |
| | MRCGP | 6 | 14% | 3 | 7% |
| | Specialist | 3 | 7% | 1 | 2% |

Z < 1.96 no significant differences were noted.

Table 45

Years Qualified

| <u>Drug</u> | <u>Early-prescribers</u> | <u>Late-prescribers</u> |
|---------------------------|--------------------------|-------------------------|
| A | 21.6 | 23.6 |
| <i>standard deviation</i> | 9.5 | 12.11 |
| B | 22 | 24 |
| <i>standard deviation</i> | 10.17 | 11.7 |
| C | 21.2 | 23 |
| <i>standard deviation</i> | 10.62 | 11.25 |

Using 't' test $t < 1.96$. No significant differences were noted.

Inasfar as the above comparisons test the main characteristics of the sample, the fact that they all show no significant differences leads to the conclusion that the results from the sample derived from data referring to Drug A should be representative of results for *early* and *late-prescribers* of new drugs in general.

The hypotheses which were formulated and around which the questionnaire was designed, generally took into account the results obtained in chapter 2. The final discussion is considered after the hypotheses.

Please note that all italicised percentages placed beneath numbers in the following tables refer to row percentages.

Hypothesis 27

Female doctors are more likely to be late-prescribers than male doctors.

All prescribers who have not removed their names from the mailing lists, receive very similar amounts of drug information. It may be that any differences will be a function of the personality, all other variables being randomly distributed throughout both groups. The sex of a doctor may be a determining factor in the personality function. Female doctors are likely to see more female patients than their male colleagues, and thus may have fewer patients for whom Drug A is indicated.

(Generally Drug A is used more for males than females).

Mapes (1977b) considered that there was a difference in the prescribing habits of female doctors as compared to males but Cull (1977) found no correlation.

Tables 46, 47, 47a were derived from data obtained for the complete group of respondents and non-respondents using the FPC Medical List and Medical Register.

Table 46

| | <u>Sex of Doctor</u> | | <u>Late Prescribers:</u> | |
|--------|--------------------------|------------|--------------------------|------------|
| | <u>Early Prescribers</u> | | Number | Percentage |
| | Number | Percentage | Number | Percentage |
| Male | 75 | 83% | 70 | 78% |
| | (52%) | | (48%) | |
| Female | 15 | 17% | 20 | 22% |
| | (43%) | | (57%) | |

Using the proportions test $Z < 1.96$ therefore the hypothesis is rejected at the 5% significance level.

In chapter 2 single-practice doctors were found to prescribe new drugs more often than joint practice doctors. Coleman et al (1966) considered that the more integrated doctor (joint practice) was more likely to prescribe new drugs than the non-integrated doctor (single practice).

Hypothesis 26

The single practice doctor will be an early-prescriber more often than joint practice doctors.

Table 47

Partnership Number

| Partnership Number | <u>Early-prescribers</u> | | <u>Late-prescribers</u> | |
|--------------------|--------------------------|---------|-------------------------|---------|
| | Number | Percent | Number | Percent |
| Single practice | 20 (55%) | 22% | 16 (45%) | 18% |
| 2 | 24 (48%) | 27% | 26 (52%) | 30% |
| 3 to 4 | 35 (51%) | 39% | 34 (49%) | 36% |
| 5 and over | 11 (44%) | 12% | 14 (56%) | 16% |

Using the proportions test at the 5% level of significance there is no difference between partnership number for *early* or *late-prescribers*.

The group labelled 'single-practice' was divided as before, into 'no-contact' single practice and 'contact' single practice. Table 47a shows this comparison.

Table 47a

'Single Practice'

| Single Practice | <u>Early prescriber</u> | | <u>Late prescriber</u> | |
|-----------------|-------------------------|---------|------------------------|---------|
| | Number | Percent | Number | Percent |
| No-contact | 11 (50%) | 12% | 11 (50%) | 12% |
| Contact | 9 (64%) | 10% | 5 (36%) | 6% |
| Others | 70 (49%) | 78% | 74 (51%) | 82% |

In Table 47a it can be seen that there are the same number of *early* and *late-prescribers* in the 'no-contact' single practice group whereas there are slightly more *early-prescribers* in the 'contact' single practice group. Using the proportions test, there were no significant differences noted.

Hypothesis 29

Newly qualified doctors will tend to be late-prescribers.

From chapter 2 doctors who had been qualified for the shortest length of time had prescribed the new drugs less often than their colleagues. Age, or 'medical age' is considered by the majority of researchers to be an important variable.

In chapter 2 page 81 'newly qualified' was defined as having been fully registered for five years or less. In Table 48, a slight change has been made.

Table 48

Years qualified

| Number of years qualified | <u>Early prescriber</u> | | <u>Late prescriber</u> | |
|---------------------------|-------------------------|---------|------------------------|---------|
| | Number | Percent | Number | Percent |
| 10 or less | 12 (40%) | 13% | 18 (60%) | 20% |
| 11 to 30 | 61 (59%) | 68% | 43 (41%) | 48% |
| 31 or over | 17 (37%) | 19% | 29 (63%) | 32% |

Using the proportions test on each subdivision there is no significant difference between the *early* and *late-prescribers* for the newly qualified doctors. However, there are significant differences in the other groups.

The middle group (11 to 30 years qualified) contain significantly more *early-prescribers* than *late-prescribers*. In the older group (31 and more years qualified) there are significantly more *late-prescribers* than *early-prescribers*. When the doctor is first qualified it may be that he prescribes new drugs in accordance with the practice as a whole. Once the doctor has been qualified for more than thirty years he becomes more conservative and prescribes less new drugs. The *early-prescribers* come predominantly from those doctors who have been qualified between eleven and thirty years. Fifty nine percent of that group were *early-prescribers*. This aspect will be discussed later.

Hypothesis 30

Highly qualified practitioners will be more likely to be late prescribers than their colleagues.

The influence of education was discussed in chapter 2 page 85 the results from which led to the hypothesis.

Table 49

| Qualification | <u>Qualification</u> | | <u>Qualification</u> | |
|----------------------|--------------------------|---------|-------------------------|---------|
| | <u>Early-prescribers</u> | | <u>Late-prescribers</u> | |
| | Number | Percent | Number | Percent |
| MB ChB or equivalent | 77 (50%) | 85% | 76 (50%) | 85% |
| MRCGP or equivalent | 8 (44%) | 9% | 10 (56%) | 11% |
| FRCS, MRCP or MD | 5 (55%) | 6% | 4 (45%) | 4% |

Using the proportions test there was no significant differences noted, therefore the hypothesis is rejected.

Hypothesis 31.

Members of the Royal College of General Practitioners will prescribe new drugs later than non-members.

From Table 49, no significant differences were noted, therefore this hypothesis is also rejected.

Hypothesis 32

The higher the prescribers list size the greater the probability that a doctor will be an early-prescriber.

List size was discussed in chapter 2 page 91. When the one month sample of prescriptions was studied to produce the PD2 (discussed in chapter 3) an accurate measure of the list size was obtained. This was used to test the hypothesis and the results are shown in Table 50.

Table 50

List size

| | <u>Early-prescribers</u> | <u>Late-prescribers</u> |
|--------------------|--------------------------|-------------------------|
| Sample size | 43 | 43 |
| Average list size | 3032 | 2354 |
| Standard deviation | 728 | 1126 |

Using the 't' test $t > 1.96$. At the 5% level of significance, *early-prescribers* have a larger list size than *late-prescribers*, therefore the hypothesis is not rejected.

Hypothesis 33

Graduates of universities which are near to their practice are more likely to be early-prescribers than their colleagues.

The university of graduation was discussed in chapter 2. Coleman et al (1966) suggested the stated hypothesis although the quoted British studies have not produced similar conclusions.

Table 51
University

| University | Early Prescribers | | Late Prescribers | |
|------------------|-------------------|---------|------------------|---------|
| | Number | Percent | Number | Percent |
| Near to Practice | 29 | 32% | 26 | 29% |
| | (52%) | | (48%) | |
| 'Oxbridge' | 3 | 3% | 5 | 5% |
| | (37%) | | (63%) | |
| Other U.K. | 44 | 49% | 45 | 50% |
| | (49%) | | (51%) | |
| Overseas | 14 | 16% | 14 | 16% |
| | (50%) | | (50%) | |

Using the proportions test $Z < 1.96$ and therefore at the 5% level of significance there is no difference between the university of graduation and whether or not the doctor is an early or late prescriber and the hypothesis is rejected.

There are slightly more *early-prescribers* practising near to this university of graduation and there are slightly more *late-prescribers* in the 'Oxbridge' group. The differences were, however, insignificant.

Hypothesis 34

Early-prescribers will rate industrial sources of information more highly than late-prescribers in general.

The ten most popular sources selected by all the respondents are shown in Table 52. The scores and rating given by *early* and *late-prescribers* respectively, are also shown. The 'score' was calculated as previously discussed in chapter 2 grading a first selection as five points down to fifth or lower as one point.

Table 52
First 10 Sources

| Source | <i>Early-prescriber</i> | | <i>Late-prescriber</i> | |
|-----------------------------------|-------------------------|--------|------------------------|--------|
| | Score | Rating | Score | Rating |
| 1. <i>Mims</i> | 159 | 1 | 131 | 3 |
| 2. Articles in Medical journals | 134 | 3 | 140 | 1 |
| 3. Consultant recommendations | 130 | 5 | 137 | 2 |
| 4 = British National Formulary | 131 | 4 | 121 | 5 |
| 4 = Prescribers' Journal | 122 | 6 | 130 | 4 |
| 6. Drug-firm representative | 135 | 2 | 93 | 8 |
| 7. Postgraduate refresher courses | 110 | 7 | 113 | 6 |
| 8. Professional contacts | 98 | 8 | 94 | 7 |
| 9. Data Sheet Compendium | 86 | 10 | 83 | 9 |
| 10. Text-books | 90 | 9 | 74 | 10 |

Overall, there was no significant difference in the way sources were used. However, a number of differences can be observed in the table. Using the 'professional'/'industrial' scoring technique described in chapter 2, *early-prescribers* scored + 15 and *late-prescribers* scored + 29 indicating a preference, by the *early-prescribers* for industrial sources of information. Therefore the hypothesis is not rejected.

The information sources 'drug-firm representative' was considered separately and using the actual score as a proportion of the total possible score (i.e. the total number of early or late respondents was multiplied by the maximum possible score, 5, and used as the denominator while the score attained by the early or late group was used as the numerator). This ratio was tested using the proportions test.

A significant difference was noted and it was concluded that *early-prescribers* rate the representative significantly higher than *late-prescribers*. This is as might be anticipated. The representative is one of the earliest sources of new product information available

to the general practitioner and it seems reasonable to suppose an *early-prescriber* will use the 'early' sources of information.

Each source was then tested in the same way and a further four sources were found to show significant differences.

These were:-

Advertisements in medical journals

Direct mail

Mims

Controlled circulation journals

All sources were given significantly higher scores by *early-prescribers* than by *late-prescribers*. All the sources are 'industrial' and validate the previous conclusion.

Hypothesis 35.

Early-prescribers rate all sources of information used more highly than late-prescribers.

This hypothesis is based on the assumption that *early-prescribers* are less discriminating in general. The total 'early-score' was 1680, the total 'late-score' was 1516. These were not significantly different when tested using the proportions test. The hypothesis is rejected.

Hypothesis 36

Early-prescribers use less sources of information in general, than late-prescribers.

The basic premise which underlies the proposed hypothesis is that the *early-prescriber* has a 'lower threshold' than his colleagues and needs less evaluated information on which to base his decision to prescribe a new drug. The question which began questionnaire 2 appendix 2, asked the doctor to 'rate' sources of information *which he used*. The total number of sources used by each group was calculated

and is presented in Table 53.

Table 53
Number of sources used

| <u>Prescriber</u> | <u>Number of sources used</u> |
|-------------------|-------------------------------|
| Early | 527 |
| Late | 525 |

No significant difference was noted, therefore the hypothesis is rejected.

Hypothesis 37

Early-prescribers cite different sources of information as being useful at the awareness and evaluation stages of drug adoption compared to late-prescribers.

Table 54
Awareness

| <u>Source of information</u> | <u>Early rating</u> | <u>Late rating</u> |
|------------------------------|---------------------|--------------------|
| Drug firm representatives | 1 | 1 |
| Articles in medical journals | 2 | 3 |
| Consultant recommendations | 3 | 2 |
| Direct mail | 4 | 5 |
| <i>Mims</i> | 5 | 4 |

Table 55
Evaluation

| <u>Source of information</u> | <u>Early prescribers rating</u> | <u>Late prescribers rating</u> |
|--------------------------------|---------------------------------|--------------------------------|
| Consultant recommendation | 1 | 2 |
| Articles in medical journals | 2 | 1 |
| Prescribers' Journal | 3 | 3 |
| Drug firm representative | 4= | 4= |
| Postgraduate refresher courses | | |

These two tables (54 and 55) show the way in which *early* and *late-prescribers* choose sources of information for finding out about and evaluating new drugs. The ratings are very similar and a chi-square test on the actual number of citations showed no significant differences. The hypothesis is therefore rejected.

Hypothesis 38

Fewer sources of information will be cited as useful for further information by early-prescribers.

Table 56

Total number of sources chosen for further information

| | |
|-------|----|
| Early | 61 |
| Late | 57 |

There is no significant difference between the two groups, thus the hypothesis is rejected.

Hypothesis 39

Late-prescribers use the C.S.M. yellow card method of reporting adverse drug reactions more than early-prescribers.

'Risk' is assessed differently by *early* and *late-prescribers*.

(Cull M 1977) and the possibility of adverse drug reactions is the most common reason for not adopting a new drug (Cluff L.E. 1967).

It is therefore assumed that the prescribers who do not prescribe a new drug early will be those who report adverse reactions more often.

Table 57

C.S.M. (Committee on Safety of Medicines)

"Have you ever used the C.S.M. yellow card method of adverse drug reaction reporting?"

| | <u>Number and percentage of citations</u> | | | |
|-----|---|-----|-------------------------|-----|
| | <u>Early-Prescribers</u> | | <u>Late-prescribers</u> | |
| Yes | 22 (48%) | 51% | 26 (52%) | 57% |
| No | 21 (52%) | 49% | 20 (49%) | 43% |

There was no difference between the two groups at the 5% level of significance. The hypothesis is therefore rejected.

The mean number of C.S.M. reports for *early-prescribers* was 1.3 and for *late-prescribers* it was 1.6. This is an insignificant difference.

Hypothesis 40

Late-prescribers are more likely to use additional methods of reporting adverse drug reactions.

Table 58

| Do you use other methods of reporting adverse drug reactions? | <u>Early Prescribers</u> | | <u>Late prescribers</u> | |
|---|--------------------------|---------|-------------------------|---------|
| | Number | Percent | Number | Percent |
| Yes | 11 (59%) | 26% | 8 (41%) | 18% |
| No. | 32 (46%) | 74% | 37 (54%) | 82% |

The difference is insignificant at the 5% level. The hypothesis is therefore rejected.

Hypothesis 41

Early-prescribers are more likely to consider that the data sheet contains enough information from which to prescribe a new drug than late-prescribers.

The data sheet contains all information available concerning dosage, indications, contraindications, side effects, etc., which were available at the time the product licence was given. Revised data sheets can be issued if additional new relevant information becomes available. The data sheet does not have independently evaluated information following extensive use.

The data sheet can be considered to contain the minimum information necessary upon which to form a prescribing decision.

The data sheet must be the *first* item of information sent or taken to a general practitioner by a manufacturer after a drug has been launched. It was considered likely that *early-prescribers* would respond to question 8 (questionnaire 2) more positively than *late-prescribers*.

Table 59

Data sheet use

"In general, does the data sheet provide you with enough information from which to prescribe a new drug?"

| Response | Early-prescriber | | Late-prescriber | |
|----------|------------------|---------|-----------------|---------|
| | Number | Percent | Number | Percent |
| Yes | 37 (57%) | 88% | 36 (49%) | 80% |
| No | 5 (36%) | 12% | 9 (64%) | 20% |

There was no significant difference at the 5% significance level. The hypothesis is therefore rejected.

Hypothesis 42

Direct mail will be read more by early than late-prescribers.

Direct mail is industrial promotion. Its use is discussed in the introduction, chapter 1.

Table 60 shows the response to the question:-

"Do you read direct mail (through the post) pharmaceutical company mailings? "

Table 60

Direct mail

| Response | Early-prescribers | | Late-prescribers | |
|----------|-------------------|---------|------------------|---------|
| | Number | Percent | Number | Percent |
| Yes | 29 (60%) | 67% | 19 (40%) | 42% |
| No | 14 (35%) | 33% | 26 (65%) | 58% |

At the 5% level of significance *early-prescribers* read more direct mail than *late-prescribers*. The hypothesis is not rejected.

Hypothesis 43

Early prescribers will use consultant-recommended products for other patients more often than late-prescribers.

Another assumption made to formulate the hypothesis is that the *early-prescriber* needs less information of any kind prior to prescribing. It was considered possible that a recommendation from a consultant would lead to the addition of the new product to the *early-prescribers'* repertoire whereas the late-prescriber uses the recommended product only for the patient concerned. Table 61 tabulates the results.

Table 61
Consultants

"If a patient has been referred to hospital and returns with a consultant recommendation for a new product which you have not previously prescribed, have you subsequently prescribed the new product for other patients when indicated?"

| | <u>Early-prescriber</u> | | <u>Late-prescriber</u> | |
|-----|-------------------------|---------|------------------------|---------|
| | Number | Percent | Number | Percent |
| Yes | 42 (57%) | 95% | 41 (49%) | 91% |
| No | 2 (33%) | 5% | 4 (67%) | 9% |

There was no significant difference at the 5% level therefore the hypothesis is rejected.

Hypothesis 44

Late-prescribers are more likely to substitute a consultant recommended preparation for a better known product.

For the hypothesis, it was considered that if a product was unknown to a prescriber but was recommended by a consultant, then this would be sufficient for the *early-prescriber* to formulate a

prescribing decision but not sufficient for the *late-prescriber*.

Table 62

Substitution of consultants recommended preparation

"Have you ever felt it necessary to substitute the recommended product for one with which you are more familiar?"

| | <u>Early-prescribers</u> | | <u>Late-prescribers</u> | |
|-----|--------------------------|---------|-------------------------|---------|
| | Number | Percent | Number | Percent |
| Yes | 31 (52%) | 70% | 29 (48%) | 64% |
| No | 13 (45%) | 30% | 16 (55%) | 36% |

There was no significant difference noted at the 5% significance level, therefore the hypothesis is rejected.

Hypothesis 45

Early-prescribers read less journals than late-prescribers.

It was stated in the introduction that reading journals and evaluating information in general, was the preferred method of reducing 'perceived risk'. It has been assumed that *early-prescribers* require less information, particularly of the evaluated kind, upon which to formulate a prescribing decision. Table 63 indicates the results.

Table 63

Journal reading

(For the list of journals see Questionnaire 2, appendix 2).

| | <u>Early-prescribers</u> | <u>Late-prescribers</u> |
|-------------------------------|--------------------------|-------------------------|
| Total number of journals read | 131 | 171 |
| Mean number | 2.85 | 3.7 |

Using the 't' test $t > 1.96$ therefore at the 5% significance level. *early-prescribers* read fewer journals than *late-prescribers*. The hypothesis is not rejected.

This is in direct opposition to the findings of Coleman et al (1966) but conforms to the general trend of this work. Its relationship to the general findings will be considered in the 'discussion' section.

Hypothesis 46

Early-prescribers use controlled circulation journals more than late-prescribers.

This follows the general assumption that industrial forms of information are preferred by the *early-prescribers*.

Table 64

Controlled Circulation Journal

Citations for controlled circulation journals in the printed list of journals.

| | <u>Early-prescribers</u> | <u>Late-prescribers</u> |
|----------------|--------------------------|-------------------------|
| | 59 | 75 |
| Total possible | 276 | 276 |

There was no significant difference. The hypothesis is therefore rejected.

Hypothesis 47

Single practice doctors who are also early-prescribers will see more representatives than their colleagues.

Before the single practice doctor prescribes, the reassurance assumed to be necessary may come from the representative. Table 65 shows the results.

Table 65

| Average number of representatives seen. | <u>Single Practice</u> | | <u>Not Single Practice</u> | |
|---|------------------------|-------------|----------------------------|-------------|
| | <u>Early</u> | <u>Late</u> | <u>Early</u> | <u>Late</u> |
| | 1.9 | 0.9 | 1.7 | 1.4 |
| N = | 8 | 9 | 41 | 41 |

The numbers in this particular analysis are small and it is difficult to draw firm conclusions. The *early* single practitioner does appear to see slightly more representatives in a week, possibly because he needs some verbal reassurance prior to prescribing a new drug.

Hypothesis 48

Early-prescribers will see more representatives than their colleagues.

The representative is a very important source of information. He brings information about new drugs very early after the products launch. Some prescribers prescribe new drugs within weeks, sometimes days, after a product's launch and it is therefore considered probable that such *early-prescribers* will see more representatives.

The mean number of representatives seen by both groups are shown in table 65a.

Table 65a

Number of representatives seen

"About how many drug-firm representatives do you see at your surgery in a week?"

| | <u>Early-prescribers</u> | <u>Late-prescribers</u> |
|--------------------------------------|--------------------------|-------------------------|
| Total number of representatives seen | 72 | 60 |
| Average number per week | 1.7 | 1.3 |
| Number who stated 'see no reps' | 8 | 11 |

Using the 't' test there was no significant difference at the 5% level, however, the implications from tables 65 and 65a are that more representatives are seen by *early-prescribers* and that fewer *early-prescribers* have a policy of seeing no representatives.

The hypothesis is however rejected.

Hypothesis 49

Late-prescribers are more likely to be selective about seeing representatives.

Table 66
Selectivity

"Do you see all representatives or are you selective?"

| | <u>Early prescribers</u> | | <u>Late-prescribers</u> | |
|---------------|--------------------------|-----|-------------------------|-----|
| Selective | 18 | 45% | 12 | 43% |
| | (60%) | | (40%) | |
| Non-selective | 22 | 55% | 26 | 57% |
| | (46%) | | (54%) | |

Using the proportions test, there is no significant difference between the two groups at the 5% level. The hypothesis is therefore rejected.

Hypothesis 50

Early-prescribers are more likely to have sufficient information on which to base a prescribing decision after seeing a representative, than late-prescribers.

The representative has been shown to be rated more highly by early-prescribers than by late-prescribers (see hypothesis 34).

Table 67 tabulates the results to question 15 questionnaire 2 (appendix 2.)

Table 67
The Representative

"Generally after seeing the representative, do you have enough information on which to decide to prescribe the discussed product?"

| Response | <u>Early-prescribers</u> | | <u>Late-prescribers</u> | |
|------------|--------------------------|---------|-------------------------|---------|
| | Number | Percent | Number | Percent |
| Yes | 16 | 41% | 11 | 30% |
| | (59%) | | (41%) | |
| No/depends | 23 | 59% | 26 | 70% |
| | (47%) | | (53%) | |

Although there were more *early-prescribers* who stated that they had enough information from the representative, the difference was not significant using the proportions test. The hypothesis is therefore rejected.

Hypothesis 51

Early prescribers attend more post-graduate medical courses than late-prescribers

Postgraduate refresher courses, particularly when arranged by hospitals or medical groups (independent bodies) may be responsible for bringing awareness of new drugs when these are considered to be 'innovations'. It may be that the *early-prescriber* receives his information from such courses, in which case the assumptions previously made might be incorrect.

Table 68

Postgraduate refresher course

"Do you attend postgraduate medical course?"

| | | <u>Early-prescribers</u> | | <u>Late-prescribers</u> | |
|------------------------------------|-----|--------------------------|---------|-------------------------|---------|
| | | Number | Percent | Number | Percent |
| Attendance at refresher courses | Yes | 33 (45%) | 80% | 40 (55%) | 89% |
| | No | 8 (67%) | 20% | 55 (39%) | 11% |

Using the proportions test there was no significant difference at the 5% level. The hypothesis is therefore rejected.

Hypothesis 52

Early-prescribers are more likely to attend out-of-town meetings than late-prescribers.

Coleman, Katz and Menzel considered 'cosmopolitaness' or integration

was the most important factor in determining when a doctor prescribed a new drug. (Coleman J. 1966). Table 69 tabulates the results from questionnaire 2.

Table 69
'Integration'

"Have you attended any conferences or symposia in the last year which were held outside your own areas? "

| Attendance | <u>Early-prescribers</u> | | <u>Late-prescribers</u> | |
|------------|--------------------------|---------|-------------------------|---------|
| | Number | Percent | Number | Percent |
| Yes | 9 (39%) | 22% | 14 (67%) | 31% |
| No | 31 (50%) | 78% | 31 (50%) | 70% |

At the 5% level of significance, there was no significant difference noted. The hypothesis is therefore rejected.

Hypothesis 53

Early prescribers consider drug firm symposia give enough information on which to prescribe a new drug more often than late-prescribers.

Assessment of information has been shown to be the major difference between *early* and *late-prescribers* and therefore the above hypothesis was proposed.

Table 70
Symposia

"Do you think meetings and symposia arranged by drug firms give enough information on which to prescribe a new drug? "

| | <u>Early-prescribers</u> | | <u>Late-prescribers</u> | |
|-----------------|--------------------------|---------|-------------------------|---------|
| | Number | Percent | Number | Percent |
| Yes | 19 (43%) | 49% | 25 (57%) | 56% |
| No/Occasionally | 20 (50%) | 51% | 20 (50%) | 44% |

Using the proportions test, there was no significant difference noted at the 5% level. The hypothesis is therefore rejected.

Hypothesis 54

Late-prescribers are more likely to specialise than early-prescribers.

Throughout this section the trend has been to suggest *early-prescribers* as being 'basic' prescribers, using the minimum amount of information and relying more heavily upon the industry than upon the profession. It is therefore suggested that *early-prescribers* will specialise less than their colleagues. Table 71 tabulates the results.

Table 71

"As a general medical-practitioner, do you specialise in any particular field of medical practice?"

Number of prescribers who self-designated themselves as specialists

| | | |
|-------------------|--------|-----|
| Early-prescribers | 26 | 52% |
| | N = 50 | |
| Late-prescribers | 18 | 37% |
| | N = 49 | |

Using the proportions test $Z < 1.96$ therefore, at the 5% level of significance, the hypothesis is rejected. It must be noted that there are in fact more *early-prescribers* who self designated themselves 'specialist'. This implies a certain amount of extraversion on the part of the *early-prescriber*. It may also suggest that the *late-prescriber* is less interested in specialisation, preferring to remain a *general practitioner*.

Deltakos

In a study to be referred to as the *Deltakos study* (Deltakos 1974) a number of relevant hypotheses were postulated and tested. The method of analysis was mailed questionnaire. These were returned by 1172 general practitioners. Doctors were divided into 'innovators', 'moderate-conservatives' and 'ultra-conservatives'.

A limited list of sources of information was given to the doctors and their assessment of them was requested. The general practitioners were then asked to 'describe themselves' in accordance with four statements. These were:-

- a) *In general I like to evaluate a new medicine within a few months of its becoming generally available.*
- b) *I prefer to wait rather longer, until it has been evaluated by at least some doctors in practice before prescribing.*
- c) *I do not generally prescribe a new medicine until it has been available for some time and then only on the basis of use and recommendation by many other practitioners.*
- d) *If none of these statements describe your attitude would you please state your views.*

From the doctor's response to the four statements, he was classified as innovator, moderate -conservative or ultra conservative. To some extent this highly subjective method of classification can be criticised. However, the analysis of the results is interesting. Statistical significance was not given. The main points can be briefly summarised as follows. More-innovative doctors are more interested in commercial sources of information. Less-innovative doctors are not necessarily more interested in professional communication sources.

The more-innovative doctors are more interested in a larger number of publications. This is in direct contrast to the findings of the

present study. Here it was shown that significantly more journals were read by *late-prescribers*. The *late-prescribers* also cited the greatest variety of extra (unlisted) journals. Doctors in the current research were given the opportunity to cite additional sources, unlike the *Deltakos-study*.

81.7% of the *Deltakos-study* doctors in the innovator group claimed to see the majority of representatives who called. This was compared with 68.4% in the moderate and 53.8% in the ultra conservative group. (Compare with hypothesis 48 when no significant differences were found).

It was suggested in the *Deltakos-study* that the youngest doctors were innovators more often than their older colleagues. In the present study, leading from hypothesis 29 it was shown that there was no significant difference between the number of *early* and *late-prescribers* who were newly qualified but that the middle group (qualified from 11 to 30 years) showed significantly higher 'innovative' tendencies. The older doctors (qualified over 30 years) had significantly more *late-prescribers* than *early-prescribers*.

In the *Deltakos-study* when information sources were discussed, no attempt was made to show if different sources were used at different stages of the drug adoption process.

Representatives were shown to be more highly 'valued' with increasing age and advertising and direct-mail data usage, suggested a slight trend towards increasing usefulness with increasing age of the prescriber. The *Deltakos-study* showed that from the age of 35 the trend was for the practitioner to see more representatives and to be less

selective. Marginally more 'innovators' were found in single practice. This could be a reflection of age of the general practitioner. Younger doctors tended to be in multiple practice, whilst a higher percentage of the older doctors were in single and two and three man practices.

Results

The medical age of the practitioner was discussed on page 78, no conclusions could be drawn from Rogers and Shoemakers retrospective analysis (Rogers E.M. 1971). Where differences were noted with age from the questionnaire data in chapter 2, they were concerned with the way different age groups seemed to use different sources of information. Age did appear to influence the time a new drug was first prescribed. Although newly qualified doctors showed no difference in the proportion of *early* and *late-prescribers* in the sample, doctors qualified from between eleven and thirty years were more likely to be *early-prescribers*. Conversely doctors qualified for over thirty years were more likely to be *late-prescribers*.

The conclusion to be drawn is that when a doctor is newly qualified he has less knowledge of new drugs than his older colleagues. He may have had a certain amount of caution instilled into him from medical school and it is more than likely that he has acquired a certain scepticism about all new 'wonder drugs'. Perhaps 'lack of confidence' is the greatest single influence.

As the doctor becomes established, so his confidence in his ability to evaluate and responsibly prescribe new drugs increases. He moves from caution to confidence and this is shown in table 48 by the increased number of *early-prescribers* in this age group.

As he ages, so his prescribing gradually becomes more cautious. It may be that his scepticism increases as his experience of drug

'failures' also increases. Claims made, concerning new products, may not have been achieved, and so the doctor qualified for over thirty years is found to be a *late-prescriber*.

Obviously a doctor in the 'newly-qualified' group will, in due course, move into the 'qualified over thirty years' group. An interesting study would be to see if the prescribing habit is a function of age or whether undergraduate training at certain distinct times has produced distinct patterns of prescribing. If the groups of doctors could be tested again in say ten years, an interesting comparison could be made.

The number of patients a doctor has on his NHS list showed a correlation with the time of first prescribing. It was shown that *early-prescribers* had a larger list size than *late-prescribers* and, in contradiction to other studies such as Ministry of Health 1964 it was also shown that the larger the list size, the greater the number of prescriptions issued per patient per month. (0.49 for *early-prescribers* and 0.44 for *late-prescribers*). Thus the *early-prescriber* has not only a larger list size but also issues slightly more prescriptions per patient. The more patients who visit a surgery, the greater the opportunity for seeing and treating patients with diseases for which new drugs may be indicated. Joyce (1967) considered that less frequent prescription writers were 'person-orientated' so the *early-prescribers* in this study must be considered not to be 'person-orientated' but perhaps 'drug-orientated'. This conclusion would tend to validate the findings.

When the first ten sources of information were considered (Table 52) no significant difference was noted between the ratings given by *early-prescribers* and *late-prescribers*. However, using the professional/industrial scoring technique described in chapter 2,

the *early-prescribers* were shown to be more industrially orientated. Specific sources were then compared using the proportions test and significant differences were noted with four sources. Advertisements, direct mail, *Mims* and controlled circulation journals, all were rated significantly higher by the *early-prescribers*, again indicating a higher reliance on the industrial forms of drug information than by the *late-prescribers*. A further hypothesis (hypothesis number 42) indicated that a significantly higher number of *early-prescribers* read direct mail than *late-prescribers*.

As has been stated previously, industrial information is usually the first to be distributed following a new product's launch. Its higher use by the *early-prescribers* indicates that they are the type of prescriber who wants to find out about new drugs more rapidly than any other group. These prescribers must feel that they have been given enough information concerning a new product from the 'industrial-sources', which they rate more highly, and especially from the data sheet which precedes all promotion. From table 52 it should be noted that *early-prescribers* do not rate professional sources significantly lower than their colleagues.

Perhaps not surprisingly, *early-prescribers* read significantly less journals than *late-prescribers*. This result, is in direct contradiction to previously published work (such as Coleman 1966), but follows the general findings of the work so far. The model which is indicated for the *early-prescribers* is of someone who wishes to find, both rapidly and probably with the least amount of effort, enough information on which to base a prescribing decision. This again indicates a 'drug-orientation' rather than a 'patient-orientation'.

Some of the hypotheses which proved negative will be considered next. To summarise, *early-prescribers* will have a larger list size, issue slightly more prescriptions per patient, will rate industrial information more highly and will read fewer journals.

Conclusion

Doctors were divided into two groups, *early* and *late-prescribers* using data obtained from the PPA. Hypotheses were tested which attempted to relate a number of pre-selected variables to membership of the *early* or *late* group. Characteristics of each group which could uniquely define a member of that group were not found. However, certain differences were noted. Some of the hypotheses proved to be statistically insignificant. The differences have been noted and any observable trends are considered.

The sex, qualifications and number of partners in a practice did not significantly affect the date of first prescribing a new drug. There were similar numbers of self-designated specialists in both groups and the position of the practice with relation to the university of graduation had no discernable effect.

There were slightly more *late-prescribers* who attended postgraduate medical courses, although the difference was statistically insignificant. (Table 68). Similarly, more *late-prescribers* attended conferences or symposia outside their own area (Table 69). More *late-prescribers* thought that there was enough information in symposia and conferences arranged by the pharmaceutical industry upon which to base a prescribing decision but, as before, the difference was statistically insignificant. (Table 70).

From Tables 65 and 65a, the implications were that more representatives were seen by *early-prescribers* than by *late-prescribers* and that *late-prescribers* saw no representatives more often than *early-prescribers*.

The prescriber who sees most representatives is likely to hear of more new drugs earlier and is, therefore, more likely to be an *early-prescriber*. There were slightly more *early-prescribers* who felt that they had sufficient information after seeing a representative, upon which to base a prescribing decision.

Early-prescribers were as discriminating as *late-prescribers* when it came to giving scores for sources of drug information (hypothesis 35). Similar numbers of sources were used by both groups and sources used for 'awareness' were also similar. This is in agreement with Ryan & Gross (1943) who found that those who adopted hybrid seed at the end of the diffusion process had heard of it almost as soon as the earliest adopters.

Mims and the representative were placed first and second as general sources of information by the *early-prescribers* whereas they were placed third and eighth respectively by the *late-prescribers*. This other group placed 'articles in medical journals' and 'consultant recommendations' first and second whereas the *early-prescribers* placed these two sources third and fifth respectively (Table 52). This is in agreement with the general model of the *early-prescriber* as someone who prefers concise, rapid information which is generally 'industrial'.

Perhaps the fact that 'industrial information' is usually concise, is rapidly produced after a drug launch and is *positive*, is what makes it preferred by a group of doctors and this preference leads to early-prescribing. In other words the propensity to prescribe a new drug is inversely proportional to the amount of information concerning the new drug first read by the doctor. 'Industrial' information may well be biased but it is positive. It states that 'drug X is better than

Drug Y because'. Its reasons are brief and to the point. The sort of practitioner who can cope with a large number of patients must be able and must prefer to make speedy diagnoses and quick decisions. This same individual is more likely to prefer the 'industrial' type of information. As industrial information has been stated as the first to arrive after a drug launch, it is not unreasonable to assume that this same prescriber will be a member of the group called *early-prescribers*.

Chapter 5

The Influence of Particular Sources of Information

THE INFLUENCE OF PARTICULAR SOURCES
OF INFORMATION

Chapter 5A

The Consultant

In chapter 2, the way sources of information were used by a sample of general practitioners was considered. The method of data gathering was by questionnaire.

In this part of chapter 5, the single source of information 'consultant recommendation' will be considered in detail. Results from chapter 2 and to some extent chapter 4 will be incorporated where appropriate.

The consultant as a source of information

Wilson (1963) found that doctors used consultant advice significantly for fifteen percent of the disease-states studied. The source of information most used was medical training. The consultant was used more for certain illnesses such as psychoses. Other sources were preferred for other illnesses. The preferential use of consultants for advice was also reported in the Hospital-Update Study (1977) 'H-U' Study. Doctors were asked for what types of disease their prescribing was influenced by hospitals. Forty percent said cardiology, twenty percent rheumatology while the remaining forty percent divided their responses among the other major specialties. In Marshall's study the consultant was placed eighth as a 'great deal of help' in general prescribing and fifth in terms of prescribing a new drug.

Younger doctors used the consultant and colleagues more than older doctors. (Marshall J. 1972).

In chapter 2 (page 52), the consultant was found to be fifth as a source of information for finding out about new drugs (awareness). He was shown to be second as a source for evaluating a new drug and

third for obtaining advice or further information. This implies that his major function, in terms of information transfer, is as an opinion leader, with the industry maintaining the role of 'front-line' information-giver. (See Tables 4, 5 and 6).

When the three specific drugs A, B and C were considered, the pattern was continued (Table 7). As a source for evaluation, the consultant was first choice for Drugs A and B but only sixth, for Drug C. (The numbers in the sample however were very small).

The doctors were asked which single source had been most useful to them. The consultant was placed first for Drug A (N = 93), third for Drug B (N = 14) and first again for Drug C (N = 11).

It is obvious then that the consultant has the potential of being an influential source of information for prescribing, especially for new drugs, as his expertise is respected and perhaps used to legitimise the doctor's own actions.

Sub-divisions of variables

In chapter 2, each response to the questions in the questionnaire was considered under sections corresponding to divisions of pre-selected variables. A number of these divisions showed trends where the consultant was considered. The practice size did not appear to influence the way consultant advice was used although single practice doctors cited consultant recommendations less than their joint practice colleagues for finding out about new drugs. (Table 20).

The number of years a practitioner had been qualified, did not appear to affect the use of the consultant as far as 'awareness' was concerned. However, there was a significant difference in the choice of the consultant as an evaluative source.

Significantly, more older doctors (qualified over thirty years) used the consultant as a source of information for evaluation. (Table 28). A section of Table 28 is shown.

Table 28
Percentage of citations for Evaluation

| | <u>1. (0-5 years)</u> | <u>'Years Qualified'</u> <u>2. (6-30 years)</u> | <u>3. (Over 30 years)</u> |
|-------|-----------------------|--|---------------------------|
| rank | 16% | 18% | 27% |
| order | 3rd | 2nd | 1st |

In general, the older doctor will have sent more patients to consultants and will have assessed the outcome of subsequent recommendations more often than his younger colleagues. The newly qualified practitioner will probably use consultants recommended by partners or 'trainers', especially if not practising close to his medical school.

Table 33a shows that the more highly qualified doctor uses the consultant least for 'evaluation' and Table 33 again shows a similar result for 'awareness'.

Presumably the more highly qualified doctor deals with more patients himself relying on consultants to a lesser extent. No other differences of interest were noted within the sub-divisions of the variables.

Influence assessment

It was postulated that hospital doctors and in particular the consultant can 'influence' the prescribing habits of general practitioners in a marked way. (Report - Update 1977). In the 'H-U' study, an average of seven percent of the patients on a doctor's list received new hospital-recommended medications in any year. The total number

of hospital-recommended first prescriptions in general practice in the UK was considered to be at least seven million per annum and the total number of repeat, or indirectly hospital-influenced prescriptions was thought to be many times this amount.

The study did not in fact measure *influence* in any positive way. The measurement was of prescriptions written for patients referred by general practitioners to consultants and returned to the general practitioner with a recommendation for a particular preparation. The study merely showed the number of general practitioners who were prepared to accept a consultant recommendation for a *named* patient. It would seem reasonable that a prescriber who considered it necessary to 'relinquish' his diagnosing role to the consultant for whatever reason, would be willing to accept the specialist's recommendation for a preparation.

The numbers ascertained by the study are a useful beginning. For example, 559 patients were referred back to 50 doctors in one month with prescribing recommendations which resulted in prescriptions for 1050 drugs. (1.88 per patient). What 'influence' does this represent? The general practitioner is at liberty to use the recommended product for subsequent new patients if he considered this appropriate or he can maintain the referred patient on the product and thereafter revert or keep to his more usual prescribing.

The technique and results shown in the 'H-U' study indicate a *potential* influence rather than an actual influence.

Seltzer and Riley (1970), using figures from the Royal College of General Practitioners, found that slightly more than four percent of general practitioner/patient consultations ended in the referral of a patient to a hospital or specialist.

It was reported by Spencer (1971) that the consultation rate per thousand patients decreased as the size of a doctor's list increased. Analysis of consultation rates will not be representative unless this is taken into account.

A schematic diagram representing the referral process is shown in Figure 12. The consultant as a specialist may expect to see patients who have proved difficult for the general practitioner to treat. The patient generally sees the consultant after prior arrangement by the general practitioner.

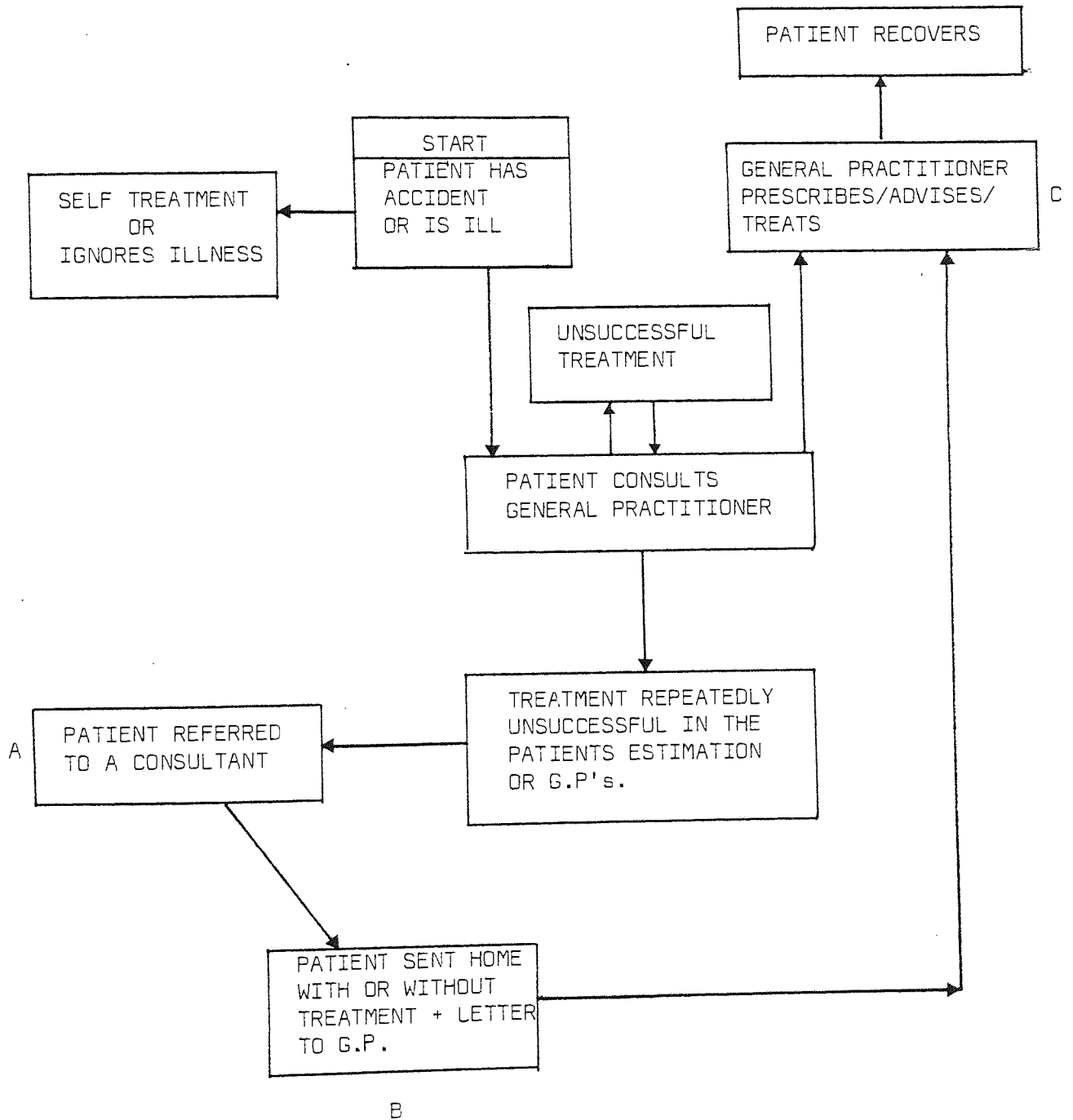
The simplified picture in Figure 12 does not take into account admission to hospital or possible patient death. The interesting step is from A to C. The armamentarium of the consultant may vary in its range and/or its content. It was stated by Seltzer and Riley (1970) that the hospital doctor uses a far greater range of products in a particular therapeutic class. Twenty antibiotics/antibacterials were used by consultants compared with only ten by general practitioners. The first six antibiotics were the same. The findings of the current work will be reported in the discussion section.

If the consultant treats a general practitioner's 'hard-to-treat' patient using a new drug this may give the general practitioner reassurance in the use of the drugs so that he may subsequently prescribe the new drug for other patients.

In the current research it is postulated that the prescribing pattern of a consultant will be highly correlated with the prescribing pattern of the general practitioners who refer their patients to that consultant.

Figure 12

Patient Referral to a Consultant



Methodology

To assess the influence of the consultant on the prescribing of general practitioners further prescription analysis was undertaken.

One Area Health Authority, which includes approximately three hundred doctors, was selected because of availability of data. All prescriptions written by them for rheumatological preparations in a one month PD2 sample were analysed.

Analgesics were excluded from the bundles because of the inability to distinguish between the rheumatological use of the preparation and the more general analgesic use.

There were approximately ten thousand prescriptions written for rheumatological preparations in the sample month. The majority of prescriptions were written for a small number of preparations. The total number of different preparations prescribed in the month was thirty-six. Photocopies of each prescription were sent from Newcastle to the local PPA office where analysis was carried out. Each prescription was recorded on the pre-printed coding sheets previously mentioned. Details of the preparation (a single letter or number code was used) dosage, quantity prescribed and any other preparations prescribed on the same form were taken and a doctor code number was added to each entry.

The hospital prescriptions written by the three rheumatology consultants in the Area on or before the PD2 sample month, were analysed in the same way.

The three consultants (1, 2 and 4) wrote one hundred and fifty, fifty, and one hundred prescriptions respectively during the survey period.

This length of time was limited by the availability of the prescriptions which were held in hospital pharmacies within the Area. The number of prescriptions written for each rheumatological preparation was compared among the consultants and the differences were noted. Certain drugs were only prescribed by specific consultants and not the others. The third part of the experiment consisted of obtaining data which divided the general practitioners into groups. Membership of a particular group depended upon the consultant to whom the general practitioner usually referred his 'rheumatology' patients. These data were obtained directly from the consultants.

When the divisions were completed, a number of practitioners were found to have no definite preference for a particular consultant. These were placed in doctor-group '0' and doctors who sometimes referred their patients to consultant No. 1 and at other times to consultant No. 2 were placed in doctor-group 3.

The number of prescriptions written by each *group* of general practitioners and each consultant for each particular drug, was calculated and tabulated.

Analysis

The first analysis used only those drugs where differences had been noted among the consultants. Considering consultant No. 1, he prescribed Drug N forty-seven times which gave the drug the rank order, first. The drug placed second was Drug I with twenty-four prescriptions. This shows a strong preference by consultant No. 1 (borne out in an informal interview) for Drug N. It might have been expected that Drug N would be first in the corresponding doctor-group (Group 1). However, it was placed fifth by this group.

Drug D was prescribed by consultant No. 1 where it was ranked fifth. It was prescribed by no other consultant. Among the doctor-groups the highest ranking of Drug D was in group 3 at fifteenth. Consultant No 1's own group placed Drug D nineteenth.

With consultant No. 2, the lowest prescriber, twice as many prescriptions had been issued for Drug F than for the second ranking drug, Drug I. The highest ranking for Drug F among the doctor-groups was fourth by group 3. Group 2, corresponding to the consultant, placed Drug F sixth.

Consultant 4 ranked Drug O fourth issuing seventeen percent of his prescriptions for this preparation. Consultant No. 1 ranked Drug O thirteenth and Consultant No. 2 did not prescribe it at all. Again, it may have been anticipated that the high position of Drug O for consultant 4 would have been reflected in the prescribing of group 4 doctors with a lower position for the other doctor groups. Group 4 ranked it sixth; group 1, eleventh; group 2 fourth; group 3 tenth and group 0 ranked it ninth.

After looking at specific differences, the number of prescriptions written by each consultant for each drug, was compared with the number of prescriptions written by each doctor-group for each drug. The Spearman Rank correlation technique was used (see appendix 3). This technique was also used to test the correlation among the different doctor-groups.

Results

The correlation coefficient r_s between each consultant and each doctor-group is shown in Table 72. The numbering of the doctor-groups is such that doctors who refer their patients to consultant No. 1 are group 1 and so on.

Spearman Rank Correlation Coefficients

Consultant: Doctor-groups

Table 72

| <u>Consultant Number</u> | <u>General Practitioner Group numbers</u> | | | | |
|------------------------------|---|-----------|-------------|-----------|------------|
| | 0 | 1 | 2 | 3 | 4 |
| 1. | 0.33 (14) | 0.31 (14) | -0.006 (10) | 0.36 (13) | 0.18 (13) |
| 2. | 0.23 (13) | 0.35 (13) | 0.43 (9) | 0.42 (13) | 0.06 (12) |
| 4. | 0.20 (10) | 0.09 (10) | 0.21 (10) | 0.47 (10) | -0.11 (10) |

Numbers in brackets refer to the number of drugs upon which the correlation was carried out.

None of the coefficients shown in Table 72 are significant at the 5% level. This low correlation *implies* that the consultant has little if any influence on the prescribing habits of the general practitioners.

Table 73 shows the coefficients obtained by comparing each doctor-group with each other for all preparations for which at least one prescription was issued by both of the groups being compared.

Spearman Rank Correlation Coefficients

Doctor-groups : Doctor-groups

Table 73

| <u>G P Group Numbers</u> | <u>General Practitioner Group numbers</u> | | | | |
|------------------------------|---|------|------|------|------|
| | 0 | 1 | 2 | 3 | 4 |
| 0 | - | 0.92 | 0.78 | 0.93 | 0.78 |
| 1. | | - | 0.78 | 0.93 | 0.69 |
| 2. | | | - | 0.77 | 0.67 |
| 3. | | | | - | 0.64 |
| 4. | | | | | - |

In each case the coefficient was calculated using seventeen pairs of numbers.

All the coefficients are significant at the 1% level of significance.

The high correlations shown in Table 73 suggests that the doctor-groups are similar in their prescribing habits although group 4 are consistently less well correlated.

Before discussing this point, one final analysis was carried out. Marshall(1972) pointed out that one psychiatrist had prescribed an unusual drug combination which had been prescribed subsequently by general practitioners in the community. In the current study, consultant No. 1 issued twenty prescriptions for a rheumatological preparation with the concurrent administration of an anxiolytic. Valium 10mg. This combination was considered separately in Table 74.

Table 74
Prescribing of N* (N + Valium 10 mg)

| Consultant Number | Number of N* | General practitioner group number | | | | |
|-------------------|--------------|-----------------------------------|---|---|---|---|
| | | 0 | 1 | 2 | 3 | 4 |
| 1 | 20 | 2 | 2 | 0 | 6 | 0 |
| (2 | 0) | | | | | |
| (4 | 0) | | | | | |

The number of prescriptions are small but the two groups in which consultant No. 1 could have least influence, 2 and 4 prescribed no N* combinations and the groups where consultant No. 1 would be expected to have the greatest influence, 1 and 3 prescribed the combination twice and six times respectively. This may indicate an influence. However, the prescriptions written by the doctor-groups may have only been continuations of earlier consultant recommendations. It certainly represents justification for further work using the technique of looking for some drug treatment 'unique' to one consultant in prescriptions of general practitioners in the community.

Discussion and conclusion of Chapter 5A.

The study involved analysing the prescriptions of general practitioners and consultants in the therapeutic class 'rheumatology'. Correlation between the consultants and their corresponding 'doctor-groups' were not found to be significant. However, correlation among doctor-groups were all shown to be significant at the 1% level.

In the previous chapter, drug information was considered. Each drug, particularly new drugs are accompanied by large quantities of 'industrial' 'professional' and 'miscellaneous' information. In addition to this come four to seven percent of patients on the doctors list with prescriptions for consultant-recommended preparations. (Report - Update (1977) and Seltzer (1970)). Even though these recommendations will generally be followed by the patient's general practitioner, their impact on future prescribing habits is likely to be swamped by the plethora of other influences. Seltzer and Riley (1970) found that the consultant's range of drug prescribing in a particular therapeutic class was greater than the range among general practitioners. In this study, the three consultants prescribed between twelve and sixteen different preparations and the doctor-groups between seventeen and twenty-eight different preparations. Thus there are many more rheumatological drugs being prescribed in the community than in the hospital clinics. This contradicts the findings of Seltzer and Riley (1970).

The final point to be made from this pilot study is the lower correlation between doctor group 4 in table 73 and the other groups.

The most likely explanation is an 'area' effect. The consultant and his doctor-group practice north of an Area which is divided by a major river. Consultants 1 and 2 and doctor-groups 1, 2 and therefore

3, practice south of the river. It is likely that there will be certain differences in the promotional activities on each side of the river. The drug-firm representative may be different and meetings may have different emphases. The 'type' of patient visiting the doctor may also be different. All of which can have a differential influence upon the prescribing of drugs. Lee (1965) suggested that the area in which a practice was maintained was the single most important influence on prescribing and chapter 2 has also indicated its importance. The low correlation in this section with group 4 (north of the river) doctors, leads to the recommendation that further work should take patient profiles in particular 'areas' into account.

These areas may be determined by physical boundaries or it may be considered relevant to study 'drug-firm representative detailing areas'.

The consultant considers he has an effect on the prescribing of general practitioners who also believe this to be true. This study indicates that any influence which the consultant may have on the prescribing habits of general practitioners is small. It cannot be considered the major influence some studies have suggested.

THE PHARMACEUTICAL INDUSTRY
AND THE INFLUENCE OF ADVERTISING

Chapter 5B

The Pharmaceutical industry has been responsible for some major advances in drug therapy in the last few decades (Rawlins MD 1977). However, the major increase in life expectancy over the last century has been due to improved hygiene and sanitation.

As death from circulatory disorders increases, so the variety of therapeutic agents to combat the controllable forms increases. Whereas twenty years ago the cost of research could be well matched with the return from that research, today costs for research and development of a new compound rise annually with a corresponding decrease in the expectancy of a successful new drug discovery. "The ripest plums have already been harvested". (Bright B.E. 1970). "Me-too" drugs are inevitable but may be justified on economic grounds. It is true that if two companies have been developing a new but similar type of product and one subsequently markets it, the remaining company will still attempt to recoup some of its losses. Also, although a doctor is unlikely to maintain an armamentarium of many similar products he is likely to maintain a few, and so "me-too's" can be useful in practice and be profitable for the industry. Fig.13 is taken from "A.B.P.I. News" and shows a schematic representation of the "Birth of a Drug".

The cost involved in developing a new drug is obviously difficult to estimate. However, Davey (1974) suggested that I.C.I's drug research costs in the U.K. were running at about seven million pounds annually. Expansion and inflation push up costs steadily. World patents must

Fig. 13

"BIRTH OF A DRUG"



Aston University

Content has been removed for copyright reasons

Taken from ABPI News 10, (4) April 1974 "Chemistry in Britain"

be checked, outlay for buildings and equipment must be estimated (Quantock D.C. 1976). Development costs are roughly half the research costs. Davey suggested that one new compound per year would satisfy a company. The estimated time taken for the recovery of research costs was ten years after the date of discovery.

The estimated figures for the cost of pharmaceuticals in the U.K. for 1979 to 1980 was £380 million, of which approximately £300 million was for prescriptions of general practitioners.

In general, fourteen percent of the product income from home sales was spent on promotion which is now being gradually reduced to ten percent by government pressure (Editorial-Lancet 1976)). Dixon, writing in the *New Scientist* considered that there should be no such government 'interference' although he suggested that the DHSS should regulate advertising claims (Dixon B. 1977).

With these figures in mind, it may be interesting to note that for the fifteen years up to 1976, drug industry profits (as a percentage of sales and company net-worth) out-ranked those of all other manufacturing industries listed on the stock exchange. (Illich I. 1976).

The cost of a drug is arrived at via complex formulae negotiated with the DHSS. The Voluntary Price Regulation Scheme (VPRS) attempts to control the cost of drugs. New preparations which required 'original' research are exempted from the scheme for four years following their introduction and other new products are exempted for two years. (Pradhan S.B. 1974).

The Impact of Drug Advertisements

Lion (1979) studied the impact of advertisements on prescribing. Fifty psychiatrists were shown advertisements from two professional

journals from which the names of the products had been deleted. Generally, few drugs were identified from the advertisements despite wide exposure in the journals. As part of the current research a pilot study was designed in which seven general practitioners were shown five advertisements with 'striking' pictures. Advertisements for the three new drugs A, B and C were included in the five.

Questions were asked about the trade and approved names, the price and the manufacturer of each product advertised.

Drug A, the innovation, had been on the market for eight months, the other products had been available no less time. The results are shown in Table 75. The questionnaire used is shown in appendix 14.

From this pilot study, it can be seen that although fewer doctors recognized the advertisement for the innovatory Drug A only one did not know its approved name and all knew that it was fairly expensive. One interesting factor which has not been discussed is that some doctors think they remembered an advertisement which in fact they have confused with another. With the advertisement for Drug B, two of the seven doctors said they recognised it and then gave the name of Drug C. The reverse did not occur. It should be pointed out that Drugs B and C are the same chemical entity being marketed by two companies. C had been on the market for six months longer than B. Lion concluded his study by saying that creative pictorial design, together with limited salient text and a succinct caption were the ingredients of advertising most conducive to aesthetic appeal and transmission of information. (Lion J.R. 1979).

The conclusion from the current research must be that important drugs are identified even if the advertisements for them are not. The drug cost and the drug manufacturer were rarely recalled. Generally,

Table 75: Advertisement recall

| | Have you seen the advertisement before? | Do you know which product is being advertised? | If not the name is "-----" Have you heard of this product? | Can you give its approved name? | Do you know the approximate cost of 100 dosage units? | Who is the manufacturer? |
|---|---|--|---|---------------------------------|---|--------------------------|
| A | 4 | 4 | 2 | 6 | 4 > £12 | 1 |
| B | 6 | 2 | - | 1 | 1 | - |
| C | 6 | 1 | 5 | 1 | 1 | - |
| X | 6 | 5 | 2 | - | - | 2 |
| Y | 7 | 2 | 3 | 1 | 1 | 1 |

N = 7

the advertisements were remembered so impact had been made, but only when the product was seen to be useful to the practitioner, was the name of the product linked with the picture in the doctor's mind. The study was not followed up due to the excessive time involved in interviewing and the limited usefulness of the results.

Prescribing statistics

The company's marketing problem has been defined by Paoli (1970) as, how to decide for each practitioner on its file:-

*The promotional drive which will be directed at him;
the share of the expenditure which will go on visits, samples and brochures; the proportion of marketing costs between different drugs, especially between new and old drugs.*

For example, in France the Dorema Panel collects during one week (randomly chosen during the year) all of the prescriptions of 1,600 doctors representative of the entire medical corpus. Drugs are selected which are assumed to be competitive. The prescription potential for one as compared to the other is determined in accordance with the characteristics of the doctor or at least those characteristics which are available on all doctors, to the company. In this way doctor groups are produced consisting of those doctors with similar characteristics, and having uniform prescription potential.

The prescriptions issued, by each doctor is compared to his potential. The computer then lists those doctors who would 'benefit' from an extra representative's visit or increased mailings. These lists are forwarded to the representative to take the necessary action.

In the U.K., manufacturers can buy statistical information on any marketed products from certain market research organisations. One set of statistics is based on the prescriptions written by two hundred

general practitioners for a specified period. The data gathered is divided into therapeutic classes and various sorts on different variables are carried out. Using a sample of these data for anti-depressants, the variables 'years qualified', 'practice-size', 'sex' and 'dispensing-practitioner' were considered.

With drugs B and C (defined in chapter 2) a sample of these market research statistics for the final quarter of 1977 was studied. This was approximately twelve and eighteen months after the launch of the two drugs respectively. The variable 'years-qualified' was divided into four groups 0 to 9 years, 10 to 19 years, 20 to 29 years and 30 and more years. There was no statistical differences among the age groups when the prescribing of Drugs B and C was compared.

'Practice-size' was divided into small, medium and large and no statistical differences were noted among the groups for Drugs B and C. Similarly with the other variables no significant differences were noted.

For the same quarter of 1977, the prescribing levels of anti-depressants were considered. Two million anti-depressant prescriptions were analysed in the statistics. Fifty-seven percent of doctors were classified as 'low-prescribers' basing the classification on the number of prescriptions which they issued. Twenty-four percent were classified as 'medium-prescribers', thirteen percent were classified as 'high-prescribers' and six percent did not prescribe anti-depressants. Unfortunately, the numbers of prescribers for drugs B and C were too small on which to base any conclusion; ninety-six and ninety-four percent respectively had not prescribed them.

The data and statistics supplied to each manufacturer are very detailed and indicate to the company how their product is faring in

comparison with its competitors. Data are also supplied about the individual drugs in each therapeutic class, comparing certain doctor characteristics with prescribing. The data also included information gathered from six hundred chemists showing the cost of the prescriptions, the number of packs of each size which were bought from the wholesalers and the market fluctuation.

Intercontinental Medical Statistics (IMS) produce a vast amount of information in the form of statistical breakdowns as described above. They also produce tables showing the cost of advertising in various sources of information. These are categorized as 'GP Journals', 'GP Mail' and a 'Total'. In the case of Drug B in the month of December 1977, a little over £5,000 was spent on journal advertising to general practitioners but there were no mailings. Drug B was also advertised in a 'General-Hospital' journal which cost almost £10,000, and in specialist journals costing under £400. Over the year IMS estimated that advertising in the categories mentioned cost the company £102,000 and accounted for eleven percent of the total cost of advertising all anti-depressants. In the same study, December 1977, Drug C had been on the market for about eighteen months. Their costs were £6,000 for 'GP Journals', £3,000 for 'GP Mail', no expenditure for hospital journals and £200 for specialist journals. The total year's expenditure was £100,000 and again accounted for approximately eleven percent of the advertising costs in the anti-depressant group.

The advertising costs do not include meetings and do not break down journal advertising into its constituent parts. The major omission is the cost of the representative. Threshold levels of promotion must be achieved if a company is to compete at all in the industrial 'market-place'. The smaller the company the larger the percentage of sales income which must be spent on sales promotion to achieve the threshold.

The total expenditure on advertising in journals varies among the largest companies between twenty-three and sixty-two percent of the total promotional expenditure. This suggests a disagreement among the industry executives about the cost effectiveness of different forms of promotion. The expenditure on journal advertising increases as the product reaches the 'mature-stage' of the product 'life-cycle' (Slatter S. 1977).

Table 76 shows the average breakdown of promotional expenditure of the ten largest ethical pharmaceutical manufacturers in 1973.

Table 76

| <u>Representatives</u> | <u>Journal</u> | <u>Direct Mail</u> |
|------------------------|----------------|--------------------|
| 50% | 39% | 11% |

(Taken from Table 2.10 of Slatter S. 1977).

The various costs for samples and administration are included in their most appropriate section.

Some companies receive information about new drugs or initiate surveys about them. This would normally be undertaken when a new product was launched by the company or when a similar product to one established by one company, was launched by another. The survey may give comparisons between the acceptance of new drugs. One such survey was carried out comparing a large number of new products including drugs A, B and C of the present study. It was completed in March 1977. The details gathered are set out in Table 77.

The comparisons are interesting and the picture of Drug A confirms its 'innovative nature'.

Comparing Drug B and C, more had heard of the newer drug (B) by five months after launch than had heard of Drug C by the same time after launch. However, the number who had heard of and prescribed Drug C by the eleventh month had overtaken those for Drug B. The

Table 77

Summary of Awareness and Usage five and eleven months after launch

| All doctors | Heard of | Used | Still Use | Increasing | Decreasing | Neither | Don't Know | Non-users, Intend to Use | |
|---------------------|-------------------|----------|-----------|------------|------------|----------|------------|--------------------------|--------|
| | | | | | | | | | Number |
| | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | |
| | Number % | Number % | Number % | Number % | Number % | Number % | Number % | Number % | |
| MONTHS AFTER LAUNCH | | | | | | | | | |
| A | First five months | 184 92 | 121 61 | 114 57 | 73 37 | 5 3 | 28 14 | 8 4 | 23 12 |
| | Eleven months | 189 95 | 165 83 | 160 80 | 96 48 | 8 4 | 53 27 | 3 2 | 6 3 |
| B | First five months | 89 45 | 26 13 | 23 12 | 10 5 | 6 3 | 7 4 | - | 8 4 |
| | Eleven months | 118 59 | 45 23 | 37 19 | 13 7 | 6 3 | 15 8 | 3 2 | 11 6 |
| C | First five months | 71 36 | 20 10 | 13 7 | 6 3 | - | 7 4 | - | 6 3 |
| | Eleven months | 124 62 | 48 24 | 45 23 | 15 8 | 10 5 | 19 10 | 1 1 | 4 2 |

effect of marketing a 'licensed' product must be to increase the sales at least initially of both products so that if Drug B was receiving greater coverage in terms of advertising than Drug C it is likely that Drug C would also benefit.

The number of non-users for Drug B who stated that they intended to use the product increased with time whereas the reverse was true with Drug C. This must be disappointing for the manufacturer's of Drug C but could point to the greater promotional facilities available to the Drug B company.

As well as carrying out surveys on particular groups of compounds or classes (eg. new drugs) of product, the pharmaceutical industry can initiate the production of monthly statistics on the sale value of all current products. These data generally give monthly cumulative and 'breakdown by outlet' figures for each product. All products introduced during the four years 1968 to 1971 which obtained fifteen percent of the market share by 1973 were analysed by Slatter (1977). Also all products which were introduced into the top fourteen therapeutic classes and which obtained between five and fifteen percent of the market share were studied.

Companies which achieved a fifteen percent share in a therapeutic market segment, typically incurred twenty-nine percent of all marketing promotion expenditure undertaken in that therapeutic class in the initial years. Products which achieved between five and fifteen percent were not promoted as intensively as those achieving more than fifteen percent. Large initial promotional expenditures are a pre-requisite for achieving a significant market share with a new product.

For Drug C, the first month's sales figure was a little over £200. Six months later, the month's figure was £27,000 with a cumulative total of £127,000. The majority of sales were of course via prescriptions; 94% were bought by wholesalers and 3% were bought by retail pharmacies and hospital pharmacies direct. The figures eleven months after the products launch were £40,000 for the month, £312,500 cumulative with a small percentage of the outlet going to dispensing doctors. Scanning this data gives each manufacturer information upon which to align market strategy. It takes away some of the uncertainty and shows up deficiencies in promotional activity.

The marketing division will also keep details of the exact placings of advertisements and how the product is selling, as compared to estimates. Drug C estimates were to some extent based upon the marketing of another of the company's products of a similar type in another country, adjusted by the results of the first month after launch. The actual sales after two months were twice the expected value. The following month sales were also twice the value estimated. The market manager then left and his replacement was apparently unfortunate. In his first month, the figure was half the estimate. However, this was a holiday month which may explain the relative fall in anti-depressant sales. The next few months showed a steady increase in sales. In the month in which Drug B, the same product under licence to another company, was launched, sales for Drug C increased sharply, and by the eleventh month after launch the estimated value of C was again being overtaken by actual sales.

The costs of journal advertising for Drug C are shown in Table 78 and additional costs for medical meetings are added where available. The two sets of figures have not been merged as the 'meetings' costs are for Birmingham only while advertising costs refer to the national figures.

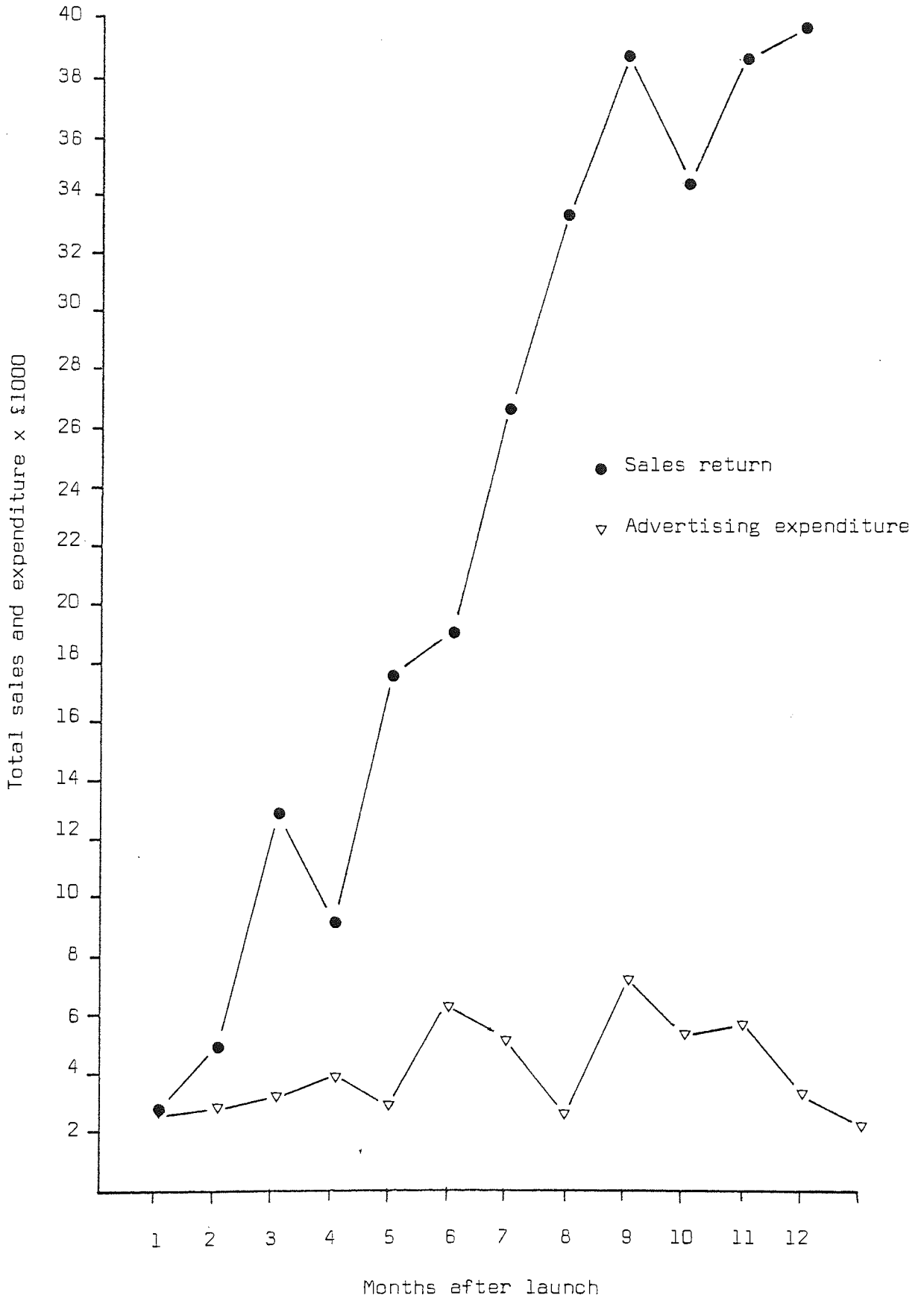
Table 78
The Cost of Advertising

| Month after launch | Cost of Meetings in <i>Birmingham</i> . £ <i>cumulative</i> | | Monthly advertising expenditure in the U.K. £ <i>cumulative</i> | |
|--|---|------|---|--------|
| 1 | 60 | 60 | 2,700 | 2,700 |
| 2 | 300 | 360 | 2,950 | 5,650 |
| 3 (including first <i>Mims</i> entry) | - | . | 3,350 | 9,000 |
| 4 | 78 | 438 | 3,900 | 12,900 |
| 5 | 55 | 493 | 2,850 | 15,750 |
| 6 (including first BMJ advertisement) | 160 | 653 | 6,400 | 22,150 |
| 7 | 250 | 903 | 4,950 | 27,100 |
| 8 | 350 | 1253 | 2,550 | 29,650 |
| 9 | 0 | 1253 | 7,400 | 37,050 |
| 10 | 55 | 1308 | 5,350 | 42,400 |
| 11 | 0 | 1308 | 5,800 | 48,200 |
| 12 | 720 | 2028 | 3,400 | 51,600 |
| 13 | - | 2028 | 2,400 | 54,000 |

A plot of the monthly costs of journal advertising against the monthly returns is shown in Figure 14.

Figure 14

Graph to show the influence of advertising (measured in terms of expenditure) on the sales of Drug C.



Slatter (1977) calculated the costs of each facet of promotional activity in 1973 based upon percentages from 1965. These percentages in conjunction with the known total cost of journal advertising are calculated and shown in Table 79.

Table 79

The promotional expenditure for a new drug

| | <u>1965</u> | <u>£</u> |
|-----------------------------------|--------------------|------------------------------------|
| | <u>Percentages</u> | <u>(Estimation) over 12 months</u> |
| Representatives | 46% | 237,360 |
| Literature | 17% | 87,720 |
| Journal advertising | 10% | 51,600 (<i>known value</i>) |
| Administration of sales promotion | 12% | 61,920 |
| Samples | 8% | 41,280 |
| Other promotional activities | 7% | 36,120 |
| Total | 100% | £516,000 |

It is obvious then that the promotional expenditure is actually higher than the sales figures and this is not apparently unusual. (Slatter S. 1977).

It was assumed that field personnel did not alter greatly throughout the duration of the study although their *emphasis* may have altered significantly.

According to Paoli (1970) if the curve for sales remains approximately the same whether or not mailing has taken place then the number of direct mail dispatches would be reduced. Extrapolating this concept to journal advertising, Figure 14 shows that this was not completely accepted by the manufacturer of Drug C. It would appear that the company reacted to the sales fall in the fourth month after

launch by increasing advertising at the next possible opportunity - month six. By the time this action had been carried out, sales had picked up, possibly because of increased sales-representative activity. The following two months showed a decrease in journal advertising with an increase in sales. It is therefore surprising that the journal advertising expenditure for the following month increased to over £7,000, when remaining constant could have been expected to have produced the same result. The increase in sales was maintained during that month but it fell sharply in the next. The reaction of the company at month six was not repeated and advertising expenditure tailed off as sales began to increase.

When the Birmingham figures are again considered, expenditure on 'medical meetings' seems to bear no relationship to the number of new prescribers or the number of tablets dispensed. The greatest expenditure on these meetings was in the twelfth month after launch. Only one new prescriber (out of more than two hundred possibles) was recorded in the following month. (Figure 15.) The number of tablets dispensed however, was beginning to increase at this point. (Figure 16.)

Data gathering at the local branch of the PPA began three months after the launch of Drug B. As Drug C was launched six months before Drug B, the data refers to the market position six months later. Thus figures 16 and 17 have been constructed to show the *relative* 'number of doctors first prescribing' and the *relative* number of tablets dispensed at equivalent months. Figure 18 shows the data on the month they were taken at the PPA for drug B and C. In month 7 of Figure 18 the detailing position of Drug B was changed from first to third. The manufacturer of this product also manufactured two other products,

Figure 15

Graph showing the number of new prescribers of Drug C each month.

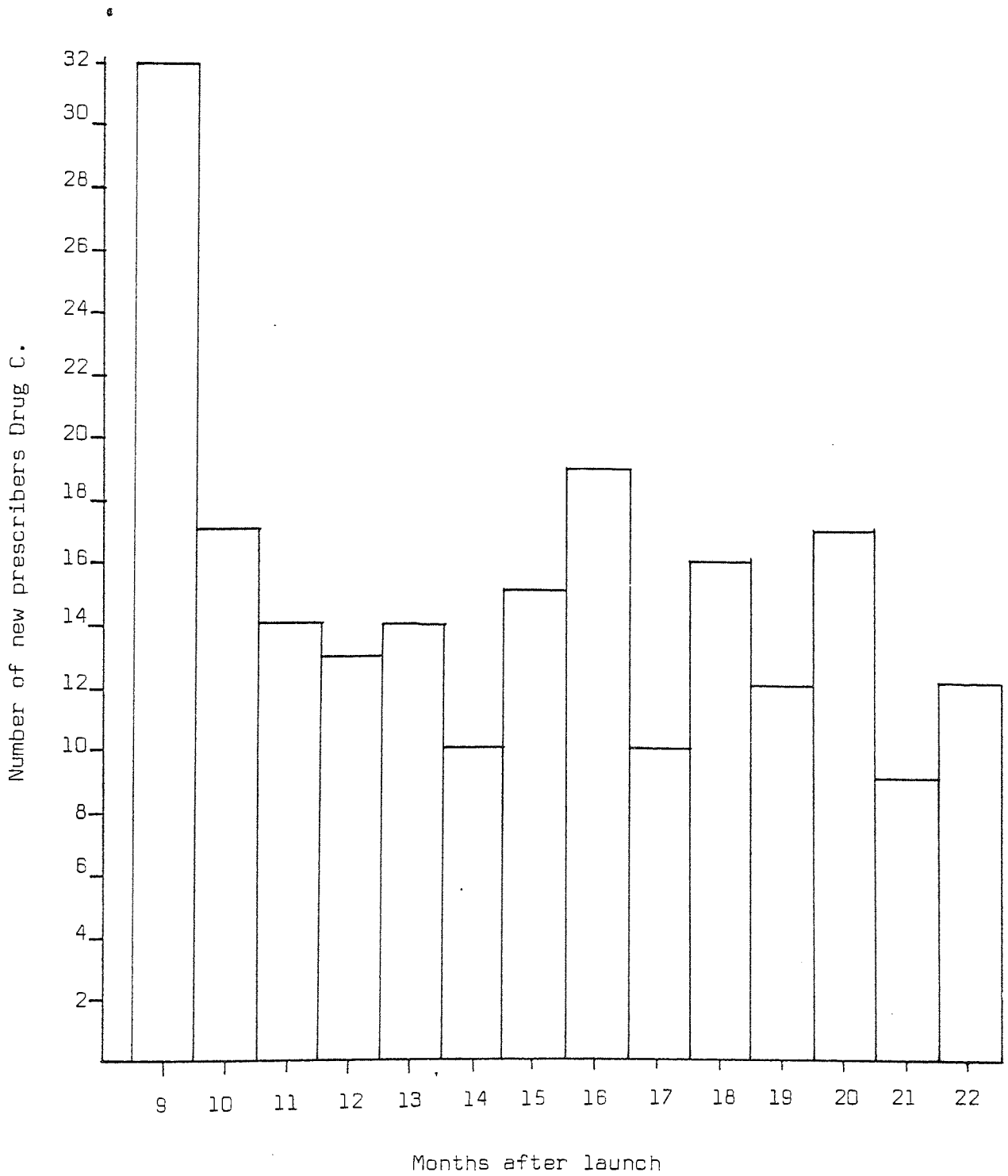


Figure 16

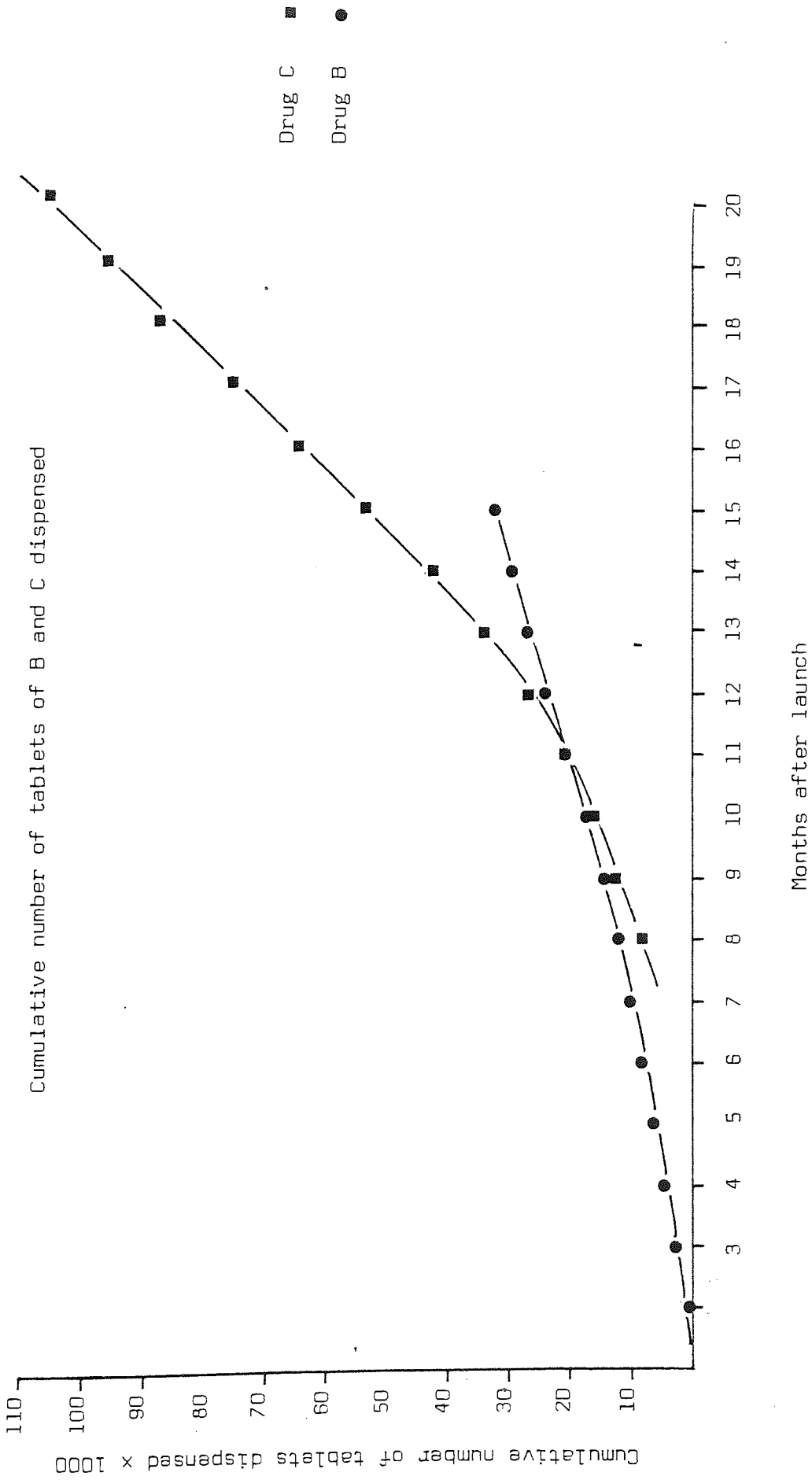


Figure 17

Cumulative number of doctors prescribing Drug B and C
for the first time to show the difference in adoption

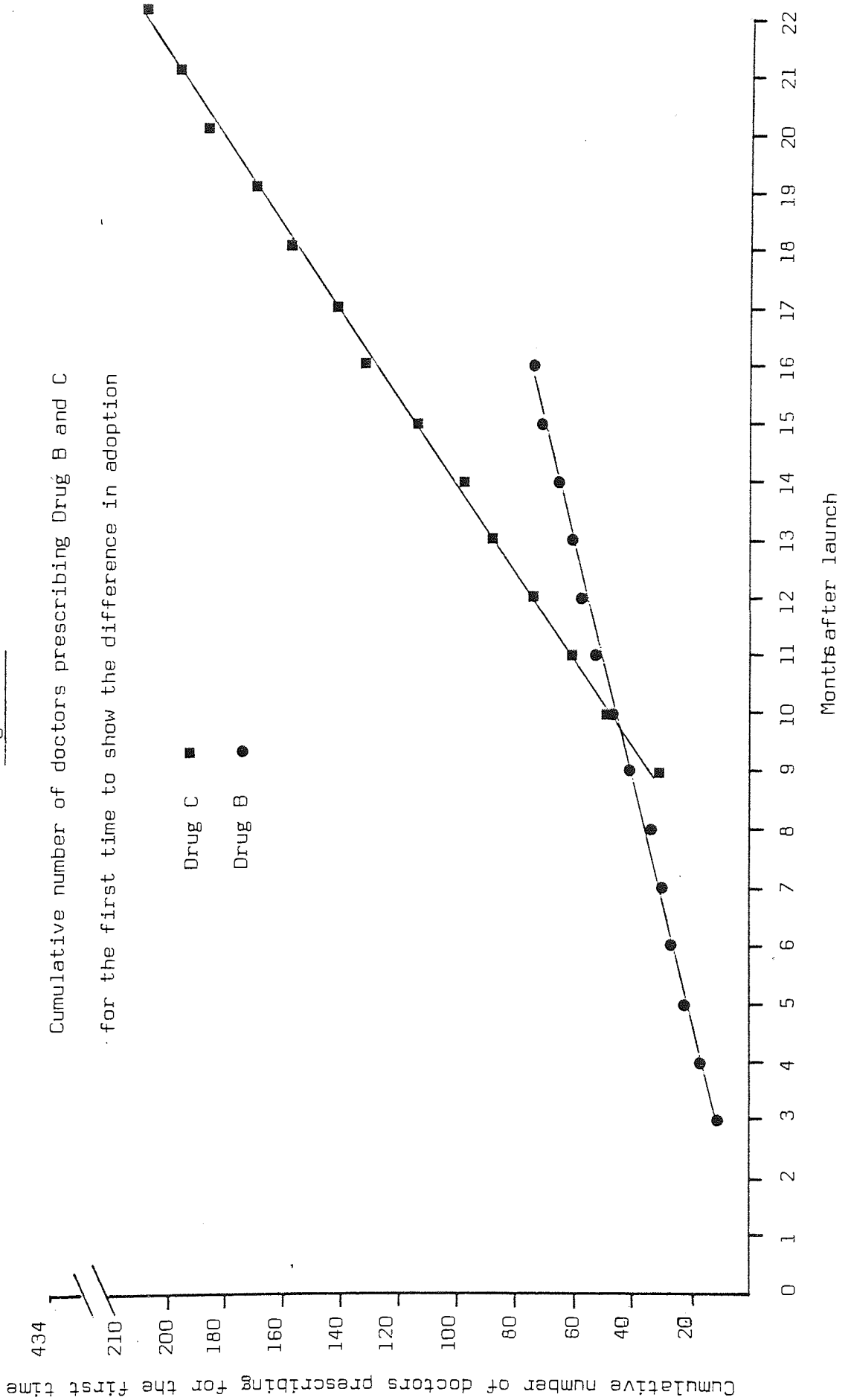
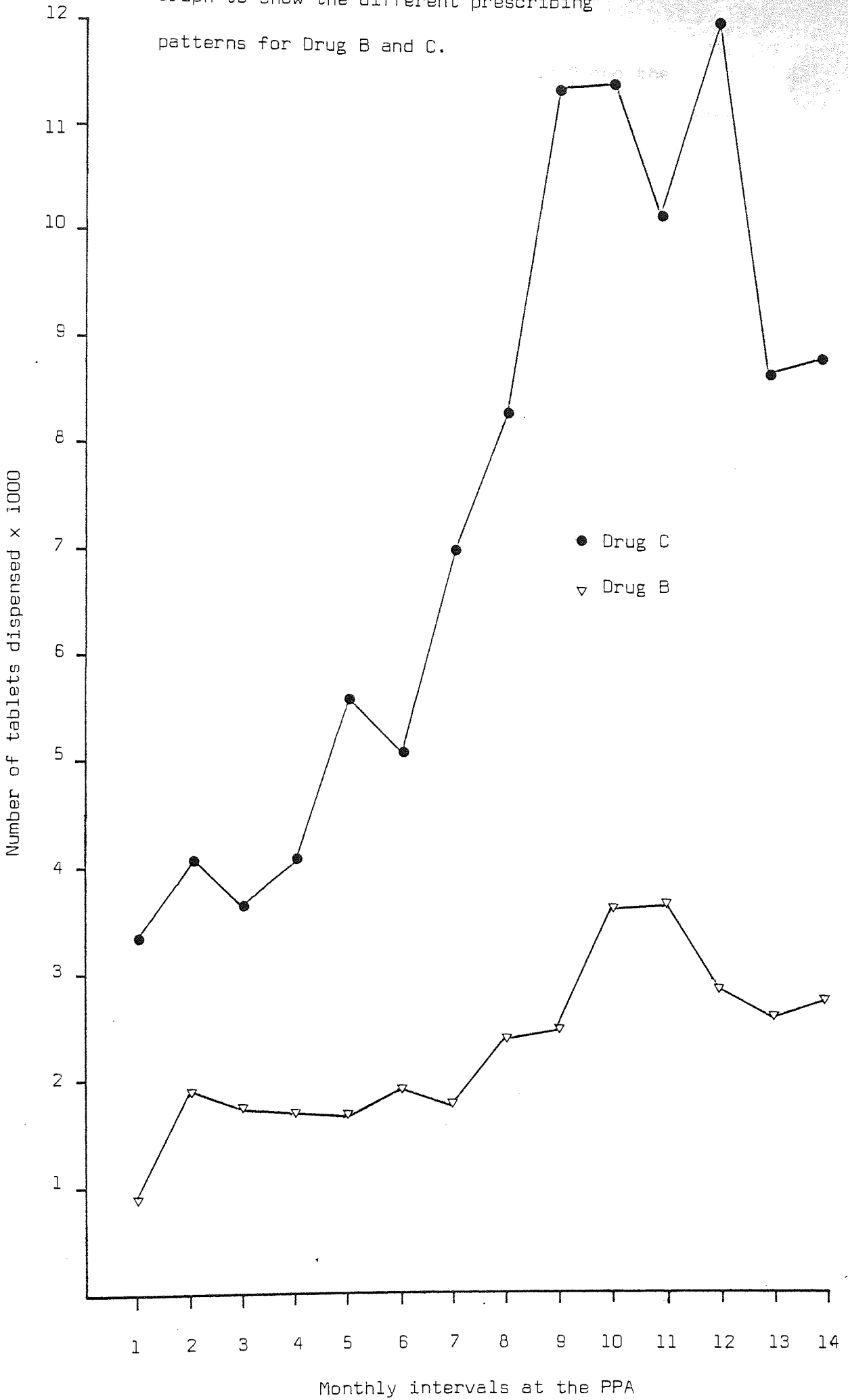


Figure 18 - 222 -

Graph to show the different prescribing patterns for Drug B and C.



the revenue from which was much greater than for Drug B and the marketing position of which had to be maintained. The higher placing of the two products on the detailing list, meant that in the short time which the representative had to discuss his company's products, with the general practitioner, he had to mention the other two drugs *before* he could mention Drug B.

The manufacturer of Drug C considered that this would have a serious effect on Drug B's performance. However, as can be seen from the lower curve in figure 18 there was no adverse effect from this action.

In chapters 2 and 4 the role of the industry in informing prescribers was studied. Briefly, it was found that industrial sources of information were used most often at the awareness stage of drug adoption. Older, single practice doctors who did not specialise academically or within their practice and who did not dispense their own prescriptions were found to be more responsive to industrial forms of drug-information. This may mean that promotional resources could be cut from this group in order to increase the expenditure on the less responsive doctors. Conversely the company may concentrate its resources on the responsive doctors reducing the waste in resources on non-responsive doctors.

In chapter 4 the reading of journals was discussed and it was shown that *early-prescribers* read less journals and a smaller variety than *late-prescribers*. Table 80 shows the rank order of the first ten journals listed in their overall position for the complete set of respondents. This is followed by a breakdown into *early* and *late-prescribers* rank order.

Table 80

Choice of Journals by General Practitioners

| | <u>Rank Order</u> | <u>Rank Order</u> | |
|--------------------------------|------------------------|--------------------------|-------------------------|
| | <u>for Total Group</u> | <u>Early-prescribers</u> | <u>Late-prescribers</u> |
| 1. <i>Prescribers' Journal</i> | | 1 | 1 |
| 2. General Practitioner | | 2 | 2 |
| 3. Pulse | | 3 | 4 |
| 4. = World Medicine | | 6 = | 3 |
| 4. = 'B.M.J.' | | 4 | 5 = |
| 6. Practitioner | | 5 | 5 = |
| 7. <i>Mims Magazine</i> | | 6 = | 7 = |
| 8. = Medical News | | 8 = | 7 = |
| 8. = Doctor | | 8 = | 7 = |
| 10. <i>J.R.C.G.P.</i> | | 10 | 10 |

Total number of rankings 14 17

Total number of different journals 18 26

Prescribers' Journal does not include advertisements. However, all the other journals do, and it might be expected that the number of advertisement inclusions and the total journal advertisement expenditure would be greatest for the first few journals in Table 80. It has already been stated that *early-prescribers* read less journals overall and that *late-prescribers* rely more on professional sources of information. From these two points it may be thought relevant that advertising in the first few months of a products life would be most beneficial if placed in a few well chosen journals. When the initial period of prescribing is considered to be complete, then more specialized journals should be included in the schedule. Table 81 shows the actual number of inclusions and the total cost for the first

Table 81

Advertising costs and inclusions for Drug C in the twenty months after launch, divided into four month 'lots'.

Number of inclusions in each journal. The time after launch is divided into four month lots.

| Journal inclusion Schedule | Total cost for twenty months | 1 | 2 | 3 | 4 | 5 |
|-----------------------------------|------------------------------|-----------|-----------|-----------|-----------|-----------|
| | £ | | | | | |
| Doctor (W) | 11,905 | 8 | 7 | 8 | 4 | 8 |
| World Medicine (F) | 9,265 | 5 | 1 | 6 | 0 | 5 |
| Medical News (W) | 8,400 | 1 | 3 | 9 | 4 | 7 |
| Medical Interface (F) | 7,455 | 2 | 1 | 4 | 4 | 4 |
| B.M.J. (W) | 5,925 | 0 | 6 | 4 | 0 | 0 |
| Medical Digest (M) | 5,752 | 4 | 3 | 4 | 4 | 4 |
| General Practitioner (W) | 5,195 | 5 | 4 | 0 | 1 | 0 |
| Practitioner (M) | 4,355 | 2 | 4 | 2 | 0 | 1 |
| Modern Geriatrics (M) | 3,645 | 2 | 1 | 4 | 0 | 2 |
| <i>Mims</i> (M) | 2,532 | 2 | 4 | 2 | 2 | 2 |
| On-Call (M) | 2,531 | 0 | 0 | 7 | 1 | 5 |
| British Journal of Psychiatry (M) | 2,304 | 3 | 3 | 4 | 4 | 4 |
| Br. J. Hosp. Med. (M) | 2,280 | 0 | 0 | 3 | 0 | 3 |
| Pulse (W) | 1,968 | 0 | 3 | 0 | 0 | 0 |
| Update (M) | 1,758 | 2 | 4 | 0 | 2 | 4 |
| | <u>75,270</u> | <u>36</u> | <u>44</u> | <u>57</u> | <u>26</u> | <u>49</u> |

(W) = weekly, (F) = fortnightly, (M) = monthly.

ten journals ranked in order of total cost to the company. They refer to the advertising of Drug C.

If Table 80 and Table 81 are compared, it is apparent that the most popular journal in which advertising can be included is *General Practitioner*. However, this journal had only five advertisements included in the twenty month schedule whereas *Doctor* which appeared as eighth equal in Table 80 was singled out as the journal into which the majority, (thirty-five) of advertisements were included.

Pulse, another popular journal as shown in Table 80 was second from the bottom in the industry's schedule of advertising with only three inclusions. Advertising in *Pulse* is the most costly per journal inclusion. It is more expensive than the BMJ, however cost should not be the primary consideration. Twenty-seven doctors said they read *Pulse* whereas sixteen said they read *Doctor*, with thirty-eight stating that they read *General Practitioner*. It seems that advertising emphasis was not in phase with the reading habits of the general practitioners.

The timing of insertions was analysed, Using data from chapter 4, and it was noted that the *early-prescribers* read less journals overall so the decision to increase the number of inclusions from the first four-month period to the third, was in accordance with this finding. Less specialist-journals were read by the *early-prescribers*. The pattern of advertising in the British Journal of Psychiatry should reflect this.

The figures in Table 81 show a slight increase in inclusions after the eighth month. Perhaps it would have been better to put one advertisement in this journal in the first four months, two in the second and five in the next two months, increasing the emphasis as the

the *late-prescribers* began to notice the product. It should be noted that journal-advertisements are also seen by hospital doctors and their response has not been studied here. *Mims* is the source of information most widely used by general practitioners. It is therefore surprising that more money was not spent on advertisements in *Mims*. An advertisement placed in *Mims* has a greater chance of being seen than one placed anywhere else. The figures from which Table 81 was constructed refer to the 1976 and 1977 advertising schedules. Journal placement, during this period was based on *ad hoc* readership surveys and impressions gained by representatives. This method of information collection was recently criticised and *JICMAR* (the Joint Industry Committee, Media and Readership Survey) has begun a series of analyses on reading habits of general practitioners. Such rationalisation of journal-advertisement placement has been shown in this chapter to be important.

Chapter 6

University of Florida
The Prescribing Model

Every day the doctor prescribes treatments for his patients on the basis of his assessment of their condition. The particular drug he chooses depends upon his attitude to the drugs which he knows are available and suitable to treat that condition. His attitude will be formed from experience and his susceptibility to promotion.

The choice of the drug by the doctor will also depend upon the way it is received by the *patient* and its effect on him. Other factors such as the doctor's age, sex and qualifications may also have a marked effect on the decision to prescribe a particular product.

Obviously it would be useful if the pharmaceutical industry was able to ascertain in advance the probability of a doctor deciding to prescribe a new drug. A model could be constructed taking those variables into account which were shown to be valuable in forecasting the prescribing of drugs. This proposed model should reproduce changes in prescribing habits in different therapeutic classes. It should include a measure of a doctor's attitude and susceptibility to promotion and attempt to demonstrate changes in prescribing brought about by experience in a drug's use. The model must contain recognizable variables which can be quantified and compared objectively such as age and prescriptions issued, in a set period. In chapter 2, a number of variables were chosen with which to attempt to characterise the prescriber. Some of these variables were shown to be related to the way drug-information was used. In chapter 3 a number of additional variables were considered and in chapter 4 further variables were used to probe for differences and similarities between *early* and *late-prescribers*.

In this chapter, the four hundred and thirty-four doctors who were selected in the 'Newcastle Prescription Study (NP Study) are again considered. Each variable which could be obtained from the FPC Medical List was taken for every doctor, and filed. The files containing the variables already selected from the 'PD2' and the NP Study' were merged with the FPC file. A composite variables list was therefore produced consisting of -

The exact number of years qualified.

The university of graduation.

The doctor's sex.

The qualifications achieved.

The list size.

The number of prescriptions issued in the sample month.

The number of partners.

The number of new drugs issued in the sample month.

Whether the doctor was a 'high', 'medium' or 'low' prescriber in each therapeutic class.

The number of *different* preparations issued by each doctor in the sample month in each therapeutic class.

Doctor-groups were compiled corresponding to the dates of first prescribing each of the six new drugs labelled as A,B,C,D,E and F which, as was explained earlier, corresponded to five therapeutic classes.

Each doctor's variables, including his 'high' 'medium' or 'low' prescribing value in a particular therapeutic class of drugs, was compared with his date of first prescribing a new drug in that therapeutic class.

Before a more detailed account of these results is given, a consideration of other prescriber models will be made and a generalised

picture of prescribing will be discussed.

Wilson et al (1964) considered the need for a common objective measure which could be related to the factors which may influence prescribing. This was taken to be the total number of prescriptions issued for a particular item by the individuals in a sample of GP's. 'Operational research' was applied to this system in order to assign numerical values to the various factors.

The formula:-

$$y = f(x_1 x_2 x_3 x_4 \dots x_n)$$

was derived where

y = the number of prescriptions issued for a particular item

x_1 = the comparative price of equivalent alternatives

x_2 = the impact of consultant advice

x_3 = the impact of advertising

x_4 = the impact of representatives' calls...

Prediction of 'y' should be possible for new products knowing values of x_1 to x_n . Eventually, six factors which were considered measurable, were selected. These were:-

1. The influence of pharmaceutical mailing.
2. The influence of journal advertising.
3. The number and effects of representatives' visits .
4. The effect of consultant recommendations.
5. The influence of the cost of the drug.
6. The influence of the company's 'image'.

A number of experiments were carried out to elucidate the 'values' for these factors and weights were added to the general formula.

The solution of the equation was made when

$$S = \sum (y - a_1 x_1 \dots a_5 x_5)^2 \text{ was a minimum value.}$$

(factor 6 was omitted due to difficulty in measurements).

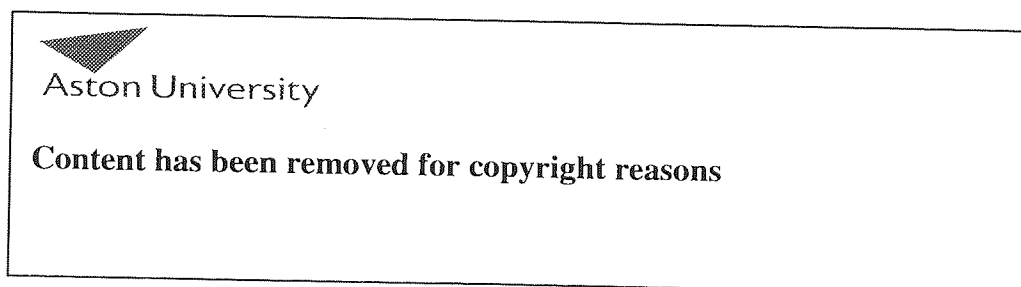
The multilinear regression equation found to fit the data was:-

$$y = 0.187X_1 + 0.616X_2 + 0.369X_3 - 0.348X_4 - 0.031X_5 \dots 2$$

Scaling was used and the standard deviations were large indicating a 'looseness' of measurement. The variables chosen are few in number and do not take into account the doctor's personality in any way. None of the characteristics such as age or sex were used in the computation. It's usefulness as a predictive model is doubtful. Considering it was formulated fifteen years ago, it represents one of the earlier attempts to quantify what almost seems to be 'random prescribing'. Miller (1970) used simulation where simple analogues of elements in the 'market' are studied. The model produced is applied to one therapeutic area at a time but it is capable of adaptation to almost any area of therapy.

His model of drug prescribing is shown in Figure 19.

Figure 19



From Report-Esomar - Miller I.S. p 199.

The Prescriber is presented in isolation and there is no attempt to mention professional sources having their effect. Equations were formulated to assess the various factors involved in prescribing. These included attitude, susceptibility to advertising as well as other promotion and experience.

Equations 3 and 4 show how experience with a new drug modifies the doctor's prescribing habits.

$$a_1 = a + \gamma(x-\bar{x})(1-a^2)(1-a^3) \text{ when } x \geq \bar{x} \dots\dots 3$$

$$a_1 = a + \gamma(x-\bar{x})(1-a^2)(1+a^3) \text{ when } x < \bar{x} \dots\dots 4$$

where a_1 = new attitude

a = old attitude

γ = the susceptibility to a new experience

$(x-\bar{x})$ = the difference between what actually happened and what the doctor expected to happen

The equation which shows attitude modification by promotion is constructed to indicate diminishing returns of increased promotional stimuli.

Each medium has its own value of p in equation 5.

$$a^1 = \frac{a + (1-\exp[-\beta p])(1-a^2)}{2} \dots\dots\dots 5$$

a^1 = new attitude

a = old attitude

β = the susceptibility to promotion

p = relative promotional stimulus.

The measurement of 'attitudes' necessary for solving the above equations needs to be calculated or derived. Presumably this is done by asking questions in interviews or questionnaires. The interpretation of any results must be questioned as hard data was not presented.

Attitude Testing

Fishbein (1967) was obviously sceptical of any useful results which might arise from attitude testing in that he said *"After more than 75 years of attitude research there is still little, if any, consistent evidence supporting the hypothesis that knowledge of an individual's attitude toward some object will allow one to predict the way he will behave with respect to the object"*. This was the view of someone who

had worked in the field of 'marketing' for many years and cannot be dismissed out of hand. To some extent, this comment leads to the conclusion that a doctor's attitude to a new drug cannot be predicted in all but a superficial way. Other studies have considered that the perceived risk in prescribing new drugs has an important influence on that prescribing. (Williamson P. 1975).

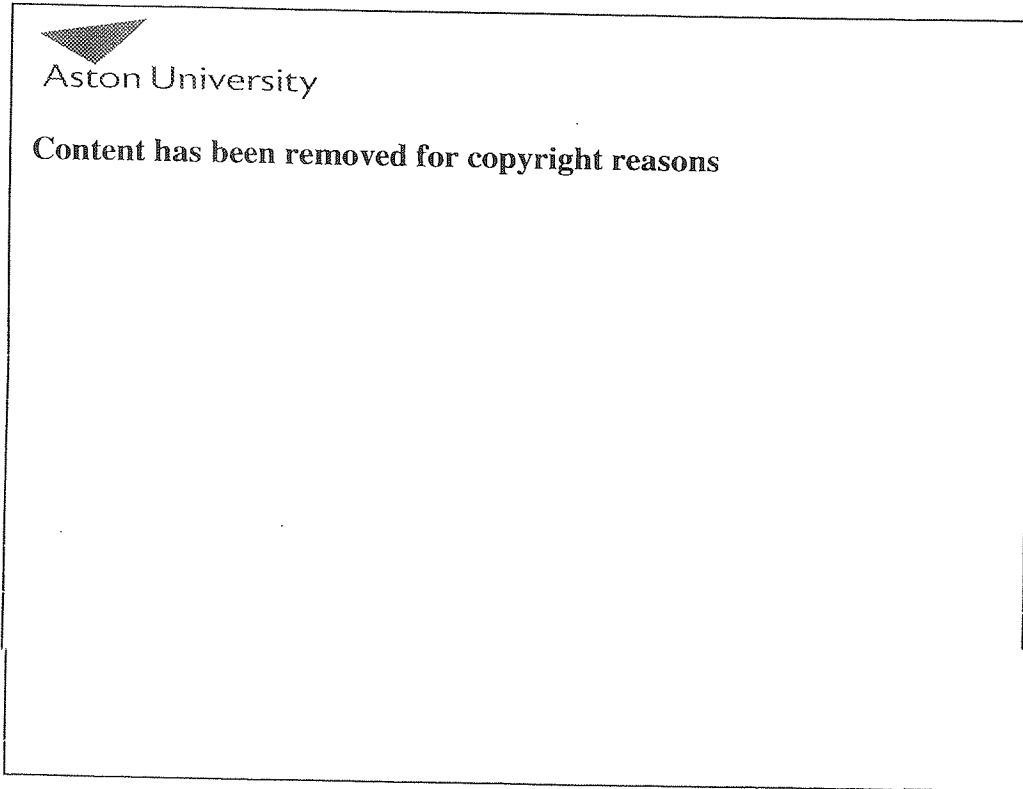
The models discussed so far attempt to quantify attitudes to patients, drugs and medicines in general. Fishbein might be correct, on the other hand if a *reproducible* method of attitude assessment was available then the way a prescriber views the mentioned abstract entities would be interesting. It would be particularly interesting to see how a doctor views drugs, new drugs, and patients and add these data to the objectively assessed or obtained variables.

A general model was given by Smith (1977) in his comprehensive review. This is reproduced as Figure 20. Pritchard (1978) considered a model of prescribing in purely attitudinal terms. The doctor's reactions, positive and negative, were matched with the patient's. (Figure 21. Pritchard then followed this with a more objective approach which also included the prescriber's attitudes in certain circumstances (Figure 22). Others have used a more 'sophisticated' but not necessarily a more illuminating view of the process. One was previously shown in Figure 1, chapter 1 of this study page 13 where the physician is shown in the context of his 'social system'.

The 'antecedents' include both the objective and attitudinal-subjective variables for each doctor. Although a doctor may be isolated, even so, as was shown in chapter 2, he still uses professional contacts as a source of information about new drugs. These 'professional-contacts' also form part of a 'social-system' and are equally resistant

Figure 20

Drug Prescribing



From 'Drug product advertising and prescribing:' a review of the
evidence.

Am. J. Hosp. Pharm. 34 p. 1218 1977.

Figure 21.

MODEL OF PRESCRIBING

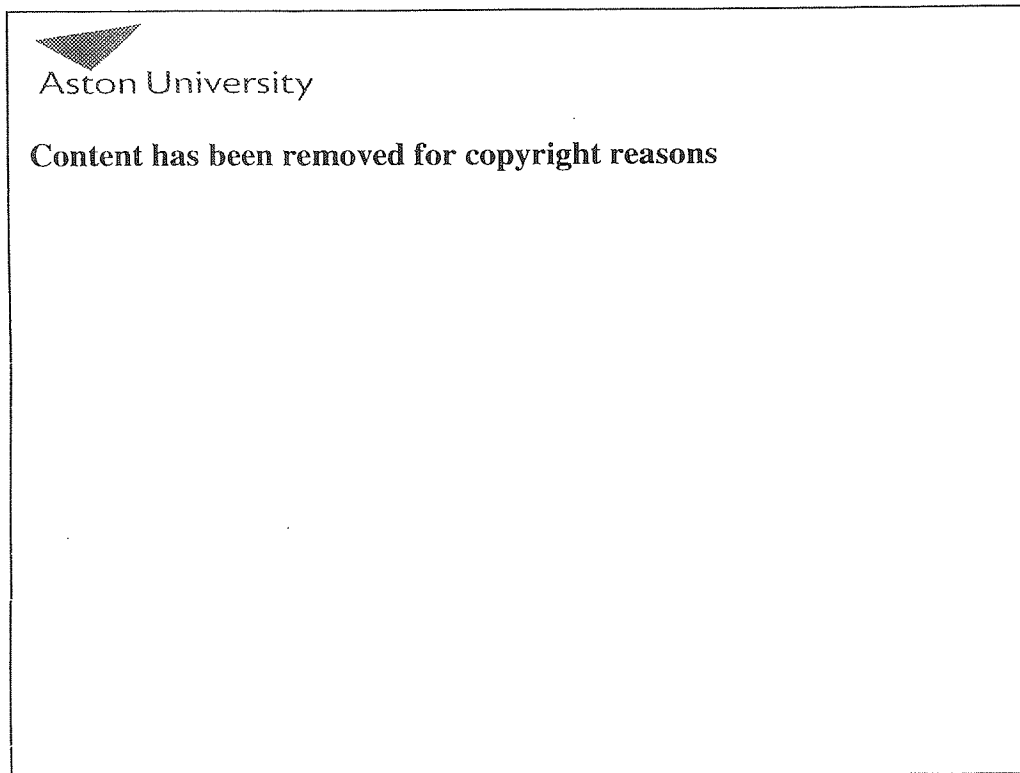
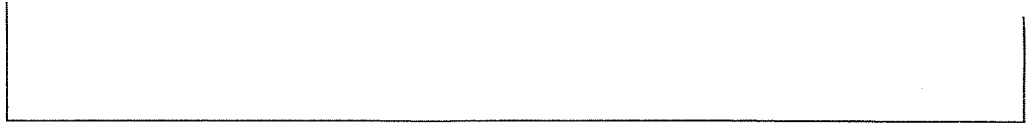


Figure 22

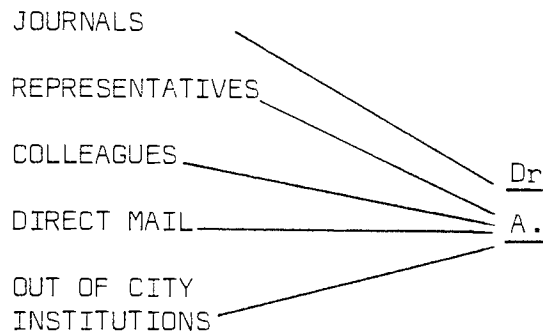
DECISION TREE ON PRESCRIBING A NEW DRUG



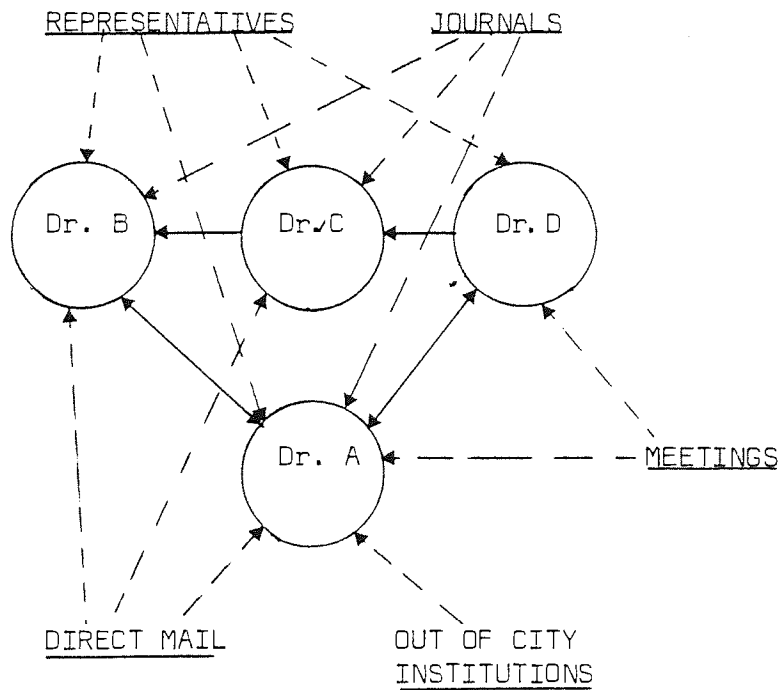
Astron University

Content has been removed for copyright reasons

Figure 23



The individual as the Target of Outside Stimuli.



The Community as the Target of Outside Stimuli:

Adapted from Medical Innovation, a Diffusion Study. Coleman,

Katz and Menzel 1966 Bobbs-Merrill Co. Inc.

or susceptible to promotional activity and comments from other colleagues. Coleman, Katz and Menzel (Coleman J.S. 1966) placed each practitioner within his 'objectively' measured social-network, calculating the number of links each had with other doctors and assessing the influence this network had on prescribing (Figure 23).

Such a complex model is probably nearer the truth than the isolated identification of selected variables for each doctor taken as it were 'out of context'. However, if a model is ever to be used to *predict* the possible outcome of a new-drug promotional campaign, then some easily obtainable or measurable variable must be used *as* and not merely part of, the model. These variables may not correspond exactly to the situation but they must be chosen so as to give a high probability of prediction.

The number of prescriptions issued, the number of new drugs prescribed and the number of *different* preparations selected in a therapeutic class are a measure of the influence of drug information. Other variables such as 'list size' and 'number of partners' are crude indicators of personality while the remaining variables, including age and sex, relate directly to the prescriber as an individual. This gives figure 24.

Figure 24.

Measurement of:-

| "The Prescriber" | "Personality" | "Information Influence" |
|---------------------|--------------------|---|
| Age | List size | Prescriptions issued |
| Sex | Number of partners | Different preparations |
| University attended | Qualifications | New preparations 'High', 'Medium', 'Low' prescriber |

It could be argued that the number of new drugs issued in a particular therapeutic class will, to some extent, measure the *susceptibility* of the prescriber to the drug information and therefore also be a measure of his 'personality'. Similarly some of the other variables may be redefined in terms of the other broad categories.

The data used to construct the model was first used to answer the three hypotheses 24, 25 and 26 mentioned in chapter 3, page 136.

Hypothesis 24

An early prescriber in one therapeutic class of drugs will also be an early-prescriber in other unrelated therapeutic classes.

Crosstabulations of the date of first prescribing each new drug by each other new drug in the five therapeutic classes were constructed and the numbers in each 'cell' were compared. Table 82 shows the *early, group 2* and *late-prescribers* of Drug A crosstabulated by the *early, group 2* and *late-prescribers* of Drug B or C.

Table 82

| Drug A time to prescribe 'by' Drug B or C time to prescribe | | | | |
|---|-------------|---------|---------|---------|
| Drug A | Drug B or C | | | |
| | Early | Group 2 | Late | |
| Early | 20% | 32% | 48% | 100% |
| | | | | N = 108 |
| Group 2 | 16% | 32% | 52% | 100% |
| | | | | N = 258 |
| Late | 17% | 17% | 66% | 100% |
| | | | | N = 12 |
| | N = 66 | N = 119 | N = 193 | |
| | | | | ΣN=378 |

Twenty percent of the *early-prescribers* of Drug A are also *early-prescribers* of Drugs B or C. Sixteen percent of the *group 2 prescribers* of Drug A are *early-prescribers* of Drugs B or C and

seventeen percent of the *late-prescribers* of Drug A are *early-prescribers* of Drug B or C. This indicates a slightly greater probability that an *early-prescriber* of a drug in one therapeutic class will also be an *early-prescriber* in another unrelated class. Similar crosstabulations were carried out for the other drugs studied. Table 83 shows Drug A crosstabulated against Drug D (a bronchodilator-inhaler).

Table 83

| Drug A time to prescribe 'by' Drug D time to prescribe | | | |
|--|--------|-------------------|---------|
| Drug A | Early | Drug D Group-2 | |
| Early | 11% | 89% | 100% |
| | | | N = 108 |
| Group 2 | 10% | 90% | 100% |
| | | | N = 258 |
| Late | 0% | 100% | 100% |
| | | | N = 12 |
| | N = 37 | N = 341 | |
| | | | ΣN= 378 |

For Drugs D, E and F a three month sample was examined after the drugs launch, prescribers of the new drugs within the three months were termed *early-prescribers*, all others were termed *group-2 prescribers*.

The indication for all crosstabulations was that slightly more *early-prescribers* of one drug, than was estimated, were also *early-prescribers* of other drugs. The differences were not significant using the chi square test.

The final crosstabulation was of Drug A against Drug B or C when only *early-prescribers* of Drugs D, E and F had been selected. See Table 84.

Table 84

(Drugs D, E and F all "early")

Drug A time to prescribe 'by' Drug B or C time to prescribe.

| Drug A | Early | Drugs B or C Group-2 | Late |
|---------|-------|-------------------------|------|
| Early | 1 | 1 | 2 |
| Group 2 | 1 | 1 | 0 |
| Late | 0 | 0 | 0 |

One prescriber had prescribed all five drugs within the time defined as 'early' for the particular drug. The expected values, obtained by multiplying together the proportion of *early-prescribers* in each therapeutic class is 0.15. It would therefore have been more probable for the value in the first 'cell' to have been '0'. The hypothesis is rejected as results were insignificant. The trend in the first tables (eg. 82 and 83) does not give a conclusive result. Coleman, Katz and Menzel suggested a higher probability of an *early-prescriber* in one therapeutic class being an *early-prescriber* in other therapeutic classes where 32% of *early-prescribers* of one drug were also *early-prescribers* for two others. (Coleman J.S. 1966 p 34). This constituted eleven prescribers and is comparable with Table 82 for Drug A by Drug B or C. The twenty percent was equivalent to thirteen prescribers. Using Coleman's criteria we must conclude that there are doctors who prescribe new drugs in different therapeutic classes early in the products' lives but as the number of classes studied increases, so the number of *early-prescribers* in all classes decreases until as was shown in Table 84, only one prescriber remains.

Hypothesis 25

A high prescriber in one therapeutic class will be an early-prescriber in that class.

Again using the Newcastle Prescription Study sample, the number

of prescriptions written in each therapeutic class studied was categorized into 'low', 'medium' and 'high'. When the study was started, there were five hundred and eight doctors and the categories contained similar numbers. As was previously explained, when the files were merged, one hundred and thirty prescribers were excluded because of a paucity of data. This unfortunate exclusion gave the 'low', 'medium' and 'high' groups uneven distributions. However, the numbers are still great enough to carry out statistical tests. Each prescribing level, for the five therapeutic classes, was compared with the corresponding drug in that therapeutic class. (See tables 85 to 89).

Table 85

Drug A time to prescribe (antiulcer)

| Level for Class A | Early | Group 2 | Late | |
|----------------------|---------|---------|--------|------------------|
| Low | 24% | 70% | 6% | 100% |
| | | | | N = 97 |
| Medium | 25% | 75% | 0% | 100% |
| | | | | N = 116 |
| High | 34% | 62% | 4% | 100% |
| | | | | N = 165 |
| | N = 108 | N = 258 | N = 12 | $\Sigma N = 378$ |

The chi-square value is 6.3 with 2 degrees of freedom (df) which is significant at the five percent level. The significant difference was obtained from the high value of 'early/high' and the low value of 'low/early' prescribers.

Table 86

Drug B or C time to prescribe (Anti-depressant)

| Level for Class B/C | Early | Group 2 | Late | |
|---------------------|--------|---------|---------|----------|
| Low | 14% | 24% | 62% | 100% |
| | | | | N = 96 |
| Medium | 11% | 34% | 55% | 100% |
| | | | | N = 106 |
| High | 23% | 34% | 43% | 100% |
| | | | | N = 176 |
| | N = 66 | N = 119 | N = 193 | ΣN = 378 |

The chi-square value is 10.2 with 2 df. This is significant at the 1% level. Again the major contribution to the difference was from the high/early and the low/early prescribers.

Table 87

Drug D - time to prescribe (Bronchodilator-Inhaler)

| Level for Class D | Early | Group 2 | |
|-------------------|--------|---------|----------|
| Low | 5% | 95% | 100% |
| | | | N = 87 |
| Medium | 4% | 96% | 100% |
| | | | N = 137 |
| High | 18% | 82% | 100% |
| | N = 37 | N = 341 | ΣN = 378 |

The chi-square value is 18.2 with 2 df. This is significant at the 1% level.

Table 88

Drug E - time to prescribe (Antirheumatic)

| Level for Class E | Early | Group 2 | |
|-------------------|---------|---------|------------------|
| Low | 29% | 71% | 100% |
| | | | N = 83 |
| Medium | 37% | 63% | 100% |
| | | | N = 136 |
| High | 51% | 49% | 100% |
| | | | N = 159 |
| | N = 155 | N = 223 | $\Sigma N = 378$ |

The chi-square value is 12.6 with 2 df, again it is significant at the 1% level.

Table 89

Drug F - time to prescribe (Hypnotic)

| Level for Class F | Early | Group 2 | |
|-------------------|--------|---------|------------------|
| Low | 14% | 86% | 100% |
| | | | N = 92 |
| Medium | 17% | 83% | 100% |
| | | | N = 120 |
| High | 23% | 77% | 100% |
| | | | N = 166 |
| | N = 72 | N = 306 | $\Sigma N = 378$ |

The chi-square value is 3.3 with 2 df which is not significant.

In each case, the high-prescribers were more often the *early-prescribers*. This was more obvious with some drugs than with others. As was previously suggested, the fact that a doctor writes a large

number of prescriptions in a particular therapeutic class can mean that he sees more than the average number of patients who *he* defines as needing treatment by administering a preparation in that class. This gives him the greater opportunity of trying out new preparations in that class. He has perhaps become a specialist in that class. The hypothesis is not rejected. The number of prescriptions written by doctors in a particular therapeutic class in a month can be ascertained from the PPA and therefore the time to prescribe can, to some extent, be predicted.

Hypothesis 26

The number of different preparations prescribed in a particular therapeutic class is related to innovativeness.

This means that the number of different preparations a doctor prescribed in a particular therapeutic class should be correlated with the 'time to prescribe'. Tables 90 to 94 show the results. The range of different preparations was again categorized into three groups. 'Low-D', 'Medium-D' and 'High-D'.

Table 90

Drug A - time to prescribe (Antiulcer)

| Different preparations prescribed | Early | Group 2 | Late | |
|-----------------------------------|---------|---------|--------|-----------------|
| Low-D | 19% | 70% | 11% | 100% N = 63 |
| Medium-D | 28% | 70 | 2% | 100% N = 274 |
| High-D | 46% | 54% | 0% | 100% N = 41 |
| | N = 108 | N = 258 | N = 12 | ΣN = 378. |

The chi-square value is 6.6 with 1 df. This is significant at the 1% level indicating that the prescribers of the largest number of different preparations in a particular class are also the *early-prescribers*.

Table 91

Drug B or C time to prescribe (Antidepressant)

| Different preparations prescribed | Early | Group 2 | Late | |
|-----------------------------------|--------|---------|---------|----------|
| Low-D | 19% | 28% | 53% | 100% |
| | | | | N = 58 |
| Medium | 16% | 31% | 53% | 100% |
| | | | | N = 286 |
| High-D | 24% | 44% | 32% | 100% |
| | | | | N = 36 |
| | N = 66 | N = 119 | N = 193 | ΣN = 378 |

The chi-square value is 0.9 with 1 df which is not significant.

Table 92

Drug D - time to prescribe (Bronchodilator-inhaler)

| Different preparations prescribed | Early | Group 2 | |
|-----------------------------------|--------|---------|----------|
| Low-D | 5% | 95% | 100% |
| | | | N = 130 |
| Medium-D | 10% | 90% | 100% |
| | | | N = 218 |
| High-D | 30% | 70% | 100% |
| | | | N = 30 |
| | N = 37 | N = 341 | ΣN = 378 |

The chi-square value is 17 with 2 df which is significant at the 1% level.

Table 93

Drug E time to prescribe (Antirheumatic)

| Different preparation prescribed | Early | Group 2 | |
|----------------------------------|---------|---------|---------|
| Low-D | 27% | 73% | 100% |
| | | | N = 59 |
| Medium-D | 40% | 60% | 100% |
| | | | N = 270 |
| High-D | 63% | 37% | 100% |
| | | | N = 49 |
| | N = 155 | N = 223 | N = 378 |

The chi-square value is 15.8 with 2 df which is, again significant at the 1% level, again indicating the greater probability for a prescriber of a large number of different preparations in a therapeutic class being an *early-prescriber* in that therapeutic class.

Table 94

Drug F time to prescribe (Hypnotic)

| Different preparations prescribed | Early | Group 2 | |
|-----------------------------------|-------|---------|---------|
| Low-D | 8% | 92% | 100% |
| | | | N = 72 |
| Medium-D | 21% | 79% | 100% |
| | | | N = 235 |
| High-D | 23% | 78% | 100% |
| | | | N = 71 |

The chi-square value is 6 with 2 df which is significant at the 5% level.

The hypothesis is not rejected. Generally, the number of different preparations prescribed in a therapeutic class is related

to innovativeness. If the doctor is a high prescriber of different preparations in a therapeutic class he is likely to be an *early-prescriber* in that class. The measure may be slightly more sensitive in that the chi-square values were higher, but the extra work involved in assessing this number is perhaps unjustified when the total number of prescriptions written in a class is more straightforward and less time consuming.

Finally, the variables discussed throughout this chapter were correlated with the time to prescribe a new drug. This was carried out for Drug A, the innovation. Multiple regression (equivalent to discriminant analysis) was carried out and the values were noted.

Using all the variables including the high, medium and low values and the high-D, medium-D and low-D values accounted for less than ten per cent of the variation.

The list size was the most important variable. The higher the list size the more likely the doctor is to be an *early-prescriber*.

The number of new drugs prescribed in the sample month was the second most important variable. When it was included in the equation, the variable 'number of different preparation' was excluded, indicating the close correlation of the two variables. As the number of new drugs prescribed increased so the probability of prescribing Drug A 'early' increased. 'The years qualified' variable and 'the number of partners', were the only other variables which help to explain the variation. The fewer the number of years qualified, the greater the probability of Drug A being prescribed early; and the single practice doctors were more likely to be *early-prescribers* than joint practice doctors.

The general equation is:-

The 'Time to Prescribe' = $f(-L-M+N+P)$ and is solved when:-

$$T_{\text{early}} = 0.00008 \times L - 0.01525 \times M + 0.00457 \times N + 0.0781 \times P + 1.85424 \text{ (const.)}$$

$$\text{Std. error} = (0.00002) \quad (0.00531) \quad (0.00238) \quad (0.05047) \quad r^2 = 0.07077$$

T_{early} = The prescribing of a new drug (A) early in its market life

L = List size .

M = Number of new drugs prescribed in a one month sample

N = Years qualified (Medical age)

P = Partnership number

Over ninety percent of the variation has not been accounted for and further work should bear this in mind. Little can be gained by re-examining the variables not included in the above equation. A therapeutic class indicator plus Williamson's risk values may be required to aid refinement.

Chapter 7

Discussion, Conclusion and
Recommendations for further work.

Chapter 7

Discussion

This chapter attempts to bring together the discussions and conclusions of each of the preceding chapters. Reference to these should also be made.

The underlying theme of this work has been the impact of drug information on the prescribing of new drugs by general practitioners. Three new drugs were selected and followed throughout the study.

Where a *need* for a drug treatment exists and the doctor is dissatisfied with established products, he is more receptive to new products in the same therapeutic class which offer possible advantages. Prior to prescribing, he must become aware of the new preparation and ensure that claims made by the manufacturer are justified. He must minimise the perceived risk involved in prescribing the product after the need for it has been established.

Three new drugs were studied. They were labelled A, B and C. A is an innovation in that it fills a gap in therapy. B and C are anti-depressants with the same novel chemical structure and are additions to the current range available. There are few drugs which will treat stomach ulcers effectively; Drug A was shown to be successful in this area and as such was accepted rapidly in the community of physicians studied. In contrast, Drugs B and C were two more anti-depressants. Doctors needed to treat depressed patients but there were many products available which had already been tried by physicians. The 'risk' involved in prescribing anti-depressants is high (Williamson P. 1975a) indicating that doctors would need more information to convince them of the need to change. The perceived risk in prescribing Drug A was overcome by the drug's innovative nature. The perceived risk in prescribing and the advantages claimed for Drugs B and C were not seen to justify their addition to the prescribing

repertoire of the majority of doctors studied in the fifteen months of this work. The acceptance of a new drug in a therapeutic class which has few alternatives was shown to proceed more rapidly than in areas where many products exist and where the perceived risk in prescribing is high. It was suggested that innovations such as Drug A are accepted via a contagion process where information is spread from doctor to doctor. 'Me-too' drugs such as B and C (me-too here is defined as preparations which do not appear to offer immediate advantages over other established products) are accepted more slowly as reason for change is not critical. The process involved in the acceptance of me-too's would appear to involve discrete packages of information given to each doctor probably by the representative. It did not appear to involve a spread of information as in the contagion process from one doctor to another. In the fifteen months of the study, almost fifty percent of doctors had prescribed Drug C at least once and approximately twenty-five percent had prescribed Drug B. In this time neither Drugs B or C had achieved more than a two percent share of the anti-depressant market.

If the need is established, the risk is minimised and the decision to prescribe the new drug made, then the doctor is still theoretically faced with a dilemma. If he waits until the new product is established and has received its accolades from the medical profession as a whole, he may be accused of denying a new treatment to his patients. If he uses the product without first making himself fully aware of its possible hazards, the accusation may be one of rashness.

Prescriptions are the only objective record of a doctor's prescribing decisions and as such constitute the only completely valid measure of drug prescribing. For this reason they were used in a number of experiments in this study. The vast number of prescriptions written each month produces the greatest problem for research. To

look at each script takes time, to read and interpret takes considerably longer. With the approval of the DHSS and the Prescription Pricing Authority, a valuable store of prescribing information can be tapped.

A questionnaire was designed to answer twenty-three hypotheses about drug information. The questionnaire was sent to six hundred randomly selected general medical practitioners in the West Midlands (see Appendix 1). *Mims, Prescribers' Journal* and consultant recommendations were regarded as the three most important general sources of information. When the *process* of drug adoption was considered, 'industrial' sources and in particular the drug-firm representative were shown to be used most at the *awareness* stage. 'Professional' sources such as articles in medical journals were used most at the evaluation stage. In all, five stages were accepted as forming the drug-adoption process, these are awareness, interest, evaluation, trial and adoption. Each stage was discussed and an active-awareness sub-stage was proposed. This was said to be the activity of the drug-firm representative.

A number of variables were selected to divide doctors into groups which could be compared. The usefulness of physicians typology to the pharmaceutical industry is the identification of those segments of the physician population which contains the best 'customer' prospects. It is also used to attempt to screen out those physicians who are poorer prospects for prescribing a company's products. Lower prescribing activity gets less promotion (Report-Esomar 1970). The variables chosen in chapter 2 were; number of partners; the number of years qualified; the university attended; the qualifications obtained; the list-size; whether the doctor dispenses or not; the number of years the doctor has been in the particular practice and whether or not he specialises.

It was shown that certain sub-groups used sources of information in different ways, for example, single-practice doctors rated direct-mail, controlled circulation journals and the BNF significantly higher than joint practice doctors. They also used the representative significantly more as a source with which to *evaluate* a new product. The representative was regarded by the joint practice doctors as more suitable as a source to bring *awareness* of a new product. This leads to the conclusion that the pharmaceutical industry could increase promotional cost-effectiveness if they were more selective in the approach to dissemination. Instead of blanket promotion of all forms of information to all doctors, it would be more useful to say, increase direct-mail to single practice doctors while decreasing the amount sent to joint practice doctors. Money could be saved by cutting down on stamps and envelopes. The print order for advertisements could be tailored to the number of doctors intended to contact. The representative would be more cost-effective if he concentrated on those doctors who wanted to see him and who would be most receptive to his form of promotion. At present the industry relies upon field personnel to attempt to assess the doctor's approach to promotion. However, each representative must bring his company's products to the attention of the doctor and time is at a premium. There is little time left for assessment. Using the suggested variables, which can be discovered without recourse to the individual doctor, is one way of successful selection.

Using various methods of assessment including a 'professional/ industrial' scoring technique described in chapter 2, it was shown that 'industrial' sources of information were preferred particularly by older single-practice doctors who had not specialised or achieved higher qualifications and who did not engage staff to do their own dispensing.

By the time the patient enters the consulting room, discusses his symptoms with the doctor and receives a prescription, drug-information in its many forms will already have acted. If a problem in drug therapy arises during a consultation, where can he turn? To use the telephone is difficult when a patient is sitting opposite. This usually eliminates the current direct approach to a consultant, hospital, pharmacist or any other 'active' form of drug information. A colleague may be approached if the doctor practices in a group but this again can be difficult. A copy of *Mims* will be on the doctor's desk. *Mims* was shown to be the single most useful source of information available to the general practitioner. A quick concise reference work is needed. From doctor's comments, *Mims* with the addition of a cross-reference to other more detailed information was thought to be such a potential source. The more detailed source must also be convenient to use and as up-to-date as *Mims* to include new drugs as soon as they are marketed. In the near future, a card reference system produced nationally and updated regularly with a cross-index to *Mims* could be suitable. Space could be saved if the cards were produced in microform say, microfiche, each surgery being equipped with a microform-reader. For slightly further in the future, widespread use of mini and micro computers which could be programmed or used as an interactive-updatable information source would seem to be ideal. At present *Martindale*, though not widely used by general medical practitioners could be utilised. The simplest cross index would be a reference at each entry of *Mims* to a page in *Martindale*. It would be necessary to fulfill criteria already suggested, to update *Martindale* at regular intervals.

The replacement of the drug-firm representative by a pharmacist

or clinical pharmacologist was suggested in the questionnaire and approved of by the majority of respondents. The peripatetic information pharmacist is envisaged as being based in an information unit contactable by telephone. The information pharmacists now available in hospital drug-information units would seem an excellent beginning to the change. At present the hospital drug-information units have not been a significant source of information to general practitioners. This may be because of the effort needed on the part of the doctor to contact them. Alternatively it may be as a result of a lack of publicity.

Prescribers' Journal was discussed and found to be potentially useful but sometimes failed, like the BNF because of its lack of currency. The source was used more at the evaluation stage of drug adoption but is generally concerned with discussion of more established products and treatments.

Selection of doctors who prefer certain forms of drug-information has been discussed. The pharmaceutical industry attempts to assess which doctors will be likely to prescribe new drugs early after the products launch. Field personnel are used and the Walsh market 'bureau' has a computer-based information system which uses data gathered from representatives. The compiled data is sold to individual manufacturers who may include their own additional information when appropriate. Manufacturers who were contacted considered that this selection is essential although reliable data was very difficult to obtain.

Adoption of new drugs

From the study outlined and discussed in chapter 3, the acceptance of an innovation by prescribers was followed. The *early* and *late-prescribers* of a number of new drugs were identified. Each member of

the two groups was sent a questionnaire. The aim was to elucidate those characteristics which are common among members of the same group and those which would highlight differences between the groups. The prescriber who chose a new drug when it had been marketed for only a short time was termed the *early-prescriber* and he was found to issue slightly more prescriptions and have a larger list-size than the *late-prescriber*. He was also found to read fewer journals and generally rated industrial information more highly than *late-prescribers*. This implies that *early-prescribers* base their prescribing decisions upon less well-evaluated information than the *late-prescribers*. As was stated in chapter 4, 'industrial' information may be chosen because it is concise, appears rapidly after a drug launch and is positive. It was suggested that doctors' 'information-thresholds' differ, some require very little information to evaluate a new drug, some require a great deal.

Doctors qualified for over ten years were more likely to be *early-prescribers* and doctors qualified for over thirty years were more likely to be *late-prescribers*.

No doctor prescribes a new drug until he has enough evaluated information upon which to base a prescribing decision. The problem is whether or not his perception of *enough* is soundly based.

Before moving onto the impact of drug information on the prescriber and the prescribing process, two points of influence were indicated by the study. First, the area of practice was shown to be important in chapter 2 and chapter 5A as Lee concluded in 1965. Further work on the subject is overdue. Secondly, the way doctors view a new drug will reflect the way it is accepted. A real innovation which fills a gap in therapy will be accepted. An innovation for

which there is no perceived need will be resisted. Some forms of advertising are intended to appeal to those experiencing some dissatisfaction with their current drug prescribing, to induce a change.

The Impact of Drug Information

Different sources of drug information were used at different stages in the drug adoption process. Some sources such as the pharmacist, have very little effect on prescribing at present. If generic substitution was introduced or if the representative was replaced by a pharmacist as proposed in chapter 2, then his impact and influence would increase greatly. The representative is the single most influential source of drug information. He visits doctors very soon after a new product's launch and he is generally well-liked and ranked high as a source of information, particularly for *awareness*. The consultant is cited as a very useful source of information, particularly for *evaluation* and was studied further in chapter 5A. It is perhaps surprising that many studies mention the consultant as a source of information yet few have attempted to measure his influence on prescribing. The prescription analysis technique was used as before. His influence in the field of rheumatology appeared small. The correlations r_s between consultant and doctor-groups were all insignificant, whereas among doctor-groups correlations were high. This indicates a nearly uniform pattern of prescribing among doctors in the community, where the other forms of drug information out-weighed and out-numbered the consultant. The consultant is an expert in his field and as was shown in the responses to the questionnaire, he is respected and probably acts as an 'opinion-leader'. In a previous study it was shown that between four and seven percent of a general practitioner's patients

will be referred to a consultant. Most will be referred back to the general practitioner with a recommended course of treatment, *some* of whom will be recommended to take preparations new to the general practitioner. The 'opinion-leadership' of the consultant comes from the findings that ninety-three percent of general practitioners said that they had prescribed products which they had not previously prescribed when they had been recommended by a consultant via a referred patient. However, sixty-seven percent of the practitioners had felt it necessary at some time to substitute a recommended product for one with which they were more familiar. Therefore, as doctors must prescribe drugs even in the narrow field of the specialist, the fact that a consultant is well respected in this field will only mean that the relatively few 'difficult' patients seen by a general practitioner will be referred to him for treatment. The general practitioner will always treat the majority of his patients himself so the potential for direct influence is small. The results from chapter 5A suggest the possibility of two forms of consultant influence. First a *passive* form where recommendations made by the consultant for a specific patient are accepted by the general practitioner for the specified patient and then if results are favourable for subsequent patients. Secondly an *active* influence is proposed where the consultant recommends a course of treatment or a drug combination *without* reference to a specific patient. This may be in the form of papers to learned journals or talks at postgraduate meetings. It is suggested that this 'active influence' was responsible for the N* scripts mentioned in chapter 5A, and for the psychiatrist-recommended combination therapy discussed by Marshall (1972).

In chapter 5 one of the professional sources of information, the consultant was studied. To balance this, the second half of the chapter (5B) was concerned with an industrial source of information, the possible influence of journal advertising by the pharmaceutical industry. The positioning of advertisements within a journal is important. The journals chosen in which to place an advertisement are just as important. Certain journals were chosen by the manufacturers of Drug C for advertisement inclusion. The emphasis on particular journals, however, did not reflect the journal reading patterns of the respondents to the second questionnaire. The reading characteristics of the general practitioner should be the guiding factor in the choice of journal for advertisement placement. The expenditure on advertising did not appear to be related to the total sales income. Some articles suggested a minimum promotional expenditure on the therapeutic class. This minimum expenditure was not reached by either the manufacturer of Drug B or Drug C and this may be one of the contributing factors in the failure of these two preparations to make a substantial impact on the antidepressant market.

It was shown in chapter 6 that there were 'innovative' doctors who were *early-prescribers* of new drugs in a number of therapeutic classes, but they were few in number. It was also shown that prescribers of the largest number of items in a therapeutic class were more likely to be the *early-prescribers* in that therapeutic class as were doctors who prescribed the greatest number of *different* preparations in a therapeutic class. Measuring the number of different items was shown to be a more accurate measure of 'prescribing time' but was more difficult and time consuming to ascertain.

A model to relate obtained variables to the 'prescribing time' was constructed. The equation found to best fit the data was given by

$$T_{\text{early}} = 0.00008 \times L - 0.01525 \times M + 0.00457 \times N + 0.0781 \times P + 1.85424 \text{ (const.)}$$

where T_{early} = The prescribing of a new drug (A) early in its market life

L = List size

M = Number of new drugs prescribed in a one month sample

N = Years qualified (Medical age)

P = Partnership number.

Conclusions

Drug information is available at all levels of sophistication. The depth, quality and impartiality are there if the prescriber has the time, desire and need to find it. Time is the limiting factor and information producers must provide concise, accurate and speedy information in a form which is acceptable to the prescriber.

Three new drugs were considered, an innovation and two 'me-too' preparations. The innovation was accepted via a contagion process information passing among doctors. The 'me-too' preparations were accepted more slowly and by a process which did not include the contagion effect.

'Industrial' sources of information such as direct mail were preferred by older, single practice doctors who did not specialise, had a first degree only and who did not do their own dispensing.

Early-prescribers issued slightly more prescriptions per month had a larger list size, read fewer journals and generally rated 'industrial' sources of information more highly than *late-prescribers*. There was a tendency, greater than was expected, that an *early-prescriber* in one therapeutic class would also be an *early-prescriber* in other unrelated therapeutic classes.

Consultants were not shown to influence significantly the prescribing habits of general practitioners. Influence was said to be of two components, active and passive the active component being the most influential.

Rationalisation of journal advertisement placement was suggested. The choice of journals into which advertisements are placed should be based upon reading patterns of general practitioners not upon *ad hoc* reports which was found to be the current practice.

A model was proposed relating the 'time to prescribe' a new drug to the variables selected in the study. Four of the variables were shown

to have a significant influence. These were; the list size, the medical age of the prescriber, the number of new preparations prescribed in a given time and the number of partners in the practice.

It is concluded that the single most important variable in measuring the rate and 'style' of adoption is the *drug*. An innovation is accepted rapidly via a contagion process, 'me-too' preparations are accepted more slowly and lack the contagion effect.

Recommendations for further work:

The area in which a doctor practices should be studied more fully. The area may be defined in terms of physical barriers such as roads, or, as previously suggested, may be defined in terms of the representatives' detailing area.

The data base produced during this study can be used for further research. The dosage regimen of each drug studied, for example, has not been considered. Those doctors who feel confident enough to alter the dosage regimens from those recommended by the manufacturers should be studied.

The doctors in the study may be further investigated, particularly concerning the attitude towards, and reliance upon, the representative. ABPI may be willing to assist in the work.

The work carried out on the consultant should be extended. More consultant prescriptions need to be analysed.

It was stated that the only objective measure of a prescribing decision was the prescription. Similarly, there is only one method of studying the decision making process and that is to be at the consultation and see which sources of information are used for new and established products. A pilot study is recommended with willing general practitioners.

Doctors have suggested new sources of information which they would like to use. Attempts should be made to assess the practical usefulness of some of the suggestions. Space, being a limiting factor, the study of acceptability of microfiche and computers by doctors may be useful.

For OFFICE
Use Only
C. J. J. J.

APPENDIX 1

QUESTIONNAIRE 1

The names of the three drugs have been removed and replaced with the code used throughout the text.

Similarly, the companies names have been erased.

For Office
Use Only
Code Clmn

Questionnaire on Sources of Drug Information

NAME.....

ADDRESS.....

.....

.....

.....

NUMBER OF DOCTORS IN THE PRACTICE.....

(INCLUDING SELF)

DATE QUALIFIED.....

(FULLY REGISTERED IN GREAT BRITAIN)

MEDICAL SCHOOL ATTENDED.....

QUALIFICATION OBTAINED.....

1 6

2

3

4

5

1 7

2

3

4

5

6

7

1 8

2

3

4

5

1 9

2

3

4

1 10

2

3

4

1.

Assessment of sources of Information in current use

1. Would you please indicate by circling the appropriate number how, in general, you rate the following as sources of information on pharmaceutical products.

LIST 1

| | | Very Good | Good | Average | Poor | Very Poor | |
|----|---|-----------|------|---------|------|-----------|----|
| A. | Advertisements in <u>medical journals</u> | 5 | 4 | 3 | 2 | 1 | 11 |
| B. | Articles in <u>medical journals</u> | 5 | 4 | 3 | 2 | 1 | 12 |
| C. | Direct Mail (<u>through the post</u>) | 5 | 4 | 3 | 2 | 1 | 13 |
| D. | Drug Firm <u>Representatives</u> | 5 | 4 | 3 | 2 | 1 | 14 |
| E. | <u>Mims</u> | 5 | 4 | 3 | 2 | 1 | 15 |
| F. | Recommendation from <u>consultants</u> | 5 | 4 | 3 | 2 | 1 | 16 |
| G. | Professional <u>Contacts</u> | 5 | 4 | 3 | 2 | 1 | 17 |
| H. | Drug Firm <u>exhibitions</u> | 5 | 4 | 3 | 2 | 1 | 18 |
| I. | Controlled Circulation <u>Journals</u> such as 'Doctor' and 'G.P.' | 5 | 4 | 3 | 2 | 1 | 19 |
| J. | <u>Pharmacists</u> | 5 | 4 | 3 | 2 | 1 | 19 |
| K. | BNF (<u>British National Formulary</u>) | 5 | 4 | 3 | 2 | 1 | 20 |
| L. | <u>Prescribers' Journal</u> | 5 | 4 | 3 | 2 | 1 | 21 |
| M. | <u>Text-Books</u> | 5 | 4 | 3 | 2 | 1 | 22 |
| N. | <u>Data Sheet Compendium</u> | 5 | 4 | 3 | 2 | 1 | 23 |
| P. | <u>Drug Firm Symposia</u> | 5 | 4 | 3 | 2 | 1 | 24 |
| Q. | <u>Drug Information Units (hospital based)</u> | 5 | 4 | 3 | 2 | 1 | 25 |
| R. | <u>Drug and Therapeutics Bulletin</u> | 5 | 4 | 3 | 2 | 1 | 26 |
| S. | <u>The Media (e.g. Newspapers, Television)</u> | 5 | 4 | 3 | 2 | 1 | 27 |
| T. | <u>Martindale (Extra Pharmacopoeia)</u> | 5 | 4 | 3 | 2 | 1 | 28 |
| U. | <u>Drug Firm Medical Info. Units</u> | 5 | 4 | 3 | 2 | 1 | 29 |
| V. | <i>Postgrad. Refresher <u>Courses</u> *</i> | 5 | 4 | 3 | 2 | 1 | 30 |
| W. | <i>Medical School of <u>Graduation</u> *</i> | 5 | 4 | 3 | 2 | 1 | |

Would you please give the five sources which you find most useful in general, in rank order.

1. 31
2. 32
3. 33
4. 34
5. 35

* added for the final 100 questionnaires only.

For Office
Use Only

- | | | | Code | Clmn |
|----|--|--------------------------|------|------|
| 2. | Which of the sources in LIST 1 do you find most useful for finding out about the <u>existence</u> of a new drug? | | | |
| | PLEASE STATE LETTER(S) FROM LIST 1 | <input type="checkbox"/> | — | 36 |
| | | <input type="checkbox"/> | — | 37 |
| 3. | Which of the sources in LIST 1 do you find most useful for finding out about the <u>medical value</u> of a new drug? | | | |
| | PLEASE STATE LETTER(S) FROM LIST 1 | <input type="checkbox"/> | — | 38 |
| | | <input type="checkbox"/> | — | 39 |
| 4. | When you require advice or information about a new drug treatment where do you usually turn first? | | | |
| | PLEASE STATE LETTER(S) FROM LIST 1 | <input type="checkbox"/> | — | 40 |
| | | <input type="checkbox"/> | — | 41 |

Assessment of Drug Information Specifically about three Drug Products

- | | | | | |
|----|---|--------------------------|---|----|
| 5. | Has any patient presented with symptoms of peptic ulcer or reflux oesophagitis in the last twelve months? | | | |
| | YES | <input type="checkbox"/> | 1 | 42 |
| | NO | <input type="checkbox"/> | 2 | |
| | DON'T REMEMBER | <input type="checkbox"/> | 3 | |
| 6. | Has any patient presented with endogenous depression in the last twelve months? | | | |
| | YES | <input type="checkbox"/> | 1 | |
| | NO | <input type="checkbox"/> | 2 | |
| | DON'T REMEMBER | <input type="checkbox"/> | 3 | |

7. Do you know of a product DRUG A

YES

NO

1 44

IF NO PLEASE GO TO QUESTION 13

8. Would you please state from which source you first heard of DRUG A

PLEASE STATE LETTER FROM LIST 1

- 45

9. Have you prescribed DRUG A?

YES

NO

1 46

2

IF NO PLEASE GO TO QUESTION 13

10. Did you initiate the treatment or was the patient referred to you on DRUG A, from Hospital?

INITIATED TREATMENT

1

PATIENT REFERRED FROM HOSPITAL

2 47

BOTH

3

11. Other than the source(s) specified in answer to question 8, did you use any others before deciding to prescribe DRUG A?

NO OTHER SOURCES USED

1 48

OTHER SOURCES USED

PLEASE STATE LETTER(S) FROM LIST 1

-

-

12. If you have stated more than one source in answer to question 11 which one source did you find the most useful?

PLEASE STATE LETTER FROM LIST 1

- 49

13. Do you know of a product DRUG B? YES

NO

IF NO PLEASE GO TO QUESTION 19

1 50

14. Would you please state from which source you first heard of DRUG B.

PLEASE STATE LETTER(S) FROM LIST 1

- 51

15. Have you prescribed DRUG B? YES

NO

IF NO PLEASE GO TO QUESTION 19

1 52

2

16. Did you initiate the treatment, or was the patient referred to you, on DRUG B, from hospital?

INITIATED TREATMENT

1 53

PATIENT REFERRED FROM HOSPITAL

2

BOTH

3

17. Other than the source(s) specified in answer to question 14, did you use any others before deciding to prescribe DRUG B?

NO OTHER SOURCE USED

1 54

OTHER SOURCES USED

PLEASE STATE LETTER(S) FROM LIST 1

18. If you have stated more than one source in answer to question 17 which one source did you find most useful?

PLEASE STATE LETTER FROM LIST 1

- 55

19. Do you know of a product DRUG C?

YES

1

56

NO

IF NO PLEASE GO TO QUESTION 25

20. Would you please state from which source you first heard of DRUG C

PLEASE STATE LETTER FROM LIST 1

-

57

21. Have you prescribed DRUG C?

YES

1

58

NO

2

IF NO PLEASE GO TO QUESTION 25

22. Did you initiate the treatment or was the patient referred to you on DRUG C from hospital?

INITIATED TREATMENT

1

59

PATIENT REFERRED FROM HOSPITAL

2

BOTH

3

23. Other than the source(s) specified in answer to question 20, did you use any others before deciding to prescribe DRUG C?

NO OTHER SOURCES USED

1

60

OTHER SOURCES USED

PLEASE STATE LETTER(S) FROM LIST 1

-

24. If you have stated more than one source, in answer to question 23, which one source did you find the most useful?

PLEASE STATE LETTER FROM LIST 1

-

61

25. If you have not prescribed any of the three products mentioned in questions 7-24 which drug have you prescribed for the first time in the last few months.

PLEASE NAME PRODUCT _____

1 62

26. From which source did you first hear of this product?

PLEASE STATE LETTER(S) FROM LIST 1

63

27. Did you initiate the new treatment or was the patient referred to you on the new drug from elsewhere?

INITIATED TREATMENT

1 64

PATIENT REFERRED FROM HOSPITAL

2

BOTH

3

28. Apart from the source(s) stated in answer to question 26, which source(s) did you use before prescribing the product?

NO OTHER SOURCE USED

1 65

IF OTHER SOURCES USED

PLEASE STATE LETTER(S) FROM LIST 1

-

29. DRUG B (anti-depressant) is manufactured by Company Y,
does this reassure you?

| | | | |
|-------------|--------------------------|---|----|
| YES | <input type="checkbox"/> | 1 | 66 |
| NO | <input type="checkbox"/> | 2 | |
| INDIFFERENT | <input type="checkbox"/> | 3 | |

DRUG C (anti-depressant) is manufactured by Company Z,
does this reassure you?

| | | | |
|-------------|--------------------------|---|----|
| YES | <input type="checkbox"/> | 1 | 67 |
| NO | <input type="checkbox"/> | 2 | |
| INDIFFERENT | <input type="checkbox"/> | 3 | |

DRUG A ('anti-ulcer') is manufactured by Company X,
does this reassure you?

| | | | |
|-------------|--------------------------|---|----|
| YES | <input type="checkbox"/> | 1 | 68 |
| NO | <input type="checkbox"/> | 2 | |
| INDIFFERENT | <input type="checkbox"/> | 3 | |

Finally, a brief section of possible future developments.

- 30. The British National Formulary (BNF) would be more useful as a source of current drug information to doctors if it was produced annually.

STRONGLY AGREE AGREE INDIFFERENT DISAGREE STRONGLY DISAGREE

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

1 69
2
3
4
5

- 31. The drug firm representative should be replaced by a pharmacist or clinical pharmacologist, visiting doctors by appointment on a regular basis bringing together information about all new drugs brought out in the time between visits.

STRONGLY AGREE AGREE INDIFFERENT DISAGREE STRONGLY DISAGREE

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

1 70
2
3
4
5

- 32. An updatable card index type drug information system arranged under disease and approved name of product, paid for at least in part by the user, would be preferable to direct mail (through the post unsolicited drug firm literature).

STRONGLY AGREE AGREE INDIFFERENT DISAGREE STRONGLY DISAGREE

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

1 71
2
3
4
5

33. An independent local drug information unit, probably based in hospital or university (pharmacy or medical department) which could be contacted by telephone, would be a very useful adjunct to the information sources currently available

STRONGLY AGREE AGREE INDIFFERENT DISAGREE STRONGLY DISAGREE

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

1 72
2
3
4
5

34. The generic name of a medicinal product, followed by the manufacturer's name should replace the present use of trade names in drug advertising.

STRONGLY AGREE AGREE INDIFFERENT DISAGREE STRONGLY DISAGREE

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

1 73
2
3
4
5

34a. Would you be prepared to prescribe in generic name plus the manufacturer's name?

YES

NO

35. A desk reference published monthly, laid out like *Mims* but with a cross reference between the generic name of the product and its proprietary equivalents, would be a better single source of drug information than those at present available.

STRONGLY AGREE AGREE INDIFFERENT DISAGREE STRONGLY DISAGREE

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

PRACTICE DETAILS

36. Would you please state your approximate individual
list size _____

1
2
3
4
5

Would you please state your approximate practice
list size _____

37. Are you a dispensing practitioner?

YES

1

76

NO

2

38. How many receptionists (full-time equivalent) are
there in the practice? _____

1
2
3
4
5

77

39. How long have you been in this practice? _____

1
2
3
4
5

78

40. As a general practitioner do you specialize in any
particular field of medical practice? _____

1
2

79

1

80

41. Your comments on future drug information sources would be greatly appreciated.

For any further information please telephone the University of Aston, 021-359-3611 ext. 6253.

Thank you once again for your co-operation.

Yours sincerely,

B. Strickland-Hodge.

APPENDIX 2

QUESTIONNAIRE 2

Questionnaire on Sources of Information (2)

1. Which of the following do you use to provide information about drugs. (Please enter a tick as appropriate).
Please rank those sources which you use from 1. (the best), 2, 3, 4, 5, etc. Do not rank those which you do not use.

| <u>List 1</u> | <u>USE</u> | <u>RANK</u> |
|---|------------|-------------|
| A. Advertisements in medical journals | | |
| B. Articles in medical journals | | |
| C. Direct mail | | |
| D. Drug Firm Representatives | | |
| E. <i>Mims</i> | | |
| F. Consultants | | |
| G. Contact with doctors in the practice | | |
| H. Contact with doctors socially | | |
| I. Drug firm exhibitions | | |
| J. Drug firm symposia | | |
| K. Controlled circulation journals such as GP and Pulse | | |
| L. Hospital Pharmacists | | |
| M. Retail Pharmacists | | |
| N. B.N.F. (British National Formulary) | | |
| O. Prescribers' Journal | | |
| P. Martindale | | |
| Q. Data Sheet Compendium | | |
| R. Hospital Drug Information Services | | |
| S. Drug Firm Medical Information Units | | |
| T. The media (newspapers, TV etc.) | | |
| U. Text-books | | |
| V. Postgraduate Refresher Courses | | |
| W. Medical School of graduation | | |

2. Which of the source(s) in List 1 do you find most useful for finding out about the existence of a new drug?

PLEASE STATE LETTER(S) FROM LIST 1

3. Which of the sources in List 1 do you find most useful for finding out about the medical value of a new drug?

PLEASE STATE LETTER(S) FROM LIST 1

4. When you require further information about a new drug treatment from where do you usually get this?

PLEASE STATE LETTER(S) FROM LIST 1

5. Have you ever used the C.S.M. yellow card method of adverse drug reaction reporting?

YES

NO

If NO please go to Question 7

6. About how many times in the past year have you used this system?

..... per year.

7. Do you report adverse reactions in any other way?

Please specify

YES

NO

8. In general, does the data sheet provide you with enough information from which to prescribe a new drug?

YES

NO

9. Do you read direct mail (through the post) pharmaceutical company mailings?

YES

NO

10. a) If a patient has been referred to hospital and returns with a consultant recommendation for a new product which you have not previously prescribed, have you subsequently prescribed the new product for other patients when indicated?

YES

NO

b) Have you ever felt it necessary to substitute the recommended product for one with which you are more familiar?

YES

NO

THE REPRESENTATIVE

11. About how many drug firm representatives do you see at your surgery in a week?

SEE NO REPS.

..... per week

12. If 'SEE NO REPS' is this your own policy or is it the policy of the practice?

BOTH

PRACTICE POLICY

OWN POLICY

PLEASE GO TO QUESTION 16

13. Do you see all representatives or are you selective?

SELECTIVE

SEE ALL

14. If you are selective, is this on a basis of the representatives personality or on the firm he is representing?

REPRESENTATIVE'S PERSONALITY

THE FIRM BEING REPRESENTED

OTHER, PLEASE SPECIFY _____

15. GENERALLY after seeing the representative do you have enough information on which to decide to prescribe the discussed product?

YES

NO

DEPENDS ON THE REPRESENTATIVE

JOURNALS

16. Would you please indicate, by encircling the appropriate number, which journals you receive, scan, read and use as reference material.

| | <u>Receive</u> | <u>Scan</u> | <u>Read</u> | <u>Use as reference</u> |
|--|----------------|-------------|-------------|-------------------------|
| BMJ | 4 | 3 | 2 | 1 |
| LANCET.. .. . | 4 | 3 | 2 | 1 |
| PRACTITIONER.. .. . | 4 | 3 | 2 | 1 |
| JOURNAL OF THE ROYAL COLLEGE OF GENERAL PRACTITIONERS.. .. . | 4 | 3 | 2 | 1 |
| GENERAL PRACTITIONER | 4 | 3 | 2 | 1 |
| PULSE | 4 | 3 | 2 | 1 |
| MEDICAL NEWS.. .. . | 4 | 3 | 2 | 1 |
| DOCTOR.. .. . | 4 | 3 | 2 | 1 |
| WORLD MEDICINE | 4 | 3 | 2 | 1 |
| HEALTH TRENDS | 4 | 3 | 2 | 1 |
| PRESCRIBERS' JOURNAL | 4 | 3 | 2 | 1 |
| NEW SCIENTIST | 4 | 3 | 2 | 1 |
| MIMS MAGAZINE | 4 | 3 | 2 | 1 |
| MEDICAL LETTER | 4 | 3 | 2 | 1 |
| OTHERS PLEASE SPECIFY | 4 | 3 | 2 | 1 |

17. Do you attend postgraduate medical courses?

YES

NO

18. If yes, about how many of these courses have you attended in the past year?

NUMBER

19. Have you attended any conferences or symposia in the last year which were held outside your own area?

YES

NO

20. Do you think meetings and symposia arranged by drug firms give enough information on which to prescribe a new drug?

YES

NO

OCCASIONALLY

PRACTICE DETAILS

21. How long have you been in this practice?

..... years

22. As a general medical practitioner, do you specialise in any particular field of medicine?

YES

NO

If Yes, please specify.....

23. Are you working in a partnership?

Please specify

a) Single handed

b) Partnership of 1

c) Partnership of 2 or 3

d) 4 or more

If you have any comments about future information sources would you please indicate these below.

Thank you very much for your co-operation.

Appendix 3

Statistics

The Proportion Test

This test is used to compare two samples, where the sampling distribution of differences in proportions is approximately normally distributed with mean and standard deviation given by

$$\mu = (P_1 - P_2) = 0 \text{ and } \sigma (P_1 - P_2) = \sqrt{pq(1/N_1 + 1/N_2)}$$

P_1 and P_2 are the sample proportions obtained in large samples of sizes N_1 and N_2 drawn from respective population having proportions P_1 and P_2 .

The null hypothesis is proposed that there is no difference between the population parameters, i.e. $P_1 - P_2 = 0$, and thus the samples are drawn from the same parent population.

$$\mu = P_1 - P_2, \sigma (P_1 - P_2) = \sqrt{pq (1/N_1 + 1/N_2)}$$

where $p = \frac{N_1 P_1 + N_2 P_2}{N_1 + N_2}$ is used as an estimate of

population proportion and $q = 1 - p$.

By using the standard normal variable

$$Z = \frac{P_1 - P_2 - 0}{\sigma (P_1 - P_2)}$$
$$\text{i.e. } Z = \frac{P_1 - P_2}{\sqrt{pq(1/N_1 + 1/N_2)}}$$

we can test observed differences at an appropriate level of significance (5%) and test the null hypothesis to test if there is any significant difference between the two samples.

If $|Z| < 1.96$ we can conclude the null hypothesis is not rejected that is, there is no significant difference.

The 'T' Test

The 'T' Test is used to compare two sample means of two samples of data.

The test statistic in this case is t whereby :-

$$t = \frac{\bar{x}_1 - \bar{x}_2}{S \sqrt{1/n_1 + 1/n_2}}$$

\bar{x}_1 = Mean of sample 1

\bar{x}_2 = Mean of sample 2

$$S^2 = \frac{S_1^2 + S_2^2}{2}$$

where S_1 = Standard Deviation of Sample 1.

S_2 = Standard Deviation of sample 2.

The null hypothesis proposed is $H_0: \bar{x}_1 = \bar{x}_2$ (i.e. the two sample means are the same).

Hence by testing t, we can test observed differences at the appropriate level of significance (5%) and test the null hypothesis to find if there is any significant difference between the two samples.

If $|t| < 1.96$ we can conclude the null hypothesis is not rejected and that there is no significant difference at the 95% confidence limit.

Chi-squared Test for Two Independent Samples

When the data consists of frequencies in discrete categories, the chi-squared test may be used to determine the significance of differences between two independent groups.

The null hypothesis may be tested by

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^k \frac{[O_{ij} - E_{ij}]^2}{E_{ij}}$$

where O_{ij} = observed number of cases categorized in i th row of j th column.

E_{ij} = number of cases expected under H_0 to be categorized in i th row of j th column.

r k

$\Sigma \Sigma$ directs one to sum over all (r) rows and all (k)

$i=1$ $j=1$

columns i.e. to sum over all cells.

The degrees of freedom from which to calculate the significance are obtained by

$$df = (r-1)(k-1)$$

where r = the number of rows and k = the number of columns in the contingency table.

Spearman's Rank Correlation Coefficient

This is a measure of association which requires that both variables be measured in at least an ordinal scale so that the objects or individuals under study may be ranked in two ordered series.

$$r_s = 1 - \frac{\sum_{i=1}^N d_i^2}{N^3 - N}$$

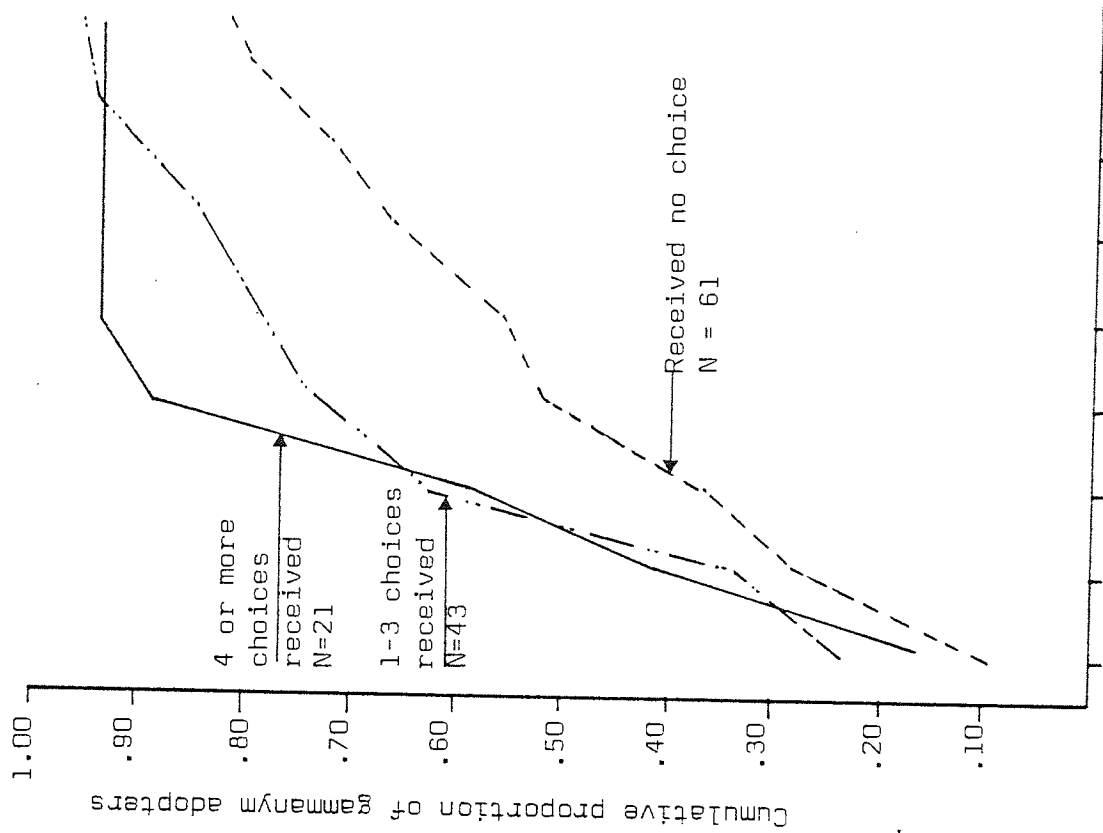
where $\sum d_i^2$ - the sum of the squares of the difference between the two rank orders of a variable.

N = the number of values in the sample.

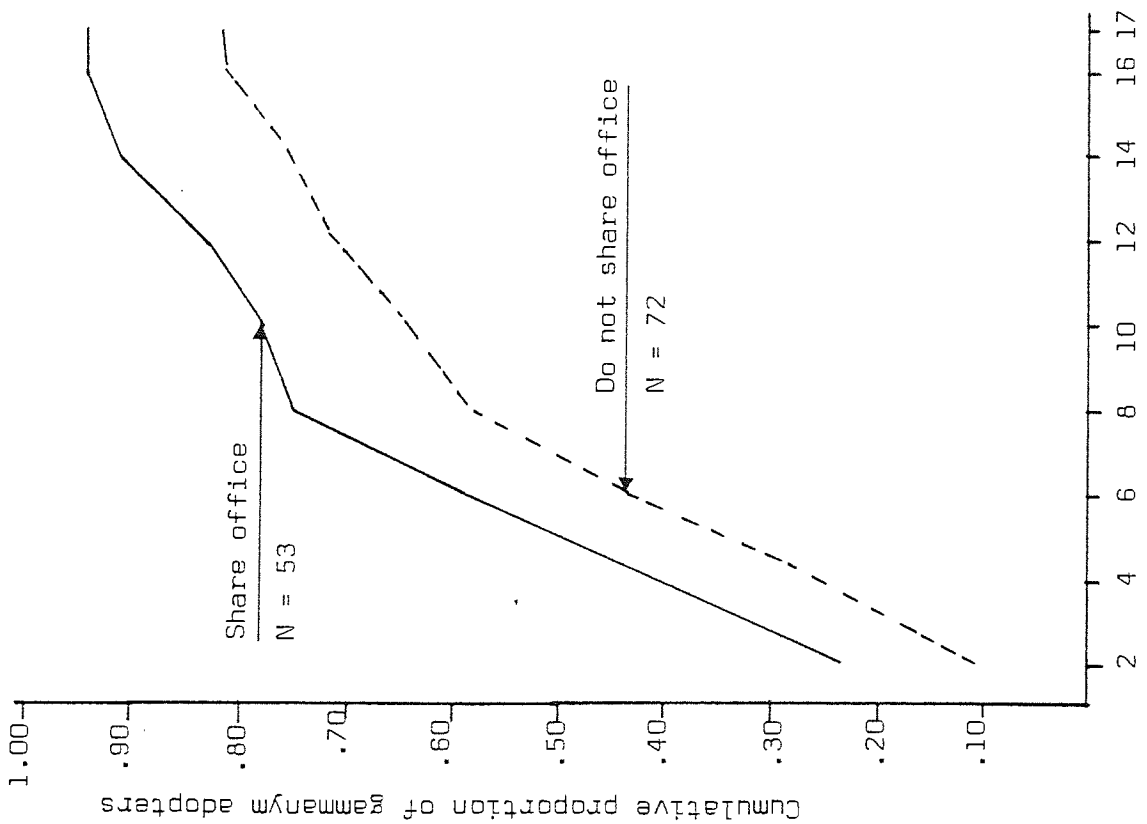
APPENDIX 4

FIGURES FROM THE WORK OF

COLEMAN KATZ AND MENZELS



Months after release of gammanym
Fig. 22



Months after release of gammanym
Fig. 21

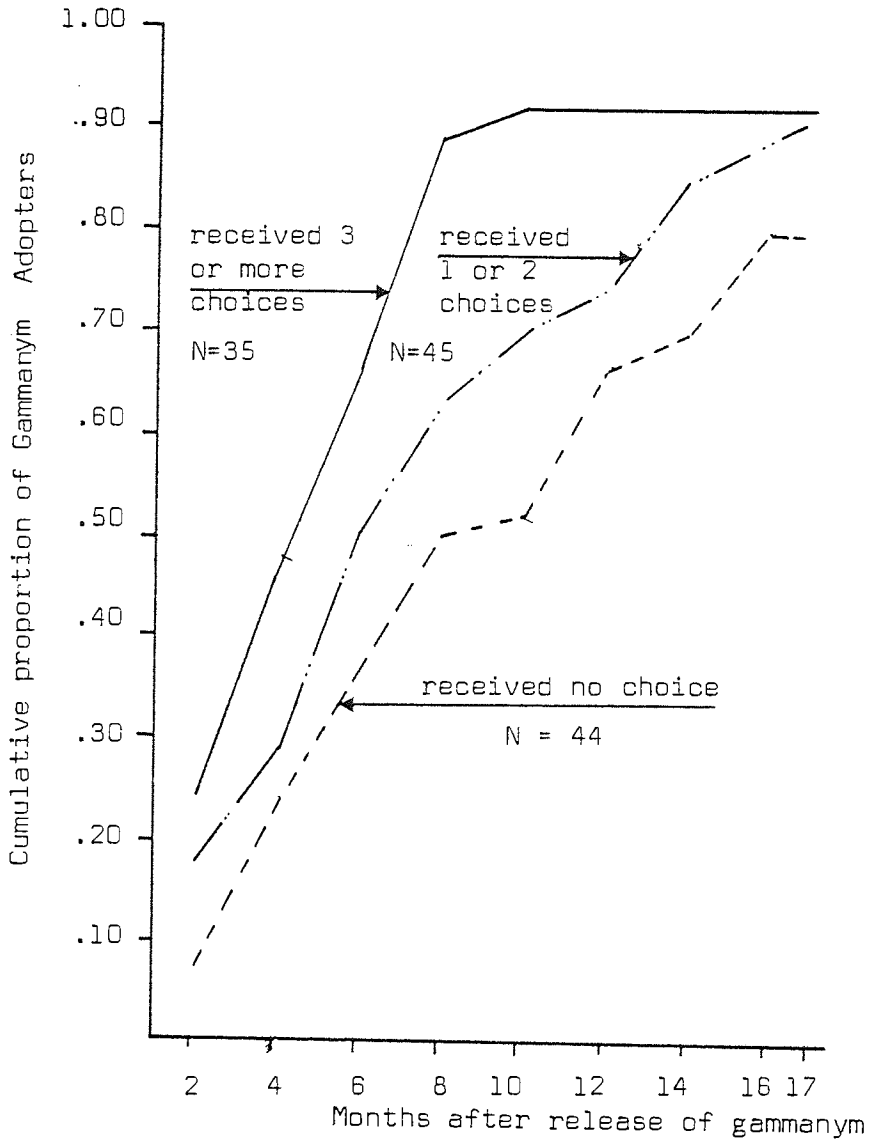


Fig. 23

APPENDIX 5

QUESTIONNAIRE 3

ADVERTISING QUESTIONNAIRE

HAVE YOU SEEN THIS ADVERTISEMENT BEFORE?

NO.

YES.

Which therapeutic group
of drugs do you think
it could be advertising?

Do you know which product
is being advertised?

← NO ←

DON'T KNOW

NO

YES (INCORRECT) _____

YES (CORRECT) _____

CORRECT _____

INCORRECT _____

CAN YOU GIVE ITS
APPROVED NAME?

NO

YES (INCORRECT) _____

YES (CORRECT) _____

NAME THE PRODUCT

HAVE YOU HEARD OF THIS PRODUCT?

NO

QUESTIONS ON THIS PRODUCT END

YES

DO YOU KNOW THE APPROXIMATE NO _____

COST TO THE NHS OF 100 TABLETS YES. _____

DO YOU KNOW WHICH COMPANY NO _____

MANUFACTURES IT? YES _____

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*Reviews are marked with an * following the year.*