General practitioners and medical research*

G. I. WATSON, *O.B.E.*, M.A., M.D., F.R.C.G.P., D.T.M.&H.
Peaslake, Surrey
Member of the Foundation Council

MORE lives have been saved or improved by fundamental research in general practice than by all the kings' physicians and all the kings' surgeons put together. A provocative statement! Is it true or false? Let us study part of the record during the last 200 years.

Through William Withering's introduction of digitalis in 1776 and James Mackenzie's monumental study of rheumatic heart disease,[1] countless thousands of patients have lived longer and less disabled lives. In 1796 Edward Jenner established vaccination as a successful means of preventing smallpox and thereby lit a trail of scientific prophylaxis which has burned right on through Pasteur's work against rabies up to modern immunization against so many of the killing and maiming diseases.

Robert Koch was a district doctor who varied the monotony of his long rides over country roads by using his microscope at home. In 1876 he described the anthrax bacillus, in 1878 pyogenic bacteria, in 1882 the tubercle bacillus, and in 1883 the cholera vibrio.

By his fundamental studies of filariasis in a Hong Kong practice, Patrick Manson [2] discovered the first insect borne infection of man. Later Manson was able to guide Ronald Ross in India (whose only qualification at that time was the L.M.S.S.A.) through three painstaking years, up to his discovery in 1897 of the life cycle of the malaria parasite in mosquitoes.[3] Manson was instrumental too in promoting the establishment of schools of tropical medicine, the first of which was in Liverpool, where Ross was appointed lecturer in 1899. Ross' discovery in turn led Malcolm Watson,[4] a general practitioner in Malaya, in 1901 to dig the first anti-malarial drain in the Empire if not in the world. From such small but vital beginnings has come the control not only of malaria but also of yellow fever and many other insect-borne diseases in all five continents. It has been estimated that malaria alone previously killed over one million people in the world every year.

These men and others since, like Will Pickles of our own times, being general practitioners, were in contact with a wide variety of people in differing circumstances. This gave them, as it does us, many chances to study or hear about Nature's own experiments.[5] Technically they may have had to 'do-it-yourself'; but as observers, logical thinkers, or scientists they were among the giants.

Withering heard about the value of foxglove for dropsy from a Shropshire woman, an unqualified practitioner, a feldsher of those days, and spent the rest of his life testing and standardising the use of digitalis.

We all know the nursery rhyme "Where are you going to, my *pretty* maid?" "I'm going a-milking, sir," she said. "What is your fortune, my pretty maid?" "My *face* is my fortune, sir" she said. Jenner was assured by a confident milkmaid that the cowpox on her hands would protect her pretty face from being pockmarked by the smallpox

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which was then locally prevalent; *he* was not content after that to leave to Nature or occupation the decision whether his patients could achieve the same protection in future.

Without realising it Mackenzie started on his lifetime study of heart disease as he sat shocked and mute at the deathbed of a girl whom he was attending in childbirth. Pickles was over 40 before his mind turned to studying, thinking about and publishing his own records, after reading Mackenzie's book on the diagnosis and treatment of heart disease. A tracing from Mackenzie's day-book for 1891 is among his first to show atrial fibrillation, though at that time he did not yet know its significance.

Preconditions for discovery

"Other discoveries will yet be found out, if a person possessed of the proper ability, and knowing those discoveries which have been made, should proceed from them to prosecute his own investigations." What a confidently modern statement of scientific philosophy, not by a modern writer but by Hippocrates about 400 B.C.! In one sentence Hippocrates here sets out the preconditions for discovery: 'proper ability'; a basic grounding in the subject; 'should proceed from them . . . ' that is with a well founded hypothesis; and the impulse necessary to go and find out for oneself.

All medical progress involves learning about what is *already* known, what others have found out—which is education; and learning to find out what is *not yet* known, or perhaps has been forgotten—which is research. Research, whether into heart failure or viruses, extends our quest for knowledge along uncharted ways, and increases the range and depth of our understanding.

No student can take on board in medical school enough factual and intellectual cargo to last for the whole of his professional voyage. He will need to replenish his hold at every port. He must learn to learn as he goes along. The spark of a new idea may be kindled into flame by argument and discussion, by professional contact and consultation, by the use of a library, or through meetings.

Precisely where contacts of this sort and attendance at such meetings prove most difficult to effect, namely in single-handed general practice, does thoughtful observation, which is the basis for clinical research, come into its own as a fundamental means of self-education. Indeed its merits in this respect will, as a rule, far exceed in value the findings of any particular investigation.

People and problems

In general practice we care for people rather than problems; not people in the mass as politicians, nor numerically as a statistician, not even as interesting cases for the specialist, but people we know who eat and drink, love and hate, breed and die in our own district; who come or call out to us for help. Sometimes we can give them that help, all the help they need; but more often—if we are honest with ourselves—we recognise that we lack either the knowledge or the means to help as much as we would wish. 'If only' is the start of medical research.

If only we knew why influenza type A can spread so quickly all over the world compared with type B; if only we knew how one child can survive an attack of measles or gastro-enteritis in the same house where another dies; why illness occurs or our help is sought today, not yesterday or tomorrow; why some people can smoke or eat so much more than others without suffering coronary or bronchial disorder.

About almost every disease there are so many questions to ask, so little time and so few people to seek for the answers. Some problems can be studied locally; others occur so rarely as to need a joint effort of many doctors to collect relevant information. Who is to organise such enquiries or spend the long hours needed to analyse the records when they come in? Much good research lies withering for want of an effort to organise it or time to write up the results.

Each young doctor, when he starts in practice, must convert his book knowledge and what his teachers have told him into first-hand experience. Thirty odd years ago the development of antibacterial therapy was altering the whole of medical practice. What are the special problems of the 1970s?

Single patients

I believe there is a need for family doctors of all ages to pay more scientific attention to studying single patients with common disorders, infective or non-infective, which they see frequently: anaemia, anxiety, gastro-intestinal and respiratory infection, malnutrition, obesity or hypertension are only a few of these. All elaborate research depends upon the integrity of small observations and good records. Inaccuracies at base level do not cancel out; they multiply.

James Mackenzie taught us how much new knowledge can come from the careful long-term study of single patients. He waited 17 years after attending a woman with rheumatic fever before seeing and understanding how the onset of atrial fibrillation precipitated heart failure. He had to understand what he saw in that one patient before he could collect further cases or start teaching others about what he had discovered.

We say in England "one swallow doesn't make a summer." Statistics is the study of numbers, frequencies and rates, the science of deciding how many swallows *do* make a summer. With the current emphasis on statistical significance, however, we must not overlook the fact that Koplik had first to observe the eruption in one child's mouth before going on to count how often this appeared in other patients with measles.

Questions

In research of any kind, 'What?' and 'When?' must be observed with understanding before counting up 'How often?', measuring 'How long?' or calculating 'In what proportion?' Remember too that neither Mackenzie nor Koplik had need of or access to age-sex registers or computers.

However many patients seek our help each day, we must be alert as scientists to try and define the causes which led up to each consultation and the limiting factors within which these causes operate. Therapy in its widest sense should be aimed both at the causes and at the limiting factors, at the squalor as well as the staphylococci; at the sweets as well as the streps; at the visitors as well as their viruses; at the aunts as well as the anxiety; at resistance as well as immunity.

Therapeutic studies present many special problems, ethical and statistical as well as medical. Yet here is the core of our very existence as doctors. Our patients plead with us to 'do something' even, and perhaps particularly, when cure is not commonly possible.

There is a worldwide need to collect from general practitioners all well-recorded data about their usual treatment of common disorders. For example, on diagnosing hypertension in Liverpool, London, or Lisbon, what drugs are commonly used and in what order, with what result? Do *you* treat glandular fever with aspirin or steroids? How quickly do patients recover from influenza in countries or places where aspirin is not freely available? Does any drug exist which will relieve the headache of influenza without reducing the temperature? Indeed, what should determine whether and how we try to reduce the febrile and tissue responses to infection, if these have any protective value?

Unless we take stock of our treatment from time to time—a medical audit—who can say whether modern methods are any better than what we used to do? All over the world doctors are in attendance on the dying. Our mission to relieve suffering of mind as well as body is here brought into sharpest focus. Have we as family doctors nothing more to learn about the management of fatal illness in the home? Do we all use the

same sequence of pain-relieving drugs in terminal cancer? I think not, yet who can tell if your way is better than mine unless we both record our experiences and exchange information with each other?

Preventive medicine

In life, as in death, the needs of ordinary people may not always be met by our profession. What my patient hopes to achieve by consulting me and what he thinks or feels when he goes away will depend only partly on my knowledge of medicine. His ease of a ccess to the consultation, his reception by whatever staff I have, my air of hurry or repose will each play a part in restoring or diminishing his sense of well-being. What he needs may not be apparent to either of us unless my training has included preventive as well as curative medicine.

I once asked a rich medically-qualified land-owner of some malarious villages what he was doing to reduce transmission. "I don't have to do anything," he replied, "for the villagers don't complain." So long as family doctors only concern themselves with "complaints" by those whom they attend, we will be guilty of the same attitude towards modern preventive medicine as that doctor.

Cholera, typhus, yellow fever, malaria, diphtheria, smallpox, tuberculosis—all these have been conquered by men who dealt with causes, not complaints. Measles will not be conquered until we learn more about the need for booster doses of vaccine. Poliomyelitis could never have been prevented by dealing only with paralytic cases, while disregarding non-paralytic carriers.

The triumphs of personal as opposed to public preventive medicine, of the sort which Manson and Ross understood, will only come to doctors who can seek out patients who *need our help*, for example those 'carrying' but not yet showing carcinoma of the cervix or bronchus, those 'carrying' obesity or hyperglycaemia but not yet diabetic, those 'carrying' glaucoma but not yet blind; those carrying cigarettes but not yet physically affected; rather than waiting till such people *seek our help* about "complaints." The ultimate failure of poor antenatal care is a dead mother carrying a dead baby. The ultimate complaint of a depressive is suicide, for which there is no cure, only prevention—*personal* prevention.

Epidemiological research is concerned as much with those who do not, as with those who do, show some particular change. In general practice we commonly study individuals; epidemiology is the study of groups or populations; for example, the practice population as listed on an age-sex register.

In prospective studies, we can select 'cohorts' chosen as typical of a larger group. The group may simply be one exposed to influenza on a bus, among whom we find that most people do but some do not fall ill within a set time. With such an opportunity we may measure both the incubation period and the group attack rate for influenza.

In future we may concentrate more studies on those who remain well, those who are *a*typical, for here we may find new clues about the meaning of health as opposed to disease.

Influenza

A group may be subdivided for study according to selected symptoms. For example, nearly every patient suffering from influenza will have either headache, cough or sore throat, but not necessarily all three. A study of patients with Asian influenza in 1957 revealed that the secondary attack rate according to the presence or absence of three common symptoms in each primary case was about 20 per cent among their home contacts, except around those of whom it was recorded that they had *no* cough. Here the attack rate was only half what it was for the other five groups. So influenza *is* spread by coughing, and when a patient has little or no cough, he spreads even less influenza.

Groups exposed to influenza at home may also be studied for the influence of age, either of the culprit or the victim. For a time during the 1957 epidemic, a clinical impression grew that teenagers in the practice were spreading less infection than young children. A glance at the histogram showed, however, that, when measured, this was not generally true for the whole group of 176 families affected—a common fate of 'clinical impressions'. Whatever the age of the person who brought 'flu' into the house, the secondary attack rate among his or her home contacts was evenly 20–30 per cent. But which 20 per cent? Here there were marked differences between the age groups in secondary attack rates at home, varying from about 15 per cent in the very young or fairly old up to 50 per cent in mid-childhood.

Now the falling rate with increasing age among adults might well have been due to past immunity; but by definition this could not have been true of the youngest children. Influenza A2 virus was a new antigen, so their low attack rate could not even have been due to passive immunity from maternal antibodies. This low attack rate in young children must have depended upon basic resistance rather than on post-infective immunity.

So even today problems exist which can be defined, if not solved, by using only the five senses and a notebook. Donald Crombie [6] has described the sequence of problem recognition, problem definition and problem solution. The capacity to solve problems is more highly developed in man than in any other animal. A doctor who has not yet defined or attempted to solve at least one medical problem is in danger of remaining but a purveyor of other people's ideas.

"Doctor, how do you manage to avoid getting ill? Do you take something special?" Our patients ask these questions with interest rather than mere envy; but our denial is laughed off with scarcely veiled disbelief. Why *do* some people keep well during an epidemic?

Good health and good resistance are almost synonymous. We use the term resistance somewhat loosely, referring either to the mildness of symptoms or to escaping an infection altogether. Between resistance and immunity, however, we can make a sharper distinction. Resistance depends upon events which precede invasion by a pathogen, whereas immune reactions can only start when infection has already taken place.

So, how do some people escape? Since family doctors in Britain are better served by their laboratories than anywhere else in the world, both for diagnosis and research, the best starting point may be a prospective study of two doctors, who had blood samples tested every fortnight for complement-fixing antibody during the first Asian 'flu' epidemic. Their symptomless serological reactions against influenza virus give us one clue. During their repeated daily contact with fresh cases of influenza, it was not surprising that these doctors eventually became infected; but what was happening to any influenza virus which reached their respiratory tracts during those first 4–6 weeks before their immunizing reactions set in?

During that time they must have been rendering the virus particles harmless, as though they were not pathogenic and before any cellular damage could be done. This is true resistance. Then, after varying periods of total resistance, followed by home contact in one case and without home contact in the other, these two doctors eventually developed serological immune reactions without any symptoms of influenza. Five years later one of them developed a second four-fold immune response to type A influenza, again without symptoms. You might call this the presymptomatic diagnosis of influenza.

Sir Charles Hastings Prize

One of the features of modern solo research by general practitioners, of which our College

can be justifiably proud, is that in all but four years since our foundation in 1952 the Sir Charles Hastings Clinical Prize has been won by a member or associate of the College.

In many of these publications the author has shown us the wide range of collaboration which he achieved with his specialist colleagues, not merely as a collector of cases but as the initiator of the programme.

Dr Allen Wilson

Among the most brilliant investigators was the late Dr Allen Wilson [7] of Innerleithen, Scotland, who introduced a new screening test on routine antenatal urine specimens in his practice. He was studying the effects of lead absorption on the health of a localised community which he showed was exposed periodically to abnormally high lead intake from soft water supplies.

He adapted a simple industrial test—the Donath apparatus—for estimating coproporphyrin in urine, and was first able to demonstrate statistically significant differences in excretion of coproporphyrin before and after restricting the intake of water with a high lead content. Higher levels of coproporphyrin in urine were also found in winter when the degree of plumbo-solvency was greater.

Then he went on to show the effect of this excessive intake of lead upon expectant mothers.[8] Out of 35 mothers studied, in 11 the urinary excretion of coproporphyrin reached a high level. Of these 11 women, four had abnormal pregnancies, with an increased foetal wastage in the past as well as in the present instance. Excess of lead was found postmortem in the kidneys of one stillborn foetus.

Later Dr Wilson completed another remarkable epidemiological study of a local recurrent gastro-enteritis,[9] which his patients associated with their intermittent brown discoloration of the drinking water after heavy rain. Careful bacteriological, virological and biochemical investigations by his specialist colleagues of material collected by Wilson at critical stages of light or heavy rainfall finally revealed that the gastroenteritis was probably caused by the release in the stomach of a mixture of metallic chlorides by the action of gastric hydrochloric acid on the sediment of organic matter in the drinking water, which increased after heavy rain.

The report on this part of his work was completed posthumously by his friends as a tribute to a remarkable young doctor tragically killed in a car crash in 1967.

Dr Ian Gregg

Another Hastings Prize winner of great distinction is Dr Ian Gregg of Putney. Working with his specialist colleagues at Brompton and Roehampton, he is studying the pathogenesis and natural history of asthma and chronic bronchitis, especially with regard to the mechanism of airway obstruction and with special reference to the use of steroids and antispasmodics.

Gregg and Trapnell[10] have shown that incomplete filling is the most common bronchographic abnormality in the early stages of chronic bronchitis. This abnormality was present in 50 out of 53 bronchograms from smokers, compared with a non-smoker's bronchogram. The most likely cause was partial or complete obstruction of the smallest peripheral airways by mucus. That this change may be reversible was shown by the striking improvement in the bronchogram of a patient after he gave up smoking.

An extramural department of clinical epidemiology in general practice under Dr Gregg has now been started by the Institute for Diseases of the Chest. One line of their research is into the nature of damage to the bronchi which is caused by different types of virus infection, especially rhinoviruses.

Dr Tudor Hart

In 1970 Dr Tudor Hart's [11] beautiful solo study on the natural history of coronary disease in the valleys of South Wales, where soft water may again be incriminated, won him the Update Prize. The acknowledgements at the end of his paper proclaim the wide range of his contacts as well as his skill in marshalling evidence: included are people at the Welsh National School of Medicine, the Waterboards of Glamorgan and Monmouthshire, the Registrar General's office, the Epidemiological Research Unit, the Warren Springs laboratory for data on atmospheric pollution, and so the list goes on.

Collective studies

There are limits to what a lone doctor can study within the ambit of one practice or the duration of a single season. Research on chilblains, for example, has to cease in summer. Therapeutic trials on patients with influenza cannot be postponed until the rush is over. Some disorders are transient or regionally variable in distribution; we cannot study pneumoconiosis in Peaslake. Other diseases occur so infrequently that a large enough group cannot be assembled for study in any one district or one lifetime. To complicate matters still further, the additional effort needed to make and record our observations on patients with influenza must be found at a time when the practice is already busier than usual.

Creating the means to carry out large collective enquiries among family doctors has been one of the principal contributions to medical research made by our College. We have provided the technical services for planning and structuring such investigations. For the study of very large populations in general practice a research team is needed. Early in its history the Research Committee of Council opened a register and enrolled the name of any doctors who expressed an interest in research.

Epidemic Observation Unit

By collecting information from those doctors who have it and passing this on to others who need it, the Epidemic Observation Unit began to investigate a variety of non-notifiable outbreaks, such as Bornholm disease,[12] Winter vomiting disease,[13] influenza among doctors [14]; and to collect reports about minor ailments such as scabies [15] or major afflictions, for example, congenital abnormalities.[16] It has helped to find doctors willing to take part in therapeutic trials or in special studies, such as the new one on developmental paediatrics, to find specimens for a pathologist, and to find patients with rare disorders for other specialists. In some of these studies it was as important to hear from doctors who had not, as from those who had, recognised the particular disorder, for example in the spread of Bornholm disease one summer in South-east England.

Dr E. Scott

A variation in prevalence of megalocytic anaemia in Great Britain was undetected until this remarkable enquiry by the late Dr E. Scott of Ashford in Kent.[17] Notice of his survey was distributed not only by the Unit but also by the principal medical journals throughout Britain and by regional officials of the National Health Service. Reports came in from doctors in 4,700 practices covering a total population of just over sixteen million—one third of the whole Kingdom.

The reason for this gradient from a higher prevalence in the north and west to lower rates in the south and east of Britain has not yet been explained by anyone. Research in general practice may sometimes—as here—discover, not answers, but new clues to old problems. Similar studies on the prevalence of multiple sclerosis and other chronic disorders might be equally revealing.

Professor J. C. McDonald

At the request of Professor J. Corbet McDonald, now of Magill University, when he

was Director of the Epidemiological Research Laboratory at Colindale, the Unit mounted a survey to determine the secondary attack rate among family contacts of patients with rubella,[18] in order to gauge the benefit provided by gamma globulin prophylaxis in pregnancy.

Figures were based on data from 500 families. Apart from the obvious variation of attack rates by age, an unexpected finding was that—at all ages over five years—the secondary attack rates were higher in females, particularly those of childbearing age. Women, especially pregnant women, appear to be peculiarly susceptible to rubella virus. Indeed we have records—not from this survey—of three mothers whose babies were damaged by *second* attacks of rubella, their first attacks having occurred in each case before marriage. When rubella threatens in early pregnancy, there is little safety in a history of a previous attack.

Organisation

The design of any scientific enquiry should enable an answer to be given to one or more carefully defined questions. The fewer the questions and the sharper the definition of the hypothesis, the better the chance of completing the task. To plan and carry out a collective enquiry, some central organisation is needed. Over the years Drs Robin Pinsent and Donald Crombie in Birmingham have built up the General Practice Research Unit of the College to provide the technical and advisory services needed for statistically valid medical research, regardless of the origin of the data; and they will provide these services to anyone whose research interest brings them into contact with problems in general practice.

No doctor can study the old age of the children he brings into the world. Relying only on his personal records, no one can yet determine, for example, whether breast feeding protects against the development of atherosclerosis or mental illness, as it does against the severity of measles. For research in and into the next generation a pencil and notebook will *not* be enough. A new system of personal records will be needed and is being developed which, while still of help in day-to-day management, can also be used in the care of whole families, can provide information about practice activities, be a source of data for national or international statistics and then live on beyond the span of the original recorder. Only computers have all these potentials.

Our research unit in Birmingham has access to computers and also to a growing team of family doctors who have undertaken to standardize certain extracts from their clinical records and to send in a summary of these extracts each week. Some misconception exists about record keeping for research.

There is no one universal form suitable for all retrospective and prospective enquiries. Several attempts have been made to devise a method of record keeping suitable for morbidity studies, which could be adapted to different types of practice in Britain or abroad. Some doctors keep a simple list of diagnostic headings under which names and dates of affected patients are entered. The best known and most widely used system is the 'E' book, so called after Dr Tev Eimerl who devised it. This is essentially an index to particular information recorded in a standard fashion about each patient attended and each diagnosis made.

These morbidity data, collected by the Unit from its research team about a cohort of men, women and children in their everyday world are tabulated as rates per 100,000 of the population at risk, and a summary is published weekly within three days of collection. No other country is providing morbidity data of such high calibre or more quickly. The value of a defined practice population as a new tool for refined epidemiological research can scarcely be over-emphasised.

The Epidemic Observation Unit has shown since 1953 that general practitioners are willing and able to contribute occasional scientific data on a voluntary basis for

centrally-organised collective enquiries. Soon after that our Birmingham unit established the first group of family doctors who were able to report figures regularly every week about every consultation with each patient about each new problem.

Dr Clifford Kay

The Oral Contraception Unit, brilliantly led by Dr Clifford Kay, another Sir Charles Hastings prizewinner, in Manchester has taken the organisation still further. This unit has been able to assemble reports also about an adequate control group of patients, who have never taken oral contraceptives, with which to compare the health of the treated group.

The retrospective pilot study for this, published in 1967, on the risk of thrombophlebitis in women according to their state of pregnancy or contraception was the first firm evidence we had about the size of this particular risk. Preliminary analyses of data about 39,000 women recruited for the prospective study have already revealed some other new information. For example, oral contraceptive users are more likely to be smokers, and to smoke heavily, than non-users. This difference in smoking habit may contribute to any observed difference in morbidity or mortality between users and non-users of the Pill.[19] The unique contribution of this five-year on-going study is that it has the capability of presenting a *complete* picture of the morbidity experienced by these two groups and to show, for example, the wide range over which the effects of the Pill are negligible or even beneficial as well as where it may be harmful.

Birmingham Unit

At our Birmingham unit, fundamental work is also being done on two other subjects. The first, on patient identification and record linkage, will generate an integrated computer-based record by combining data from general practices and hospital services for a cohort of 13,000 patients. This integrated record study is not only aimed at the exploration and solution of technical problems but is also concerned with defining confidentiality in primary and secondary records; concerned not only with the true content of clinical records but also with the predictive values of such contents.

One possible conclusion—already hinted at by early experience—is that, even if an integrated clinical record is achievable at a price, it may fulfil no worthwhile operational function. Quite the opposite is, of course, true of any number of purpose-designed but limited primary and secondary record systems already in use in research practices, such as the disease index already mentioned, the 'S' card [20] which provides a patient-orientated summary, or the 'F' book for studying diseases in families or extended sibships.

Dr Crombie is also carrying out at Birmingham systematic studies of the diagnostic process in clinical medicine by computer analysis of clusters of basic descriptive indices, whether these are signs, symptoms or machine-derived data; whether presented by the patient, found by preliminary screening or elicited by the clinician; and whether the indices are significantly frequent or significantly absent. In clinical medicine it seems likely that doctors continue their examination of a patient only until enough information has been obtained to indicate appropriate action; not so the computer, given any encouragement!

Finance

Research costs money as well as time so part of our task has been to find money to support such investigations. Some years ago a Research Foundation was established by the College in order to finance that stage of an enquiry which is hardest to develop, namely the earliest—the pilot or pre-pilot stage. The man with a good idea has quite a long way to go before he reaches his objective, even before his project is viable, before the large grant-giving bodies become interested. Sometimes quite a small sum of money

for apparatus, record cards or technical help will often lift an enquiry off the ground, and this is the main purpose of the Research Foundation. With research money now also obtainable from regional hospital boards, no general practitioner need spend so much out of his own pocket as previous generations have done; but the *time* he spends on his enquiries will still eat deep into his leisure hours and the family's recreation.

Enthusiasm for research—as for mountain climbing—is infectious and the necessary skills can be taught. We must press on in Britain and elsewhere to set up more research and teaching practices, so that each generation of family doctors can advance from where their teachers finish, not from where they began.

Conclusion

Learning and teaching, education and research are the direct concern of all of us, wherever we practise. Sometimes our emphasis will be on one, sometimes on the other aspect of what should be a continuous quest for more knowledge. This is the nourishment on which those feed who are young enough in mind to remain 'perpetual students.'

Nearly every medical student, after he has set out on his quest for medical knowledge, will sooner or later encounter some problem of interest for which his teachers and books give no satisfying answers. Part of our task as educators is to see that he is shown how to go beyond his immediate circle of teachers, to tap the vast wealth of published knowledge, hidden but accessible in the libraries of the world.

Part of the task for our colleges and medical societies is to provide a chance for the exchange of knowledge specifically related to family medicine; but when the books and the teachers cannot satisfy us with their answers, there are only two things to do: one of these is to go and find out for yourself.

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