

THE ROCK CARLING FELLOWSHIP

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PRIORITIES IN MEDICINE

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PREFACE

I owe a great debt to Sir Ernest Rock Carling and his cousin, Leonard Colebrook, for whom I worked before I met Rock Carling. Colebrook was the most compassionate clinical investigator I ever met, with unforgettable concern for each of his burned or scalded patients in the M.R.C. Burns Unit at the Birmingham Accident Hospital in the years just after World War II. He knew them each by name, their family, the extent of their burn, and any infecting organism. If he grew a streptococcus from a scalded child, none of us got much rest until it was eradicated. He had no doubts about the primary priority in medicine—the patient—and I shall submit he was right and I know Sir Ernest was of a like mind.

I got to know Sir Ernest while I was in the Army as a National Serviceman with the R.A.M.C. By strange coincidence, I was posted to the War Office to serve under Dr. (now Sir Owen) Wandsborough Jones, and one of my first duties was to try to provide an assessment of the potential casualties from atomic weapons. The Reports from the Bikini Trials had just become available. The Berlin Airlift was in the offing, Stalin was a major political force, and we all knew in the Department of the Scientific Adviser to the Army Council that it couldn't be long before the Soviet Union had nuclear weapons: in the event they produced them somewhat earlier than even Dr. William Penney, as Lord Penney then was, predicted.

In those days Sir Ernest had retired from practical surgery and was Medical Adviser to the Home Office. I used to see him for discussions about the biological effects of nuclear weapons on civilians, because the Home Office was responsible for Civil Defence. I was particularly exercised over the problem of atomic bomb flash-burns. At the time of the Japanese attacks, a great deal of attention—rightly—had been focused on the

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devastation and loss of life of a central zone and on the new terrifying radiation casualties. However, it was apparent from the Bikini Trials, where Dr. Eric Pochin performed some classical studies, that flash-burns had a far greater range and that, certainly for the Army in the field attacked by tactical weapons and probably for civilians under weapons airburst over cities, these flash-burn injuries would extend out to far greater ranges than obtained for radiation illness and would cause the bulk of the load, in terms of sheer numbers, on any medical resources available. With Sir Ernest's encouragement, the Physiological Section of the Army Operational Research Group, which I led, made a very detailed study of flash-burns and published several papers in the medical literature about them. So, in my early conversations with Sir Ernest in his office on the Mezzanine Floor of the Home Office—where he always had a roaring coal fire in winter and where during the summer he talked, all the while looking down on Whitehall from his window—we were invariably concerned with problems likely to arise at the periphery of an atomic explosion—where there would be large numbers of persons with less serious, but nevertheless incapacitating injuries—which would be slower to heal and demanding far more medical attention if they became infected, which pointed up the need for preventive measures. Many of those conversations about prevention, about educating people to help themselves, and about the simplification of therapy when it is needed on a mass scale, seem now to be only forerunners of my present theme.

It will emerge that, in my presentation here, named after Sir Ernest himself, the circle is in a way completed because I find again that it is understanding what is going on at the periphery, this time of the National Health Service, which provides important basic knowledge about the successes and failures and therefore the priorities in medicine in the immediate future. But before I leave this too brief and inadequate

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appreciation of Rock Carling, I would like to add two more points. First, he made me recognize people's courage. I had seen this, but was less aware of it until I talked to Sir Ernest. He must have known it not only from his surgical practice, but also in the war. He would always look askance if my enthusiasm for medical defence ever led to proposals which could be interpreted as pampering people: he'd seen what they could do, surmounting the blitz, and how that courage gave them the morale, and I believe, the zest which is often lacking today. I've no idea what he would have made of the remarks which follow about a study of symptoms among the Londoners near Guy's Hospital. He would probably be pretty pungent about our affluence and our flabbiness and wonder whether the original idea behind the Beveridge Report—that health expenditure would diminish as disease was countered—shouldn't be brought to bear, rather than extending health costs to cover more and more chronic less urgent problems than, say, the acute abdomen!

My last word must be to acknowledge, that, as well as moulding my thoughts, Sir Ernest also affected the course of my career. Indeed it could be argued that he must take some responsibility for my being able to accept the Rock Carling Fellowship. For he kindly helped with advice when I applied for my Chair at Guy's and acted as a referee. Had he not helped me to be successful then, I suspect I would not have been honoured with the Rock Carling Fellowship now.

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I am indebted to a very large number of persons, particularly my colleagues, who have interested me in many of the problems and ideas set out in the monograph. My department has run its research with laboratory and clinical running along side epidemiological and social studies, and the resulting cross-fertilization has been particularly fruitful for me. In the beginning, R. M. Acheson, now at Yale, introduced me to Dr. J. Fry, and this led on to meeting Gordon McLachlan and so to starting the Guy's Out-patient Study through funds provided by Roger Peers of the King Edward's Fund for Hospitals. Drs. Roger Blaney and Jocelyn Chamberlain started this work. Dr. Blaney now has an appointment in Ulster and Dr. Chamberlain with Professor J. Morris, and Michael Wadsworth, who helped them, has left for Edinburgh. To all these people, gratitude for initiating my education in these matters.

More recently, I have been stimulated by Drs. J. A. D. Anderson and Peter Draper, and the Social Medicine Unit, and of course, by Dr. Robert Smith, who has introduced me to the problems of general practice and the intricacies of medical politics, and Michael Curwen.

At the same time, I have had the unfailing support of my clinical research colleagues, Professors John Trounce and Robert Mahler, Dr. Harry Keen and his colleagues who have been following up the Bedford Survey, particularly Dr. John Jarrett and Dr. C. Chlouverakis, who now works under Professor Chain in the Department of Biochemistry, Imperial College. There have also been many others, including overseas visiting research workers, who have moulded my thoughts. And not least have been some very close laboratory colleagues who have always helped without ever stinting, Margaret Whichelow, Brian Cox, John Buckle, and Thomas Hanley, Michael Abrams

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and my ward staff, who have protected me from worry whenever they could! And anyone who has essayed a monograph will know the debt the author owes to his secretaries, and I acknowledge how grateful I have been to Jane Collins and Maureen Gregory in particular because she typed the manuscript, and to my most long-suffering wife and family.

There have also been a very large number of people outside my department, whose help I have tried to acknowledge in the text: but I would like to add how much I have appreciated and gained from my colleagues at Guys, various meetings like the Medical Sub-committee of the University Grants Committee and particularly the members' discussions at the Minister's Long-term Study Group: these have been meetings of rare quality and great pleasure. I hasten to add that they must not be held responsible for any of the kites flown here. The title the Nuffield Provincial Hospital Trustees gave me was *Priorities in Medicine*. What follows must certainly be regarded as one man's views.

I

Introduction

At a dinner in Jinja, where the Nile springs and arches into life from Lake Victoria through the sluice gates of the Owen Falls Dam, I was introduced to a doctor who had the sole medical responsibility for 400,000 people further north. 'How many did you say?' I asked. 'Well perhaps it would be more accurate if I said about 400,000, we don't know exactly, of course,' he replied.

This monograph should obviously really be about priorities for medical care in developing countries. One has only to delve a little way into the publications from the World Health Organization or visit the Secretariat in their new building in Geneva to realize that this fact is properly appreciated, and that much knowledge and energy are being brought to bear on these matters by many expert committees and field units. However, the Rock Carling Fellowship Committee would certainly not have chosen me to discuss these worldwide issues, and so I decided, quite arbitrarily, to confine myself to the scene in Britain.

But even this has proved difficult, for it has involved a great deal of personal selection. One had hoped to be able to read other people's views and hide behind their decisions, but not much writing is to be found; we are all awaiting the Report of the Royal Commission on Medical Education. The whole process of preparing this monograph has, therefore, been an anxious one. I was anxious on another occasion, and David Whitteridge told me how he, too, was once brooding as he walked along a street in Cambridge, when Lord Adrian cycled by and called out 'Don't take it too seriously'. So in the end, one decided to throw caution to the winds and set down one's own experience to make one's own suggestions. After all, priorities suggested in 1968 are hardly likely to be scrutinized very closely in 1978!

Under the old dispensation, when doctors simply saw patients, the priority for medicine was simple—always to do your best for them—and that must remain the unalterable priority.

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But when doctors didn't spend all their time seeing patients, and had time to move about in the world, they began to look at social and occupational factors which might affect disease. Hodgkin over a hundred years ago was writing of the need for a medical police force to deal with epidemics. Osler became engrossed for a time about the interaction between bad sanitation and enteric fevers.

Today some doctors don't see patients at all or even examine their blood or urine or tissues. Medicine, like all other human organizations, has become increasingly complex in its division of labour. Not surprisingly, many of the responsibilities for major decisions fall largely on those doctors who don't see patients. Yet again in the present era, with a rapidly growing repository of knowledge, it may well be that doctors who are not distracted by the responsibilities of clinical care nor by administrative decisions will know most medicine. So the evolution has proceeded from a doctor—one can imagine him as a Fellow of the College in the seventeenth century—to the doctor-manager—one can visualize him as the doctor who became the Superintendent of a Fever Hospital—to the doctor-researcher-manager—whom one can't yet imagine because it may be asking too much of any one man except perhaps Presidents of Royal Colleges! This reinforces why we must recruit some of the best young men and women to medicine. They will be needed to fill this very exacting new role.

There is in addition a new tension created by the National Health Service. Conscious that there was much more infective disease amongst the poor, it was designed to ensure that no one went without medical care for want of financial resources. Suddenly the relationship where the individual patient had sought help from the individual doctor or institution was changed so that the medical profession as a whole became doctor for the whole population. Repercussions still reverberate. Not least because, as I hope to point out, Beveridge's ideas were

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based on older foundations set down by the British Medical Association as long ago as 1920 when, stimulated by the poor physique of the recruits for World War I, the profession's ideas about medical care were largely motivated by concern for those people maimed or infected or crushed by the British experiment in Industrial Revolution. But these same ideas have been imposed on a society where changes in economic planning are beginning to ensure that poverty is unlikely in the future to be a barrier to good medical care. So two new factors are beginning to impede good medical care. First, ignorance about when to seek it, an ignorance which knows no social class or financial barriers, and second, the availability and quality of medical care. Both aspects of the matter—the patients themselves and what the profession can do to help them—will have to be examined here. We will begin with the patients.

In a Utopian society all persons born into the community would enjoy good health and, one hopes, happiness, from the cradle to the grave, dying without suffering or needing much medical attention and imposing little or no strain on the medical profession for curative procedures. More demanding would be the intensive education about how to avoid the illnesses of their forebears. The notion of illness as a crime was one of the many provocative ideas in Aldous Huxley's *Brave New World* and has been reflected in recent times by the charges brought against men who failed to take their mepacrine and subsequently contracted malaria in the East during World War II.

Figure 1 represents a well-worn conceptual model of the health of the population in a community today. Individuals may be classified into four general groups. First is the healthy, with all that goes with physical, mental, and immunological well-being. The second group comprises those persons suffering from the stage of disease where there are no symptoms, but where there is biochemical disorder. For example, this might be the incubation period of a virus infection or the develop-

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ment of antibodies in auto-immune illness or the early hyperglycaemia of diabetes. This biochemical, or pre-psychotic or pre-neurotic, phase may then pass into the next stage of symptoms, which has to be divided into, thirdly those persons suffering symptoms for which no action is taken, and fourthly and lastly, the group who take action.

In the past the symptoms of the major infective illnesses soon made themselves known. The patient stricken with fever or rigours or a rash was quickly aware that he was ill and this led to prompt action. This is not so, unfortunately, with the chronic degenerative diseases which are increasingly prevalent today, as the expectation of life is extended. Patients may have symptoms but elect to take no action about them: among my professional colleagues I know of three who have harboured inguinal hernias for a few years until their wives or friends urged them to have operative repairs before they had 'lost their resilience to surgery'. Among the *previously unrecognized* diabetics found in the Bedford Diabetic Survey in 1962, analysis showed that those new cases with blood sugars over 300 mg. per cent two hours after the start of the standard glucose tolerance test—quite high even for known diabetics—some 80 per cent had mild or transient symptoms which would suggest diabetes to a doctor or medical student, yet the diabetic hadn't taken any action about them with their doctor. Sixty per cent of persons found with blood sugars of 200–300 mg. per cent had mild symptoms but these had not been recognized for what they were. And 40 per cent of the borderliners, with two-hour blood sugars from 120 (the upper level then accepted for normality) to 200 mg. per cent, had diabetic symptoms. Dr. John Reid has reported that in Dundee diabetics suffered from mild symptoms for eighteen months and longer before taking the step which led them to their doctor and the diabetic clinic. All this is, of course, closely related to the 'clinical-iceberg' to which I shall return later. What makes people take

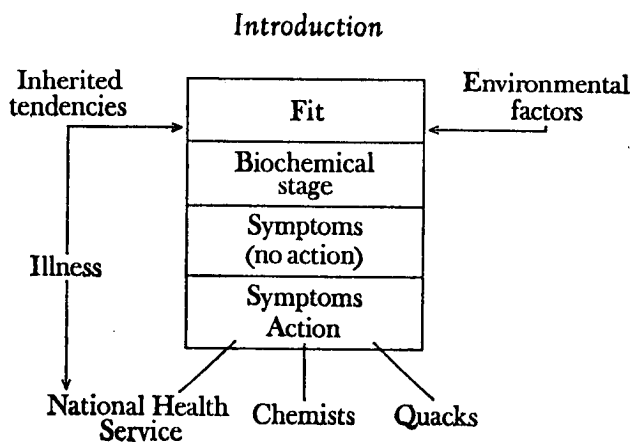


Figure 1. The community's health

action about grumbling symptoms? When does a haemorrhoid become a complaint or a varicose vein a case history. This latter is not such a joke when one learns that 6 per cent of surgical beds are occupied with such cases. What precipitates action? Insurance examinations? Relatives and friends? The Press or television? Or is action due to some new complication, such as bleeding in the case of the haemorrhoid?

And when people take action, what do they do? The naïve student of medicine might imagine that with the health services freely available, people would take their symptoms direct to the National Health Service. But it will be shown from the results of a survey carried out among the people living around Guy's Hospital in Bermondsey and Southwark that we doctors overrate ourselves. In fact people use the chemist far more than we might care to acknowledge. The reasons, it will become plain, are because it is easier to make a self-diagnosis of a symptom and try to treat it from the goods on sale on the counter than to submit to the waiting time, the crisp interrogation, and perhaps the physical examination by the doctor, with all its attendant risks of incarceration in hospital for an indeterminant time for 'investigation'—venae punctures, X-

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rays and all manner of other unpleasant prospects. An alternative to the National Health Service, an obviously appealing one, is the non-medically qualified fee-for-service arrangement—the osteopath, the homeopath, the herbalist, and even the fortune teller. Here there are no registrations, no cards, no papers, no officialdom, and one can always pull out if the prospects get too alarming. So, below the conceptual model, I have set out the three main courses of action my Department envisaged people taking: the chemist's shop, the National Health Service, and so-called quacks. Dr. John Fry and Mr. Gordon McLachlan of the Nuffield Provincial Hospitals Trust, and Mr. Roger Peers of the King Edward's Fund for Hospitals, stimulated interest in these affairs and we undertook a study of them beginning in 1960.

Since indicating priorities in medicine must involve one in personal choices, what follows is, I fear, blatantly autobiographical. Before going into priorities generally, one needed to set out one's views about the present health situation, what has brought it about and the resources we have as a National Health Service to cope with it. Much of the opening part is based on the two studies in Bermondsey and Bedford. I have included quite a lot of explanatory introductory information for these and for the Thamesmead project to which I refer later. Indeed the reader may, in places like Chapters 3 and 15 which deal with minute details to exemplify points I wish to make, wonder whether I am answering the main question: I like to think I am because this material does link up with the main arguments. So I have put it all down not only to ensure that there are no doubts about my parochialism or specialism, but because it also has ramifications with the whole. The general reader can skip over the detailed remarks: the professional reader may, one hopes, find a few points of interest buried in them.

The first point then is based on an investigation of the

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symptoms, and what was done about them, among the people living around a hospital, to show that there is much chronic mild illness in such a community today. The second is a study of a single chronic disease, diabetes mellitus, which demonstrates the point that the chronic illness in our midst may be associated with serious consequences and complications. The results also exemplify some of the difficulties we shall have from such diseases and also form part of the basis of the argument for there being much disease in the community due to modern civilization, an idea which is then examined more closely, before analysing the resources we have in the National Health Service to deal with our health problems.

All this leads on to the main propositions, that the patient still needs our help most, that it is health education which is most urgent, and that screening deserves to be explored as a means of tracing unrecognized disease. The second priority is the morale of practising doctors and their staff attending the sick, and I shall discuss this in relation to the Thamesmead project and the question of integration of the various branches of the National Health Service. I shall conclude with some remarks about hospitals and administration.

Throughout it all, the main theme is that the collection of detailed information leads to better understanding, and better understanding to better management, and so to better medical care and better morale. I suppose those who know the pattern of life of any Professor of Medicine today, will not be surprised by the suggestions that the quality of medical care hinges largely on encouraging research and improving management. At the head of the introduction I mentioned the feeling of setting out to sea in a dinghy. Research is the buoyancy tank: every research worker knows his work will serve his ego well if it is the basis of later, better, work by the next, better informed, generation. Better to be improved upon than sink without trace!

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In this chapter the ways Bermondsey people try to get relief from their symptoms is discussed. It is deduced that people may have many symptoms which they treat themselves: the so-called clinical iceberg is in part explained on this basis and health education seems to be a means of improving the situation.

Understanding the medical care needs of the community not only involves estimates of the state of health—such information as is forthcoming from the Survey of Sickness in the U.K. (1) and the U.S. National Health Survey (2). It also includes important questions about what people are doing in response to their ill health. My own views about these questions are based on previously unpublished results of a recently completed study of a sample of the 1965 population of Bermondsey and Southwark (5). This investigation set out to discover the various ways people living near Guy's Hospital obtained their primary medical care. An account of the pilot study, which involved the close interrogation of a random sample of 200 persons in the same London Boroughs in 1963, has already been published (3). This showed that, just as was found at the Peckham Health Centre (4), some 12 per cent of the population appeared to be 'completely healthy'. In the Guy's pilot study, it appeared that some 30 per cent of adults suffered symptoms, but had done nothing about them and, of the remaining 58 per cent who did take action over their symptoms, the majority resorted to the chemist's shop for medicines rather than the National Health Service.

What is presented here is an account of the more thorough investigation (5) which has followed this pilot study, which

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was part of a general investigation to collect information for planning purposes at Guy's Hospital. The background may be reviewed briefly as follows.

When Guy's Hospital was opened in 1725, it represented an extension of the original St. Thomas's Hospital across the road in St. Thomas's Street. These two hospitals served patients from the neighbourhood of Southwark, then a teeming slum at the southern end of London Bridge containing the Globe Theatre and the coaching inn which had been run by the Harvard family before they emigrated to Massachusetts. The two Borough hospitals also served the sick who would converge towards London Bridge and the City from further afield in southern England.

After being redesigned by Florence Nightingale, St. Thomas's was rebuilt on its present site opposite the new Palace of Westminster, leaving Guy's to care for the population of Bermondsey, which was growing fast. In the second half of the nineteenth century the district which attracted Roman Catholic refugees from the potato famine in Ireland and offered all manner of employment opportunities in transport enterprises such as the docks, the Greenwich, and later Southern railways, as well as work in food preparation, in printing, and in Victorian industrial concerns who used the cheap labour available sufficiently harshly for Thackray, at Guy's Hospital, to realize that it was always worth the doctor's while to ask a man his occupation—it might help understand the cause of his sickness.

By 1900, Guy's had established a great reputation due to the careful clinical and pathological investigations of the nineteenth century by such men as Bright, Addison, Hodgkin, and Astley Cooper. And by 1939 the majority of the people of Bermondsey, and some of Southwark—probably 250,000 persons or more in all—regarded the hospital as a haven for help in any kind of medical distress, physical or mental. At that

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time, despite efforts at rebuilding a garden suburb by Sir Arthur Salter (local doctor turned politician), the London County Council, and various trusts, the community was still not well housed and slums abounded near the Borough High Street, the Elephant and Castle, and the Old Kent Road. The population was also short of doctors: many, but by no means all, panel patients were served by lock-up surgeries. When these were closed, in the afternoon and evening, the sick, or the casualties in accidents, went or were carried to the Casualty Department of the hospital, which was thus to a greater or lesser extent fulfilling the function of what might be regarded as an enormous practice. A practice consisting of under-privileged, poorly housed, overcrowded patients exposed to bad sanitation, breathing smoke-laden air mingled with the smells of leather tanning and hop factories and breweries, prone to drunkenness and to infections, especially by the streptococcus with its complications of nephritis and rheumatic heart disease, and exposed to all manner of occupational hazards. It was no wonder that medical students were attracted to this kind of hospital for experience, whether it was Guy's or at St. Thomas's or Bart's, the Middlesex or The London, or other London teaching hospitals, or the Royal Infirmaries at Edinburgh or Glasgow or Manchester. The Casualty Department, the out-patient clinics, and the wards of such hospitals were the bottleneck in the progress of disease, where one would see almost every type of case and be able to watch the physician or surgeon making his examination, reaching a diagnosis—as Sir Thomas Lewis said in such circumstances diagnostic skill was the basis of all reputations—and advising what to do or operating upon the patient.

But in September 1939, with the threat of air-attack, the population of central London was evacuated, and during the heavy bombing which followed in 1940-1, many of the slum dwellings around the docks of Bermondsey and wharves of

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Southwark were destroyed. During the great conflagrations of the blitz, Mr. B. Lees Read, the Clerk to the Governors, was able to acquire a site adjacent to Guy's Hospital with a view to rebuilding what was damaged. By the time the war was over, the population of Bermondsey and Southwark was less than half the 1939 figure and, naturally, anxieties were expressed about the availability of clinical material for teaching the post-war students. Recently Guy's Governors have accepted full responsibilities as a district hospital and two nearby smaller Regional Board Hospitals, St. Olave's and New Cross, have been designated to form the Guy's Hospitals under their control, so enlarging the number of hospital beds from the pre-war 950 to 1,500. The advent of personal transport for most wage-earners has, of course, extended the hospital's catchment area so that the local population served is again approaching the old numbers. And the Southern Region Station at London Bridge continues to bring out-patients to the hospital, replacing the horse-drawn London coaches of the early nineteenth century.

Hospital rebuilding has begun. A new surgical block has replaced war-damaged buildings and new facilities for out-patients and medical wards are now under consideration. But what trends in local health must be taken into consideration to avoid wasteful developments on the new Guy's site? Research into these matters was supported by a generous grant from the King Edward's Fund for Hospitals and information collected about the out-patient department (6) and the patterns of referral of the local general practitioners (7). As to the health of the local population, we had of course, access to official statistics and the reports of the local medical officers of health. To these figures had to be added the latent cases: the experiences of the Bedford Diabetic Survey in 1962 had convinced us of the existence of the clinical 'iceberg' described by Last (8). We had also heard, after our pilot study, of the plans for detailed

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epidemiological investigations of the people in adjacent Lambeth to that carried out by W. W. Holland at St. Thomas's Hospital. So it seemed that the best use of our comparatively modest resources would be a detailed study of the behaviour of the local population in health and sickness.

Put another way, if, as we felt sure, the experiences of the Peckham Experiment and the findings of epidemiological surveys showed there was a clinical iceberg, why did it exist? How were people viewing their health? What were they doing about any symptoms they suffered? There seemed to be two major prospects in such a study. Not only would it help give insight and understanding to health service planners, it would also cast light on an important and poorly understood area, namely the factors involved in bringing patients to communicate their illnesses to their doctors—of obvious importance as chronic conditions become of greater significance in a population with extending life expectation. Summed up in an example, when does a patient become aware first that he has a chronic disease like bronchitis; second, that it needs treatment, and third, how many cases consult their doctor, and what brings them to do so? For it was apparent from our Bedford diabetic studies that the reasons patients bring their complaints into the framework of the National Health Service may be a much more random business than many of us are prepared to admit. Hypochondria, or a hypochondriacal spouse, an insurance examination, a chance accident leading to urinalysis, these are all too often reasons why diabetics get detected today.

In 1963 the population of Bermondsey and Southwark were together 138,109 (these figures represent 51 per cent of the 1939 population). When the study began the age structure was, 0-24 years 36 per cent, 25-49 years 34.7 per cent, 50-74 years 25.1 per cent, 75 and over 4.2 per cent. The people were largely of social classes III, IV, and V—20 per cent of the males employed were in jobs associated with transport, docks,

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wharves, and railways, 40 per cent of the women were in jobs as cleaners or other service industries, often part-time. The population was served by 74 doctors in 46 practices, with an average list of 2,330.

A sample of 2,500 persons was drawn from the electoral roll, spread evenly over the whole area and over the whole time-period of the study, a year. After explaining the project to the local general practitioners, these people were asked to allow an interviewer to visit them. A 40 per cent sample of the offspring of these persons was organized and interviewed at the same time. Of the 2,500 adults, interview information was incomplete in 335, making an over-all response rate of 86 per cent. The main reasons for non-co-operation among the 335 persons were: moved (67.2 per cent), died (11.9 per cent). Only 45 of the total number refused to co-operate.

The interviews took place in the home and were structured to a branching questionnaire developed specifically for this study. At first, many discussions took place about how many questions we could ask: some suggested '30', others, 'not more than 100'. But our pilot study revealed the interesting fact that whatever the door-to-door experiences of market researchers who had advised a small number of questions, the local populace was willing to talk at length about their symptoms and health: over two-thirds of the interviews with adults lasted over fifteen minutes. The questionnaire asked for personal assessment of health and for information about complaints over the previous fourteen days. The questions then followed up any symptoms, to collect data about what the person had done. For example, if there had been a complaint of bronchitis, had the person seen their doctor? And if so had he prescribed any treatment? If they had not gone to the doctor, had the person indulged in self-diagnosis and treatment at the chemist's?

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The results showed that only 4.9 per cent of persons were without complaints and a further 18.8 per cent had not done anything about the symptoms they had suffered over the previous two weeks. On the other hand, it is interesting that 76.3 per cent of persons had had symptoms in the previous two weeks and had felt them sufficiently serious to do something about them. These figures were higher than those reported in our pilot survey and the Peckham Report: the probable reason is the extension of the check-list of the questionnaire used in the main survey. That the interrogation was close is evidenced by the fact that the 2,000-odd persons who had any symptoms or complaints to report over the previous two weeks recorded a total of 9,315, or 4.5 each on average! Many people had only 1, 2, or 3 complaints, but some had very many indeed and 42 was the highest number reported!

Of the three-quarters of the community who had complaints, about one in four had consulted a medical or dental care agency during the previous two weeks, and 32 per cent of all complaints had, at some stage, though not necessarily in the previous fourteen days, been referred to medical care agencies. But it is significant that 68 per cent had not been so referred. Of all the complaints, not quite half (47.9 per cent) were being medicated, mostly by lay remedies (31.8 per cent) and the rest (16.1 per cent) by medicines prescribed by doctors. These figures all show how much sickness is dealt with in this community outside the National Health Service both in terms of diagnosis and treatment. Of the 2,500 persons drawn in the sample, about 1,000 were treating themselves.

The main complaints recorded were, in order of frequency, those referable to the respiratory tract (2,397); worry, anxiety, and debility (1,968); locomotion (1,430); the digestive tract (1,012); and the skin (502). Females had more symptoms than males in the ratio of 6:4, and as stated above only 32 per

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cent of all the complaints had been referred to their doctors.

Of the 1,500-odd adults who took some action about their symptoms, 239 went to their general practitioner, 134 attended a local authority clinic and 71 attended a hospital, 54 went to the dentist, 45 got non-medical help inside the framework of the National Health Service, and 6 were treated by industrial medical organizations, making a total use of the National Health Service by some 600 persons, or approximately 28 per cent of the whole group with symptoms and 40 per cent of those taking action for their symptoms. It is of interest, too, to discover that those using the doctor and the National Health Service in the previous fortnight were probably in the habit of doing so because 45 per cent of the people interrogated, most of whom had symptoms, hadn't seen their doctor in the previous year, and 20 per cent hadn't seen him in the previous four years.

It is instructive to review the various symptoms reported. Of the respiratory symptoms, about half were obviously not severe, but the other half included two persons who suffered haemoptosis, neither of whom was consulting their doctor. Analysis of the habits of the individuals medicating themselves for respiratory symptoms shows that the people of Bermondsey are perhaps poorer at therapeutics than diagnosis. Some 150 persons were taking aspirin, almost all of them (93 per cent) on their own initiative, 37 persons were taking antacids, 89 per cent on their own initiative. If we go into more detail and examine, for example, the self-prescription medicines for sinusitis, we find the same trend. The medicines taken including analgesics, tonics, skin medicines, and salts (purgés). This sort of evidence suggests strongly a real need for health education and reveals that it is often ignorance rather than poverty which is inhibiting the proper use of health services. Indeed it appears that ignorance is becoming the main obstacle to good medical care for all.

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Very similar conclusions can be drawn from the analyses of the other major symptom groups. In terms of frequency the next most common set of complaints included debility, headaches, anxiety, and feeling very run down, and tiredness, many of which symptoms could be regarded as clues for investigations to rule out the diseases of civilization—hypochromic anaemia, hypertension, and diabetes—diseases which people are known to suffer for long periods without being recognized. Of these 600-odd cases of debilitating and nervous symptoms, 73 had referred themselves to the National Health Service, of whom 51 were being tended by their general practitioners. Of the 592 persons taking medication, about half, 283, were taking analgesics and aspirin-containing preparations. Half the analgesics were prescribed by the doctors, almost exclusively for headaches; but of the remaining self-prescribed aspirin many of the sufferers took it for tiredness and worry. The medical profession now knows that aspirin compounds may cause occult gastro-intestinal bleeding, of volumes as large as 75 ml./day, and it is clear that this self-medication for debility and the other symptoms which could be associated with unrecognized hypochromic anaemia, might well be aggravating the condition. The evidence from this group of persons suffering various nervous symptoms suggests that the present diagnostic and therapeutic services, as they actually operate, could be improved.

In the next major category of symptoms, 628 persons complained about locomotion and of conditions referable to the skeleton, bones, joints, and muscles. The most common complaint was low back pain. Low back pain was the most frequent skeletal-type symptom reported by men and was, of course, very common in women, among whom its cause may have been gynaecological in many cases. In addition 198 persons had lumbago, 165 joint pains, and 141 rheumatism. Of the 628 persons receiving treatment of one sort or another, 73 were

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using the National Health Service agencies, including 42 being treated through their general practitioner and 19 through hospital facilities. It is worth pointing out here that, in each group of symptoms, the ratio of those treating themselves outside the National Health Service to those using the National Health Service agencies is always about 8 : 1.

When we examine the medicines used for this group of locomotor symptoms, we find that 184 persons applied counter irritants, almost all self-prescribed: in the case of low back pain, of 302 under self-treatment, a third were treating themselves personally by embrocations, etc., whereas only 17 per cent of such cases under the doctor were on this form of treatment.

It should not be thought that the information we possess from this study is sufficiently accurate or detailed to allow us to state categorically that the self-treatments were ineffective or inadequate.

It must be recognized that we cannot necessarily cure all these conditions, like low back pain, but many can be relieved by physiotherapy, though this may be more expensive in terms of time and resources than the treatments actually used. However, I have singled out low back pain, because this syndrome embodies many of the issues of the present study, including the needs for better understanding by the patient, more time for the doctors treating them, particularly with respect to possible preventative measures. The prevalence of backache is lower among the children and young people in Bermondsey and one is forced to ask will they be spared this symptom or not, and will the doctors of the future be relieved of trying to treat it or not? Finally, should we take more time educating our medical students about such very prevalent conditions and how to diagnose and manage such cases? For future urban general practitioners, they will become far more time-consum-

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ing than the mitral stenosis which complicated the streptococcal infections among previous Bermondsey and Southwark generations.

Moving on from the locomotor symptoms to the next two main classifications of complaints recorded, those referable to the gastro-intestinal tract and the skin, the same general trends obtain about diagnostic inaccuracy among lay people treating themselves and imprecise therapeutic decisions. For gastro-intestinal diseases, the ratio of referral of complaints to the National Health Service was much as with the other groups, 48 out of 442. Blood was noted in the motions by two persons, both of whom were treating themselves, one with laxatives, the other with a skin remedy applied to the perineum. Lay people used antacids for such symptoms as 'very poor appetite' and dental complaints as well as, much more understandably, for indigestion. For this last condition, doctors prescribed antacids for only 8.3 per cent of 48 cases, whereas of 161 lay self-prescribers, 61 per cent resorted to antacids. Among 217 persons suffering from skin diseases, 25 were under the National Health Service, and of the 212 persons using medications, 76 per cent were self-prescribed: the remedies used included aspirin-type analgesics, antacids, and laxatives.

DISCUSSION

How should we view these results? There were many, many symptoms, certainly, but most of them were of a chronic nature. The medical profession can be justifiably proud about the eradication of acute infectious illnesses, largely attributable to man's urban habits. But what should we make of the symptoms left, and found in the present survey? Is the great medical battle with disease really over, or is there a new challenge to be met? Are the symptoms reported in Bermondsey and Southwark of any real significance? I infer that they are, and that although the new challenge is less urgent, in terms of time, it

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is urgent in terms of husbanding medical resources. The reasons for taking this view may be summarized as follows:

Personal experience, talking to patients, as well as the results of the present study, suggests strongly that the use of the National Health Service by sufferers from chronic disease is too random. All too often it is a relative who has advised the patient that their own attempts to treat their chronic bronchitis or their gastro-intestinal symptoms, backache, or skin condition are unavailing and that they should consult their doctor about this symptom. It is also probable that the pressures of the National Health Service consultation make it difficult for the general practitioner to go into all the symptoms suffered; there just isn't time. This is supported by reference to National Health Service records, which show that consultations tend to focus on a single symptom. But if so, and if people are suffering from four or more symptoms, who is to decide the order of presentation? Perhaps we need to instruct our medical students to elicit symptom clusters rather than ask what is the main complaint. One suspects, and it is a strong suspicion among anyone who has time to take a full medical history and who knows how often really important information only emerges later, that a good deal of diagnostic and therapeutic activity must be proceeding on inadequate information about the exact symptom clusters.

One is forced to accept what one has always been appreciated from personal observation or contemplation, namely that there is often a major communication block between the complainant and the medical care services. Many lay people suspect this and either opt to treat themselves, aware that an error on their part in understanding the doctor's question or an inaccurate answer might land them in hospital for investigations involving X-rays, venae punctures, and even incarceration for an indeterminate and medically controlled sentence of time. It is no wonder that they repair to the chemist and try to track

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down a remedy for themselves, in the same way as their mothers and fathers tried to find suitable spectacles by trial and error at the counter. And if anyone is overwhelmed by suspicions aroused lately, particularly since the thalidomide tragedy, about the safety of pharmaceutical preparations, they can get some measure of reassurance about the drug they wish to purchase by inquiry of the shop assistant, as they indeed do, if much is sold and if it's 'quite safe'.

The challenge of the situation is that these attempts by lay people to diagnose and treat themselves are often misguided. For the evidence seems to be building up that there is a clinical iceberg and its explanation is emerging. It is only necessary to review the bald facts, that there are many symptoms in the community, that many people (50 per cent) have more than four symptoms, and that doctors probably do not have adequate time to elicit these symptom clusters, and one can see how it is possible for large numbers of chronic diseases to be buried as it were under this welter of complaints. The proof that this is so emerges from the result of epidemiological studies and I shall provide some evidence that the unrecognized disease is of some clinical significance in the next chapter, where I shall refer to studies in my own particular interest, diabetes mellitus.

CONCLUSIONS

The first conclusion one draws from this study is the need for more understanding by doctors of how the public gets primary medical care. This conclusion is appreciated by the Ministry of Health in England and Wales and the Home and Health Office in Scotland, who are making available the funds for operational research. Many more doctors in various walks of the profession should now indulge in this sort of activity as a useful step towards clarifying the priorities for their personal and academic research. This would have a most salutary effect on their work and their morale. There is a grain of truth in the assertions

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that, interesting though studies of, say, lung compliance have proved over the years, the great majority of Londoners were suffering from such mundane problems as infected sputum and airways obstruction.

I set this down with apologies to my colleagues indulging in respiratory research: as one who has suffered airways obstruction, I would defend to the death their right to study any aspect of lung disease in the knowledge that it all helps. But for myself, and I sense it to be true for my departmental colleagues, the sort of operational research suggested gives a greater perspective and provides academic careers of more professional satisfaction. Lord Platt's observation that it is the pharmaceutical companies and not academic medical units which initiate the research which produces therapeutic advances is in no small part due to the former paying attention to the broader issues (9).

Most important is the ignorance to be combated. The recent moves to extend health education, dull though they may appear to some, are clearly vindicated by the present results. Pharmaceutical companies might well follow the lead of Aspro Nicholas Ltd. in their 'Campaign against Ignorance', and extend their assistance in this educational endeavour by careful attention to the opportunities offered in their advertising material in the Press and Independent television about home remedies for common complaints.

Such an education drive, conducted in the schools as well as elsewhere, might make the use of questionnaires in clinical practice much more acceptable. The idea that it might be more efficient if the patient filled out a questionnaire before interview, so providing the physician with an indication of the range of symptoms at a glance, has not caught on in the U.K.—the Cornell Medical Inventory is used more in the health-conscious United States. We here fear for the ignorant left behind, floundering in the wake of all these technological

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developments. Our fears might be removed if it could be shown firstly that the use of questionnaires on an experimental basis provided the doctor with more information, helped to make a more precise diagnosis, and allowed him to manage more people in the same time. This would, in fact, leave more time to be kinder to the 'poor historians' who present such difficult and time-consuming problems.

Finally, the survey brings into sharp relief the possibility of unlimited demand, of the sort Enoch Powell appreciated (10), and shows that people, even in a relatively poor district, are spending considerable sums of money on their symptoms: there were charges for National Health Service prescriptions at the time of this survey. This points up again the changing pattern of social affairs in relation to medical care—the increasing need to reconsider priorities now that Keynesian economic policies and controlled government spending have damped down the swings from boom to unemployment and abject unexpected poverty. As economic and living conditions improve as they will, evaluating medical priorities will become a complex process including not only the older considerations of pain, urgency, and poverty, but newer ones like ignorance, chronicity, and amenity to treatment. This is not new for practising doctors. They have known that they must take special steps to help, for example the harassed mother of a large young family, or the relatives and sufferers of incurable chronic diseases like disseminated sclerosis and the muscular dystrophies who feel so cheated by the fates that all the efforts of the National Health Service are of so little avail to them, or the bewildered or the very poor or the dying. These attributes of a case do not appear in the statistics but their existence poses important points for those responsible for training medical students. Future doctors must still recognize such aspects and understand them as well as the scientific basis of medical practice. Or am I beginning to sound too Utopian?

3

One chronic disease in the community: Diabetes mellitus considered in detail

Are you sure all those symptoms you've discovered in the Bermondsey survey are important? Couldn't they just be the things we have to put up with?
My wife, recently

Surely those are the aches and pains that come to all of us, that we have to learn to live with.

Lord Platt after a meeting of the Standing
Medical Advisory Committee, some years ago

In this chapter our knowledge about one of the chronic diseases in the community which might cause symptoms without being recognized, diabetes, is summarized as a prelude to considering the epidemiology, treatment, and prevention of the condition.

There is a widespread view that, with acute illness in the decline, the great challenge to medicine is over: surgical transplantation is the challenge now. In any question of priorities in medicine today, these new techniques and particularly the ideas behind them, must be considered. There is not the slightest doubt that they command a very high priority in intellectual terms. The rapid succession of advances in knowledge about protein synthesis, cell differentiation, immunology and the role of the lymphocyte, all command our greatest respect, attract proper financial support, and win prizes. All this research is improving our understanding of disease. But, it seems unlikely that transplant operations will affect more than a small minority of sufferers in the short term future. The recent achievements in cardiac transplantation by Barnard and his

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team must not obscure the facts that the demand for medical care and ordinary surgery is increasing all the time and that resources are limited. Care must be exercised to prevent too great a diversion of resources or ambitions into this field too soon, to the detriment of research efforts aimed at understanding and preventing the very diseases transplants are used for—for example, renal and heart disease. A rather unexciting deduction, perhaps, but an inevitable one starting from the viewpoint I have chosen here, namely from the periphery inwards. For the only way to extend such therapeutic procedures to an increasing number of deserving cases without compromising the quality of the general service, to which all make a financial contribution, will be by carrying out the well-established rules of public health. This means trying to eradicate the diseases which make big demands on medical care, so leaving surgeons freer to do transplantation work and physicians research into incurable conditions like disseminated sclerosis.

While not wishing to detract in any way from endeavours to transplant organs, personal experiences, including those with the Bedford diabetic survey, lead to the conclusion that the medical challenge is far from over, that there are large numbers of persons suffering from serious chronic diseases, untended by medical care services, and often unrecognized until it is too late for effective treatment. I have in mind obese persons with mild diabetes and heart disease, like Mr. Washkansky who received the first heart transplant. We know that, if such people avoid obesity, it is highly unlikely that the sequence of events would have progressed so quickly, if at all. As I tried to indicate in the previous chapter, such patients are not easily detected in the great babble of voices reporting symptoms. In electronic terms, there is a great deal of noise obscuring the signals. We shall have to incorporate additional and more sophisticated methods of interrogation, or resort to routine measurements of such things as blood pressure and

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various blood constituents if we are to detect the diseases which do not have obvious and characteristic symptoms.

Diabetes mellitus seems an excellent example of this problem and most of the following review of our knowledge about the disease may help in understanding my general arguments later about chronic diseases in the community. On the other hand, if the details seem too irksome or too irrelevant to the main theme about priorities in medicine, they can be bypassed.

Until the last ten to twenty years, most students of medicine have been accustomed to think of diabetes mellitus as an acute illness such as can be produced by pancreatectomy in the dog or by injecting alloxan into rats—a condition where there is polyuria, thirst, dehydration, and weight loss, culminating in metabolic acidosis, coma, and death. But these findings in animals cannot be simply carried over to the human situation. It is true that 5–10 per cent of diabetics, usually but not always young patients, may have an acute onset to their disease like this, which quickly focuses attention on their condition. But in 70 per cent or so of the diabetics attending clinics today, the onset is insidious.

Diabetes mellitus is a chronic disease which runs in families associated with elevation of the levels of glucose in the blood, and in 'classic' cases, like the young patients mentioned above, this hyperglycaemia is associated with intense glycosuria. Diabetes is a good model for the present considerations, because it exemplifies the various stages of disease in the conceptual model of Figure 1. It is now realized that the early stages of the disease, involving the biochemical abnormalities without symptoms, may go on for years. And when symptoms do appear, they arise gradually and imperceptibly—feeling run down, fatigue, lassitude, inability to cope. No serious thought is given to them—'it's ageing'—and no action may be taken for further long periods—again perhaps years. Furthermore, the disease is associated with numerous complications, mostly

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detectably microscopically as abnormalities in the smaller arteries, where thickening of the intima with glycoproteins has been observed, and in the capillaries, where thickening of the basement membrane with similar material has been recognized in almost all tissues of the body. These vascular complications become of clinical significance when they interfere with function in the retina of the eye, or the renal glomeruli, or the nutrient arteries to peripheral nerves or the vessels to the heart, or brain or peripheral muscles—leading to a whole host of symptoms—visual, renal, neurological, or vascular—which may not be recognized immediately for what they are, namely manifestations of the diabetic state, by either the patient or his doctor. There are also various non-vascular complications which can be attributed with more confidence directly to the hyperglycaemia; cataracts of the eye, boils of the skin, and monilial infections of, for example, the genitalia or hands, due to glucose being excreted in the urine and sweat.

One can be less certain about the role of hyperglycaemia in the other complications. It is important to point out that it may not be the central biochemical abnormality: it is just the best recognized, being one of the first blood constituents to be measured. There are certainly major alterations in other blood constituents, fats, and proteins, and any of these could be a reflection of the central abnormality which, rightly or wrongly, is currently thought to be related to insulin. This hormone is a protein, produced in the β -cells of the Islets of Langerhans: whether any other cells of the intestinal mucosa can elaborate it is not yet completely certain. The mechanism of synthesis of insulin and its release into the circulation are under intense investigation. *In vitro* laboratory studies show that insulin certainly increases the uptake of glucose and amino-acids by many tissues, muscle, peripheral and cardiac, liver, the arterial wall, and adipose tissue, where it also suppresses the release of fatty acids. There is a controversy at

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present as to whether insulin affects glucose uptake by the central nervous system, which could be relevant, of course, to the neurological complications which can so anaesthetize the feet as to lead to serious trophic changes, bone destruction, and even amputations which are particularly distressing when needed for relatively young patients on insulin therapy.

The treatment for diabetes until the 1920s was aimed at saving life in the young acute-onset case, and preserving it in older patients. It was based on fasting, introduced by such clinicians as Bouchardet of Paris, with a regime of vigorous exercise if the patient was well enough. We know now that both these procedures tend to increase the body's efficiency in terms of its use of insulin, by diverting the hormone towards the relatively insulin sensitive muscles. The achievement of Banting and Best in 1921 in extracting insulin from the pancreas of dogs and lowering the blood sugar by injecting it into pancreatectomized animals and in diabetic patients, brought a therapeutic triumph and some 20 per cent of the diabetics attending clinics today need injections of this hormone. The over-all world demand is increasing and the pharmaceutical industry is becoming hard-pressed to satisfy it. Exactly why these cases need insulin is not clear. They often have insulin in their blood when first diagnosed and insulin is usually found in the pancreas of such cases at post-mortem. Dr. Oakley suggested recently that they may suffer a virus disease attacking the β -cells; others have provided evidence that initial high blood sugars rapidly lead to exhaustion of the β -cells in experimental animals. Others, for example Vallence Owen, have suggested that diabetics elaborate insulin antagonists. We just do not know whether any or all these causes operate.

The vast majority of cases, 75 per cent or more, are obese and elderly persons. These patients do not suffer the acute onset of 'classical' diabetes—the polyuria, polydipsia, and so on—although they may have quite high blood sugars. An ex-

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planation of this lack of symptoms has emerged recently. It appears that the blood sugar level at which significant amounts (grams) of glucose appear in the urine rises with increasing age (11). Among adolescents, this so-called renal threshold is frequently 120 mg. per cent or even less—while in patients over 60 years of age it may be as high as 300 mg. per cent. So we see that older people may run high blood sugars without heavy glycosuria, polyuria, nocturia, thirst, or weight loss: in fact another of the classic symptom clusters has been found wanting when we begin to deal with the diabetics in modern societies with the larger proportion of older people. Until recently these elderly cases were treated by dietary restrictions if they were obese, coupled with exercise.

Are there any longstanding clues about the prevention of diabetes? Yes. Since Bouchardet's observation that no new cases arose in Paris during the siege of the Franco-Prussian war, it has been repeatedly confirmed that whenever a population is exposed to food shortages, hardly any, or no, new cases of diabetes appear in the community.

What are the over-all trends in the prevalence of diabetics? Upward. Before the introduction of biochemistry, diabetes was a relatively uncommon diagnosis, suspected if the patient showed weight-loss and polyuria and confirmed when the urine-taster pronounced the sample as sweet (mellitus). But with the introduction of biochemical analysis of urine and blood for glucose, and selective screening procedures like insurance examinations, more cases, particularly of the obese type, were found and by 1939 most textbooks gave prevalences of about 0.7 per cent for the U.S.A. and U.K.

Shortly after World War II, at a time when there were many hungry people in Europe, Wilkerson and Krall studied the town of Oxford in Massachusetts, of population about 4,800. They arranged to collect and test the urine of all persons in the town and performed glucose tolerance tests on any with

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glycosuria, to separate the true hyperglycaemic diabetics from those with normal blood sugars but low renal thresholds. The result of their survey was that, for every diabetic known in Oxford, they found another, hitherto unrecognized case.

And, as the near famine circumstances receded in Europe, the lean faces began to fill out, more and more new obese adult-onset cases appeared. Fortunately for the new sufferers in the 1950s, the rigours of earlier treatment in terms of dieting and exercise regimes were relieved by pharmaceutical developments. The wartime researches of Academician Paul Loubatières in Montpellier had revealed that sulphonylamides stimulated the release of insulin from the β -cells, and had shown that these compounds were hypoglycaemic in man. In the mid-1950s German pharmaceutical chemists at Hoechst near Frankfurt produced and marketed the first commercially available oral hypoglycaemic agent, carbutamide, and when the side-effects of such sulphonylamides were found to be too high a risk for long-term treatment, they produced tolbutamide, which is one of the safest compounds ever marketed. Many analogues have followed, and another group of oral compounds, the guanides, has also been developed: they appear to be hypoglycaemic only in diabetics, and facilitate the action of any insulin present in the patient's blood.

It was against this background of increasing prevalence and the emergence of new oral therapeutic agents, which reduce hypoglycaemia and so might spare cases the vascular and other complications of the disease, that the late Dr. Clive Sharp, Medical Officer of Health in Bedford, came in 1960 and asked if my Department would consider joining him in a diabetic survey in his town. I immediately agreed.

The Bedford Diabetic Survey in retrospect

The procedure at the Bedford Diabetic Survey is described and the difficulties which arose both in terms of diagnosis of new cases and organizing their treatment are explained. A new approach to defining diagnostic levels is put forward and together with some validation for treating diabetes. The widespread prevalence of other chronic diseases is considered: they turn out to be largely diseases of civilization.

The Bedford Diabetic Survey was by no means unique. By 1965, over forty diabetic surveys had been traced in the literature and were summarized by the World Health Organization (12) and a similar number of new surveys was referred to at the Epidemiological Section of the Sixth International Diabetes Federation Congress in Stockholm in 1967. So the total surveys completed or being carried out must now be about a hundred. As will be pointed out, for its time, perhaps the most important points about the Bedford Survey were first that a modified clinical examination was carried out when persons reported for their main diagnostic test, the glucose tolerance test, and second that a random sample of the co-operating population was also subjected to a similar test irrespective of whether they had glycosuria.

Planning for the Bedford Survey began in 1961 and it was carried out in the early summer of 1962: many people helped but I must acknowledge especially Dr. Harry Keen and Margaret Whichelow. The scheme was to perform a study of the prevalence of diabetes mellitus using glycosuria as the screening procedure along the same general lines as Wilkerson and Krall's investigation, but also to call up a random sample of

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the population to try to establish 'normal' glucose tolerance test values for a British population, for we soon realized that this important information was lacking. We really needed it first to state with much precision which persons in Bedford had diabetes, and which group did not, but this was not feasible in the circumstances and so we decided to rely on published data, largely from America, and collect our own information later.

Regarding the detection of glycosuria, enzyme impregnated papers specific for glucose and sensitive to levels of 0.1 per cent or higher in the urine, which could be used very quickly and accomplish large numbers of tests in a short time if organized on a proper basis, permitted the urine survey to be carried out in Bedford, of population in 1962 60,000, over a single week-end. Of the total population, 38,000 were on the Electoral Roll and these people were taken as the defined population. The intention was to test as many of this group as would co-operate by providing a post-prandial urine sample to be collected on a Sunday morning and tested within twenty-four hours. After detailed arrangements had been decided upon and organized, 60 ml. polythene urine containers were distributed on the previous Saturday by volunteers from many walks of life, but largely by schoolboys and schoolgirls. The public was asked to provide a urine sample collected one to two hours after their breakfast next day, affix the lid, filling out on it their name, address, age, and indicating whether they knew they were diabetic. In the event, 25,701 persons—about 67 per cent—co-operated and of these, excluding from now on all known diabetics, 1,096 or about 4 per cent had detectable glucose in their urine. All these persons were called up over the following weeks for a modified glucose tolerance test, during which procedure a medical history was recorded and a limited physical examination carried out, with special reference to vascular disease and other diabetic complications. Of the 1,096 asked,

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936 co-operated. The first and lasting personal clinical impression was how similar were the general appearances and clinical histories of these persons to many of the persons attending medical out-patient clinics—this was my first realization that the use of the hospital services might be a relatively random thing: without the survey when would these glycosurias have been traced?

The diagnostic point selected in the glucose tolerance test was the two-hour capillary blood sugar level: scrutiny of the medical literature suggested that levels below 120 mg. per cent would be accepted by all authorities as normal, above, diabetic—as will be seen later, in fact, higher levels should be regarded as indicating increasing probability of diabetes. Of the persons who showed glucose in thir urine after what might be best described as random English Sunday breakfasts, a quarter, or 1 per cent, of the total population had blood sugar levels in excess of that usually accepted as normal: their general practitioners were informed of the results and any necessary action taken, the bulk of the persons with higher levels of sugar were referred to the local diabetic clinic.

Two things must be interjected here. First, when the two-hour blood sugars were plotted out as a histogram several important and relevant but unexpected findings were made. The distribution of results certainly did not fall neatly into two groups with a separation at 120 mg. per cent. At first inspection, the results looked very similar to the continuous distribution curve, from normality to gross abnormality, described by Pickering and others for blood pressure—another apparently multifactorial disease. I shall return to this point. Secondly, we were surprised by the height of blood sugar values in unrecognized diabetics. In a few cases they ran as high as 400 mg. per cent at two hours in the tolerance test and in many cases, over 300 mg. per cent. It became clear that levels exceeding 400–500 mg. per cent must have been occurring in these

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persons during their daily life before their diabetes was detected. They were only spared the intense dehydration, metabolic decompensation, and acidosis of diabetic coma by the high renal thresholds noted earlier. It is only right to point out that such levels really are high, far exceeding those first found in many of the persons attending Diabetic Clinics! Discovery of such levels in a patient attending the casualty or out-patient department of a hospital would have resulted in urgent admission to control their diabetes. In other words, some of these cases, at large unrecognized in the community until then, were, by any criteria, quite severe cases. When we went into their records more closely, we found that 80 per cent of those with two-hour blood sugars over 300 mg. per cent had symptoms which, in retrospect, suggested diabetes. Sixty per cent of the cases in the two-hour range 200–300 mg. per cent had diabetic symptoms, 40 per cent of these in the range 120–200 mg. per cent, but also 20 per cent of those in the normal range, who, it should be noted, made up 75 per cent of all glycosurias. These results confirm one of the major problems in trying to detect disease by symptoms: 20 per cent of the severely hyperglycaemic cases did not have any in reply to direct questioning, and 20 per cent of glycosuric persons with normal blood sugars (note that this is 3 per cent of the total population) reported symptoms which might have been interpreted as diabetic. In general, therefore, these results are in close agreement with the findings in the Bermondsey and Southwark Health Survey, on the one hand there are many recognizable symptoms and, on the other unfortunately, biochemical disorders can reach major proportions before recognizable symptoms arise.

Thus, while by no means all cases with two-hour blood sugars over 120 mg. per cent were clinically significant, it is possible to refute the other implication, that the cases unrecognized in the community were simply mild cases—the Bed-

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ford Survey, if it showed anything, showed that this just was not true in 1962—many of the cases detected then needed treatment badly.

At the same time as these studies were going on, the other investigation was under way to answer the question as to whether we had any right to take a two-hour blood sugar level of 120 mg. per cent as the cut-off level between normals and diabetics. As mentioned, we called up 600 persons in an age-sex stratified random sample of the co-operative population irrespective of whether they had glycosuria on the morning of the survey—26 did—and asked them to submit to a full glucose tolerance test to discover the normal glucose tolerance of the Bedford population at large. They were also questioned about their medical history and given a modified physical examination during the test in the same way as the glycosurics. Five hundred and thirty-five persons co-operated and, for us at least, the results were fascinating.

First, we found that, in this group representative of the general population, some 30 per cent had glycosuria after the administration of the standard oral glucose load, rather than the random English breakfast, which had produced a falsely low prevalence of glycosuria of only 4 per cent. The same must be generally true of all diabetic surveys using urine screening—many persons with hyperglycaemia will be missed because of the high renal threshold of ageing persons, and because they do not eat a large enough meal to raise the blood sugar significantly above such high thresholds.

Secondly, of the 535 persons, 82 had two-hour blood sugars above 120 mg. per cent—and of these only a small population had had glycosuria on the morning of the population survey. Furthermore, the histogram of two-hour blood sugars among this random sample of the population was similar to that found for the glycosuric persons, and of the persons with two-hour levels over 200 mg. per cent in this small random sample,

The Bedford Diabetic Survey in retrospect

several were found to be suffering from diabetic symptoms or signs of vascular disease. Finally, it was clear that glucose tolerance diminished progressively with age, a point of significance in modern societies with lengthening life expectation.

The main conclusion one could draw at the time was that glycosuria was no longer an adequate screening procedure for epidemiological surveys of diabetes; blood sugar methods were needed to find hyperglycaemia without glycosuria. It also appeared that, if the Bedford population was representative of the country as a whole, careful screening using blood sugar methods would reveal that some 9 per cent of the adult population had levels above the then accepted values for normality. This not only represented an intolerable potential burden on the National Health Service in terms of therapy needed, it raised all the problems one has to face when embarking on screening for disease rather than priority.

By this I mean that, to diagnose disease one needs a diagnostic level, and one could see no real reason for using the figure of 120 mg. per cent—which was based largely on a study of young persons in the U.S.A. The Expert Committee of the World Health Organization has since met and after considerable discussion, has agreed to raise the diagnostic level for persons of middle age to 140 mg. per cent: 7 per cent of the adults in Bedford exceeded this level which is just as arbitrary as the previous level, 120 mg. per cent, there being no obvious segregation of the two-hour blood sugar results into normal and diabetic groups at this level either. But diagnostic levels have to be set as there is small chance of getting the population to co-operate in epidemiological surveys or screening programmes—Ann Cartwright has produced evidence that two-thirds of the public in the U.K. would like such facilities (13)—unless there is some prospect of our being able to say ‘you have’ or ‘you do not have’ this or that disease.

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In the Bedford Survey, we sought co-operation on these same general grounds, coupled with the belief that early detection would permit early treatment, that the newly available oral therapy would lower blood sugar levels and so shield the population from the complications of high blood sugar levels and so one hoped of vascular disease. It will be seen below that the results of the arduous studies of Dr. Harry Keen and other members of the Department in the five years following the survey confirm this belief in part because treatment does appear to protect against vascular disease.

The two big problems, then, were setting a diagnostic level and meeting the resulting demands for treatment. Screening for priorities, on the other hand, could circumnavigate these difficulties, and deserves much more careful consideration. If one does glucose tolerance tests on a population, it should be possible soon to correct the results, in a rough and ready way, for age, and then select the persons in the various age-groups who have the highest levels for their age. The numbers selected for therapy could be adjusted to the treatment facilities available, in the same way as surgeons have for many years dealt with persons with other chronic conditions such as hernias, admitting some and putting others on the waiting list. This seems a better interim solution to our problem from the public's point of view, for they may have to wait a long time before the medical profession decides on diagnostic levels for diabetes, and many other diseases, and before treatment for chronic diseases is available for every sufferer. The notion of screening for priority has the additional advantage that it reinstates some sort of order into the hitherto more or less random reference of chronic disease to the treatment facilities in the National Health Service, and represents one logical solution to the problems which Enoch Powell has been so concerned about, namely the endless demand for medical care.

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THE PROBLEM OF DEFINING DIAGNOSTIC LEVELS FROM MEASUREMENTS SHOWING 'CONTINUOUS DISTRIBUTION'

However, the administrative suggestion of screening for priorities does not absolve us from attempting to define the diagnostic levels of blood sugar for the diagnosis of diabetes. This is really required before we can make recommendations about who to treat. Furthermore, if we are to avoid unnecessary medications, we need to be sure that any treatment we offer has some value in terms of relief of suffering or reduction of risks of serious complications.

The results of the Bedford random sample show that two-hour blood sugar levels in the glucose tolerance test as low as 120 or 140 mg. per cent are reasonable limits for persons under 40. At all ages, there is a substantial proportion of people who keep below these limits, but an increasing number above them with advancing age. One explanation would be simply the failure of older persons to maintain the complex metabolic and synthetic pathways needed for protein synthesis. It will be remembered that insulin is a protein and recent chromosome research suggests that, with advancing age the cells tend to 'lose' chromosomes, their nuclei containing less than the full complement of 46, and so they must have lost the full genetic equivalent for enzyme and protein synthesis. We are all familiar in everyday life with manifestations of the ageing phenomenon—balding heads and fading complexions—and we now realize the same must be going on with the insulin-producing cells.

It is not difficult to see why two-hour levels of blood sugar during the glucose tolerance test as low as 120 or 140 mg. per cent have become accepted as diagnostic of diabetes. When higher levels are suggested at international meetings convened to consider such matters, the same low values have always been confirmed. One can see several reasons for this. First of all,

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delegates from countries where private practice is the main form of medical care might be unwilling to raise the diagnostic level. This would reduce the number of cases of mild diabetes for their colleagues to treat and one can understand how this might be an unpopular decision for delegates to have to report back to the rank and file members of their medical associations and groups, particularly as everyone in clinical practice knows of patients with severe diabetic complications in whom no higher blood sugars have been recorded. It therefore seems prudent to such committees to keep the diagnostic level low, rather than high, otherwise those cases with obvious and complicated diabetes might be excluded from the definition.

What seems to be needed is a more elastic diagnostic level and although this must sound strangely imprecise, it is possible to produce an argument which resolves all the difficulties and I am indebted to a lecture by Professor W. A. Rosenblith of M.I.T. for being introduced to the idea of applying Gambler's Ruin-type analysis to the Bedford two-hour blood sugar data, and to Dr. Berwyn Smith for pointing out that a similar mathematical procedure had been used long ago by Carl Pearson to segregate the I.Q.s of mentally defective children from those simply with the lowest I.Q.s. The procedure gets its name from a consideration of the fate of gamblers, all given say £50, who play a game involving a 50-50 chance of losing to the 'bank'. It will be apparent that a few unlucky players will have lost all their resources after fifty plays: the modal number of plays (the most frequent) will be about 100. But above this number, the size of each group 'going broke' falls away exponentially. This means that if the results were plotted out as a histogram, as the Bedford blood sugar data were, the falling limb of the distribution curve, from about 100 mg. per cent onwards, would be exponential if hyperglycaemia was multifactorial and the Bedford population homogenous as far as carbohydrate tolerance was concerned. In which case, it is clear

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that any diagnostic level for diabetes would be arbitrary. But when the histogram was plotted out using a log-scale for the ordinate it was possible to recognize a second population in the Bedford data, separate from this general one. For when one did this, the falling exponential limb of the histogram fell on a straight line, which made it easier to detect in both the glycosurics and random sample second populations with a separation at two-hour blood sugar of 200 mg. per cent. And this general proposition, of the existence of a second hyperglycaemic population, is confirmed by a similar analysis of data relating to a South African survey in 1967 kindly provided by Professor W. P. U. Jackson of Capetown.

What does this mean? First, about 3 per cent of the adult population lie above the value suggested as segregating the second hyperglycaemic population, namely two-hour blood sugar values of 200 mg. per cent. Secondly, Keen and his co-workers have found that this group has a much higher prevalence of knowledge of a diabetic relative (over 40 per cent) than either the persons with blood sugars lower than the old two-hour blood sugar criterion of 120 mg. per cent, who can be designated as controls, and the group with levels between 121 and 200 mg. per cent, who have been called the Borderline group. The group with levels above 200 mg. per cent appears therefore to contain the majority of the persons whose inherited diabetic tendency has become manifest.

It is important to follow this through a little further. For the results suggest that, with a two-hour blood sugar of 200 mg. per cent, there is a 50-50 chance of being in the larger normal population and the smaller diabetic population. This means that at that level, half the persons would be diabetic and half the persons whose hyperglycaemia was due to any one of a multitude of factors on the day of the test—ranging from the physiological hyperglycaemia of obesity or under exercise

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to the possibility that recent diet, or rapid gastric emptying on the day of the test, may have influenced the result. But equally it will mean that, at levels below 200 mg. per cent, there will be some relatively low blood sugar level diabetics—such as the cases mentioned earlier, showing diabetic complications without ever having high blood sugar levels. Thus, by applying a mathematical analytical procedure, we can explain the phenomena even if we can't make completely firm diagnostic statements about the significance of a moderate elevation of two-hour blood sugar for any particular individual. Whether or not any individual is diabetic is still 'statistical'. Obviously as time goes on it should be possible to construct histograms for two-hour blood sugars by age—and also for other times in the tolerance test. This may improve the precision when trying to diagnose a clinical entity with a single laboratory test. Clearly, too, a family history of diabetes—here one might add '200 mg. per cent diabetes'—would make the clinician in charge take any modest elevation of the blood sugar more seriously. One might also add that this interpretation does not detract in any way from the earlier notion of screening for priority—but it does emphasize the need to maintain academic research aimed at discovering any better index of diabetes than the blood sugar level, where various compensatory factors lead to the overlap between high normal and diabetic values. If diabetes is, as the American school so strenuously avers, a recessive genetic trait, efforts to find a more precise biochemical marker for the disease must be continued.

VASCULAR COMPLICATIONS AND TREATMENT

In addition to an increased prevalence of family history among the Diabetics (two-hour blood sugar over 200 mg. per cent) discovered at Bedford, Keen and his colleagues also found increasing prevalence of vascular disease with rising blood sugar from Controls, to Borderliners to Diabetics. In fact, there

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were more elderly people in the Diabetic group, but Keen and his colleagues had carefully matched the Controls with the Borderliners for age, sex, and social class—the latter has to be taken into consideration as it is well known that certain social class I occupations, for example, registered medical practitioners, are particularly prone to ischaemic heart disease—and despite this matching, there was more vascular disease among the Borderliners than the Controls.

Having defined the three groups, Controls, Borderliners, and Diabetics, decisions had to be taken about the on-going management of the cases at Bedford. The survey of glycosurics and the small random sample had identified some 350 'diabetic' persons, 200 Borderliners, and 150 Diabetics, a total number somewhat in excess of the numbers then attending the local diabetic clinic! The point brings into sharp relief a very important aspect of any screening activity, which cannot be emphasized too strongly, namely how essential it is under our present health arrangements to have treatment facilities available before one finds new cases. What would have been the response had half the Bedford Clinic attenders been told that they were to be superceded by more deserving cases, one dreads to think. In fact, we adopted the principle of screening for priorities. The Department of Medicine provided extra manpower to get the 150 diabetics properly instated in the Bedford Diabetic Clinic, their records written up and their treatment started, which seemed the least we could do to relieve the hard-pressed Diabetic Clinic Consultant, Dr. Metcalfe.

The Borderliners, however, remained. Their doctors had been informed that they had blood sugar above 'normal' and the individuals themselves were told they had Borderline diabetes. They were asked if they would be prepared, and they all agreed, to participate in a trial to answer the question as to whether strict treatment was advisable for such cases, who it will be remembered might represent between 4 and 6 per cent

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of the adult population in Britain. This was mounted as a study by the Department of Experimental Medicine—after 1963 the Department of Medicine—at Guy's and the Public Health Department in Bedford. Dr. Harry Keen accepted the major responsibility for the organization of a Bedford Borderline Clinic and has been taking a small team up from London every week since for the follow-up tests and physical examinations on the 200 persons involved. The idea behind the project was to divide the Borderliners into four groups; one to be advised to diet, and given very small doses of tolbutamide, another to diet but to take clinically effective doses of tolbutamide, a third not to be instructed to diet and to take the very small doses of tolbutamide and the fourth, not to be instructed to diet but given clinically effective doses of tolbutamide. The project has been generously supported since 1962 by the British Diabetic Association's Research Funds, by the Ministry of Health's Research Funds, and by Hoechst Ltd., who made all the tolbutamide tablets, including the 'placebos', available free of charge. The study has also involved more sophisticated investigations carried out in association with Dr. G. Rose of the London School of Hygiene: special inquiries were made into vascular disease and electrocardiograms, retinoscopy, and urine studies for albuminuria, were carried out.

This is one of four studies into the very important problem as to whether persons with modest elevations of blood sugar obtain any benefit from treatment; the others are being carried out by the U.S. Public Health Service under Dr. O'Sullivan in Boston, Massachusetts, by Dr. Stowers in Aberdeen, and by the College of General Practitioners. It would be wrong to compromise the results of all these studies by reference to Keen's findings in any detail in isolation. Suffice it to say that he has recently reported to the British Atherosclerotic Study Group and the British Diabetic Association that there was significantly fewer vascular events over the last five years in the

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tolbutamide-treated groups. If these very important findings were confirmed, the importance of screening for modest levels of hyperglycaemia would have to be taken into serious consideration again. One says again because, after the first flush of enthusiasm for it, the magnitude of the problem on the one hand and the lack of data suggesting any benefit from treatment before really carefully performed prospective studies like the one Keen has led, resulted in widespread doubts as to whether treatment was worthwhile after all. In the absence of such data, Wilson and Jungner in their authoritative review of the principles and practice of screening (see later, p.94) were quite right in not recommending screening for mild diabetes. If Keen's results are confirmed, the situation changes to asking the question, what would be the overall benefits of such screening: I shall return to this project later. One might add here perhaps that if the results of Gambler's Ruin type analysis are accepted by other workers, it is probable that we shall need to redefine the blood sugar limits of the Borderline group, between normals and abnormals. It is probable that the upper limit of the mixed population extends up to 230-50 mg. per cent rather than the 200 mg. per cent we used at Bedford. As this involves the group of people with a high prevalence (60 per cent) of symptoms, the intellectual barrier to treating a disease at the so-called 'presymptomatic stage' may begin to recede: we only think they are presymptomatic because we have not elicited the symptoms.

It is pertinent to recapitulate the major points which have emerged from this detailed study of the Bedford Survey because the same problems arise with most of the other major chronic diseases with which we shall be dealing. First, the Bedford Survey shows that, considering we were dealing with only one of the chronic diseases, a lot of symptoms may be attributable to diabetes in modern society—at a most conservative estimate some two-thirds of those with two-hour blood sugars over 200

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mg. per cent had symptoms—or 2 per cent of all adults could have symptoms due to this one unrecognized condition. One may deduce from the results of surveys for other prevalent diseases that one may find organic causes for symptoms in many more people. Considering screening for this single disease in detail has also shown some of the problems involved—the needs for more academic research to find a better diagnostic criterion than the blood sugar for the recognition of the diabetic who is at risk from complications; for more epidemiological research to define more accurately normal, borderline, and diabetic blood sugar levels for different age-groups; for more prospective therapeutic research to evaluate treatment, for the development of facilities in terms of manpower and resources, to treat cases before pushing too far ahead with the easier question of developing automated methods for detecting cases—unless, as I have said, one foresees the adoption of screening for priorities which, whether consciously or unconsciously, has already happened in most of the diabetic screening studies to date, to cope with the heavy load of cases uncovered.

OTHER CHRONIC DISEASES IN THE COMMUNITY

Going back to the original question, is there much unrecognized significant disease, one can say that there is a good deal of diabetes latent in society today—but is there any evidence for other disease causing symptoms going unrecognized? The answer is that there is reason to believe that many (other) chronic diseases have gone on unrecognized to reach sufficient severity as to cause suffering (in society). For example, part of our Bedford physical examination was taking the blood pressure—we repeatedly found high levels. Others in the United Kingdom have done larger surveys and found the same thing. Again, hypochromic anaemia is frequently found in surveys of the general population and

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depleted iron stores seem even more prevalent than actual anaemia among women living in London. Epidemiological studies of chronic bronchitics have shown that it, too, is very prevalent in city dwellers, the College of General Practitioners finding a prevalence of 17 per cent in men aged 40-64 (14). There is a good deal of psychiatric disease, and these are now recognized as one of the commonest diseases seen by the general practitioner (46 per mille patients, 166 per mille consultations were reported by the College of General Practitioners (15)): how much more minor depressive illness there is lying behind the symptom complexes discovered in the Bermondsey survey we do not know. But the point seems to be clear, that the modern Briton is not fit. He or she appears as a somewhat devitalized version of our eighteenth- and nineteenth-century forebears. Other diseases may be mentioned, such as rheumatoid arthritis, for which epidemiological studies gave a prevalence of 2-3.5 per cent for persons aged 55-64 or gout which Kellgren suggests affects 4.5 per cent (16), ischaemic disease of the heart, the special form of atherosclerosis which has become a major cause of death among males with prevalence rates of some 3.8 per cent for men (17), and cancers, of the lung (with an over-all death rate four times that caused by traffic accidents), of the rectum, stomach, breast, and cervix. In all these conditions a pre-disease stage is recognized, when biochemical abnormalities or cellular changes can exist for a long time before the classical symptoms begin to appear: the phase which interests anyone organizing screening procedures on a large scale.

It is true, of course, that we all have to die, and that there are many doors by which one may leave the corridor of life. Whether we can improve the quality of life by early detection of disease, or prevent certain conditions like cancer of the cervix or hypertension from asymptomatic bacilluria, must be investigated and found beneficial, then undertaken officially

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if and when we have the resources within the National Health Service.

This raises a side issue to be disposed of quickly, namely that the ill health we have been referring to might be due to the organization of our medical care services. This is certainly not the case—for epidemiological studies in the U.S.A., carried out before the emergence of Medicare, show prevalence rates which are essentially the same as the British rates for diabetes, ischaemic heart disease, and most other conditions where the diagnostic criteria used by the medical profession are similar: one adds this proviso because there were differences in rates for chronic bronchitis, but discussions have shown that this is partly a reflection of terminological differences. Likewise, in Scandinavia, where there are highly sophisticated state-organized medical care schemes, prevalence rates for chronic diseases are of approximately the same order too. So one can say that it is not administrative arrangements, but the form of life in these modern societies which is affecting the health of the people.

When one considers the causes of ill health in detail, particularly in respect of screening, one sees again many of the problems which arose from the detailed study of diabetes. Thus, for example, there is the well-known difficulty of deciding the diagnostic level for hypertension, which has been dealt with in such detail by Pickering and his co-workers (18). The same has arisen for iron deficiency anaemia, where the World Health Organization Study Group of 1958 (19) suggested that anaemia be considered to exist in men with haemoglobin levels of 14 gm. and in women below 12 gm. Using such levels Berry, Cousin, and Mages (20) found that 9 per cent of London housewives are anaemic and Kilpatrick and Hardisty (21) found even higher levels, 14 per cent in the age-group 35–64 years. But again, the problem arises about choosing the diagnostic levels, as it does when defining ‘hypercholesterolaemia’ or

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'hyperuricaemia'. In every condition, the same results are found: remarkably large numbers of abnormal values being detected among populations studied. For example, many persons were found in the community with systolic blood pressures of over 200 mm. Hg both in Bedford and in the much larger U.S. National Health Survey (22) 200 mm. Hg far exceeds the various diagnostic levels suggested to generations of medical students by the authors of textbooks, which range between 140 and 180 mm. Hg, in exactly the same way as 200 mg. per cent blood sugar levels exceed the diagnostic criteria suggested for diabetes.

I have to admit here that, once one had seen the possibility that using Gambler's Ruin with the blood sugar data, one could not resist applying it to figures for blood pressure and haemoglobin. The results are extremely interesting. Using the actual U.S. Department of Health Education and Welfare 1960-2 field results on over 7,000 people which have been made available to me by the kindness of the National Centre of Health Statistics, it is apparent that the method is applicable. The falling limb of the distribution curve follows a perfectly straight line until levels of 200 mm. Hg are reached—and here there is a depression in the curve, until the highest levels recorded are reached, 250+, where there appears to be a second small rise. My own interpretation of these findings is that, with systolic pressures above 200 mm. Hg persons have been lost, presumably through death. The second point is that there is a small group of very high blood pressures at large in the American community: these may be persons with malignant hypertension in the pre-clinical stages of their disease. The reason Lord Platt was unable to make his point about a second hypertensive population seems to have been the fact that there are very few persons in the community with unrecognized malignant hypertension at any time, so very large random samples of the general population are needed to find them with

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any certainty—indeed the U.S. Survey is not really large enough.

Gambler's Ruin can also be applied to haemoglobin levels, and if so, it appears that the levels chosen by most epidemiologists for the diagnosis of anaemia are again too near to the normal values (in this case, of course, too high). If one applies Gambler's Ruin to the levels for haemoglobin from the Värmland Study by G. Jungner and I. Jungner (23) it emerges that there is a second 'anaemic' population of men, with the separation level of about 11.5, and of women, with the level of about 10.5. These levels are considerably lower than those decided upon by the World Health Organization Study Group in 1958—which settled for arbitrary levels of normality of 14.0 gm. for men and 12.0 gm. for women (19). They reduce the prevalence of anaemia among women to 4 per cent. A defence of the more rigorous levels I am suggesting would hinge on the fact that blood volume is reduced by sedentary life, and is related to lean body mass, which is also reduced by physical inactivity. Stricter criteria might help to explain the finding by Elwood and Wood (24) that iron therapy did not relieve the symptoms of anaemia: perhaps the so-called anaemia was physiological in a large proportion of their cases, and this, coupled with the welter of general symptoms, prevented the discrimination of small benefits from therapy.

The medical profession's views about these three diseases, diabetes, hypertension, and anaemia, therefore, show the same general trends. The diagnostic levels, which have been set largely by eminent men working in the hospital environment, are too close to the normal values. It can be argued that these values have been selected to help those sufferers from any of the conditions who come into our hospital clinics or beds. But as epidemiologists move about the communities outside the hospitals where only one person in eight is referring his symptoms to the doctor, assuming the Bermondsey results as ap-

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proximately applicable to the general situation, we must expect our diagnostic levels to be moved further from normality. Indeed, in the present circumstances, we are favouring those persons who use the doctor by establishing levels which will give us something to treat!

But however we look at it, the over-all picture is that the present-day population is not fit. It is salutary to record that, since the rigours of World War II and the physical activity and relative lack of obesity of the 1920s and 1930s in the U.K., the mortality from ischaemic heart disease in England and Wales has risen over threefold during the 1940s and 1950s, from 80.8 to 2,731 per million for males, and from 37.4 to 1,613 for females (25). It is fashionable to consider that the higher prevalence rates for diabetes mellitus may be due to more refined methods of selection, but the truth lies probably between this and a true increased prevalence since food rationing ended. Furthermore, there is certain other evidence which suggests that modern life is having adverse effects on the prevalence of diabetes: the World Health Organization Expert Committee noted that, while the prevalence of diabetes remained extremely low in all unmechanized societies, it seemed to be increasing whenever obesity and under exercise were appearing. In primitive African societies, there is hardly any diabetes, whereas it is very common among the well-to-do, plump, Indian trading communities in East Africa.

There are some other important and interesting clues emphasizing how important it is for the medical profession to think seriously about the harmful effects of technological civilization on health. These centre on the way certain aspects of modern life are linked to diseases—for example, smoking has adverse effects, in chronic bronchitis, it is a cause of carcinoma of the lung, it is accepted as aggravating peptic ulceration, it is found to be a contributing factor in coronary artery disease. The latter is also related to diabetes: both con-

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ditions and hypertension are associated with obesity, under-exercise and hyperlipaemia: obesity aggravates osteoarthritis. It is probably only because we are cosseted by our motor-cars, our lifts, our mechanical devices at work and in our kitchens, and even for our hobbies that we are kept in a state of unawareness about how unhealthy we really are. And so, having ranged from diabetes to the general problem of chronic diseases today, we must now stand back and consider things in the context of the interaction between our genetic constitution, which has been evolving slowly for a long time, and our way of life, which is changing so quickly, being revolutionized within a single generation.

5

The conflict between evolution and revolution

In this chapter, emphasis is placed upon the rapidity with which the industrial revolution is changing our environment and so our diseases.

If the primary priority is to prevent, or at any rate postpone, the illnesses which can be attributed to the developments of civilization, leaving our resources free to cope with intractable problems, it seems appropriate at this time, to review briefly the growing conflict between evolution and technology.

In Figure 1 the idea of our having a genetic constitution is indicated, implying that environmental factors act upon the genetic constitution, and that some illnesses may arise from maladaptation or inadequate adaptation. We may start the review of the conflict conveniently far back in the path of evolution by considering the appearance of the primates—neglecting all the earlier processes of selection however important they may be. To begin with, it is important to get the time scale clear. Suppose each year is represented by a millimetre, then the monkeys evolved some 30 kilometres, or say 20 miles back in time. And the forerunners of *homo sapiens* began to leave the forests some 10 miles back in time. About half a mile back, our ancestral ground apes had good eyesight, efficient hands that could grasp weapons and were already showing some degree of social organization. The needs of hunting for food may have helped in the selection of the upright stance by man, making him a faster runner; brain size was increasing and the over-all interaction of mental and

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physical advantages, coupled with tribal organization, was beginning to provide the ascendancy over other species.

On the same scale, agriculture is only some 20-40 feet back in time and the easy availability of such minerals as salt and spices in our markets only 1-2 feet back. The dramatic changes in the demands being made upon our muscles in the survival processes began to occur as recently as 200 years, or 8 inches ago, and apart from Jenner's vaccination, the major shielding of our immunological systems from all manner of infectious diseases by chemotherapy and antibiotics started only 1 inch back in time. When one contemplates the slow genetic changes wrought by mutation and the subsequent operation of selective processes over the last 20-odd miles in this analogy and compares it to the developments in the last 20-odd feet, one sees why there is concern about the way the old Adam is being squeezed into the mould of modern society.

If we review the growth of agriculture, by going back on our scale for a few paces, we find it being imposed on the habits of earlier times, when man hunted for his food and ate such fruits, roots, or leaves as he could find. But when these became inadequate, he began to cultivate all kinds of crops—yams, beans, peas, pumpkins, maize, and so on. And if hunting failed altogether, as might have happened from time to time as demand exceeded the supplies of game or fish, the tribe was forced into agriculture wholetime. This still happens today in the Congo—in societies to which we have had access for only 100 years. In Africa it is often the women who cultivate maize and vegetables, taking no part in tending the cattle. But when tribal wars or disease or loss of territory cause a reduction in the land, the men as well turn to agriculture. It may even become the main occupation in the fight for survival, for one or two bad crops, as one sees today in India, wreak a terrible havoc on lean children. Cattle and meat, therefore, represent

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a luxury and one can see how obesity may have been of survival value.

Just two paces back in our time-scale, and we are in the late Middle Ages, when cultures in Europe had reached a high degree of organization and stability. Analysis of birth and death records in the Po Valley shows that, if one survived the vicissitudes of perinatal and infant mortality and the childhood diseases, the expectation of life was comparable at least to what we can claim today. Why were the city states of those days so successful for so long? First, they were small and defensible, second, they were surprisingly health-conscious, and third and perhaps most important, they were based on a hard-working rural economy. Thus, although they had ramparts separating the town from the countryside, the towns were dormitories and market places: there were craftsmen in them, certainly, but the great majority of mankind in Europe in those days was living a vigorous life off the land, subjected to hard physical work and the change of seasons, now with good crops, now with bad. And although they were stricken with appalling and sudden epidemics like the Black Death, the plague, and were battling against endemics of the chronic granulomata, and leprosy and bovine tuberculosis (which may have had a major effect on religious experiences, for example, for Joan of Arc (26), the towns were health conscious. As Lewis Mumford wrote,

Contrary to still current prejudice many medieval towns, in their remedial and preventive measures for health, were far in advance of their Victorian successors. Public hospitals were one of the definite Christian contributions to the city. Jerome relates that in A.D. 360 Fabiola gave up his villa for the cure of the needy sick, otherwise left to die wretchedly in the streets of Rome. From that time on, very rapidly after the eleventh century, the holy orders founded hospitals in almost every town: there would be at least two in most German towns, one for lepers, and one for other types of disease, according to Heil: while in 'big' cities such as Breslaw,

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with its 30,000 inhabitants in the fifteenth century, there would be as many as fifteen, or one for every two thousand people. What modern city can show anything like such adequate accommodations?

And note, these are the rule, rather than exceptions. Toulouse in 1262 had seven leproseries and thirteen hospitals . . . while Florence in the thirteenth century . . . with a population of about 90,000 had thirty hospitals with more than a thousand beds.

This compares more than favourably with the 1,500–2,000 beds serving the 250,000–300,000 people of the slums of Bermondsey and Southwark in the era 1900–40! As Mumford says, 'the medieval town still has something to teach its elephantine dehumanized successor'. 'Where after the seventeenth century growing cities were forced to look beyond their fortifications for water', the proper natural balance was disturbed and 'the big cities continued to grow more rapidly than either their technical or their capital resources. . . . This accounts in good part for the loss of cleanly medieval habits in the growing metropolises' (27).

The concentration of the population on towns and cities where labour could be used in the Industrial Revolution began in the eighteenth century, and by the nineteenth the squalor and the slums were here. I have touched on the scene in Bermondsey in an earlier chapter; and everyone who has read Dickens must have a feel of the poor quality of much of London life: Sam Weller of *Pickwick Papers* found his father smoking beside the fire at the George Inn behind Guy's Hospital and the pleasantness of Pickwick's rural scenes contrasts strongly with the appalling slum conditions described in *Oliver Twist*: bad air, bad odours, bad water, poor light, hard work, bad habits, and bad morals. And yet the cities offered chances, chances when crops failed, when there was a potato famine or a death in the family, and country people flocked there to take them. 'Cocks Eggs' they became to those who could survive in

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the rural scene: the conflict between town and country has not yet been and probably never will be completely resolved.

When the Industrial Revolution came, it brought what Mumford called 'Coketowns' with slums and disease. And although the end of the nineteenth century saw the improvement of water supplies, bringing them back to the quality of medieval towns, and the conquest of the enteric fevers, and recently cleaner air, so that the physical environment is becoming progressively less horrible in the towns where most people have come to live now, despite all this the new buildings going up on all sides have not completely restored a more natural life. For, in the last 200 years, man has come to expect a steady supply of food to be carried into his market place, has indulged his sweet tooth as technology has separated tastes from nutritive values of food reflected particularly in his increased consumption of sucrose (28), and is eating more and more fat. Food and vitamins are now available almost for the asking and the posters of the railways, a nationalised industry in Britain, bid us today 'Don't just stand there, eat something!' Our cheapest commodity, clean running water, cleanses our food, common salt with added iodide is on every table. But perhaps the most remarkable has been the change in exercise rather than over-all calorie consumption. Dr. P. V. Sukatme (1967) calculates that food consumption in the U.S.A. hasn't greatly changed from the 4,000 to 6,000 calories/day of hard manual agricultural work, the old time country work, but energy expenditure has fallen and is still falling, he suggests in the last ten years from 3.10 to 2.56 cal./min. (29).

Besides all these physical changes, mental pressures are obviously growing, too, and civilization is inducing what has been summed up neatly with the word stress—an attempt to list all the factors involved is probably not worthwhile since any and every aspect of modern life may produce some such response in susceptible individuals. This is shown by such

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simple sociological observations as letters of complaint to newspapers about aircraft noise, morals, hooliganism at football matches, taxes, rudeness of officials, and so on. In each case, enough tension was induced for the need to express oneself in writing and print.

Unfortunately, the new problems are no longer confined only to the towns in highly developed countries. There is abundant evidence from the recent Värmland study, where nearly 90,000 persons in a mainly agricultural community in Sweden were studied with a screening examination which included a brief medical history, urinalysis, chest X-ray, and chemical analysis of blood for twelve constituents at the Jungner automated laboratory in Stockholm. The results were summarized by Dr. A. Engel, until recently the General Director of the Swedish Medical Board, in his recent Heath Clark Lectures given in London (30).

Among the 7,620 persons who had to be followed up with a detailed visit to the doctor to look into various abnormalities detected, the three most prevalent previously unrecognized conditions were hypertension, hypochromic anaemia, and diabetes. Of course, as I have indicated earlier, we are still trying to unravel the precise mechanisms which cause these common disorders, but there seems little doubt that our civilization has some part in it. For example, in the case of essential hypertension, there have been reports of some remarkably close correlations between salt consumption and blood pressure in different parts of the world. Perhaps that transport which brings salt cellars to every table has made them too accessible for some susceptible individuals: it is interesting to reflect that the first therapeutic agent used in many cases of mild hypertension today is an oral diuretic, given with the idea of reducing the body's salt content.

We have already referred to hypochromic anaemia and its

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prevalence. Finding anaemia should set the doctor to work trying to find the explanation for iron deficiency. It's usually present, of course, in women during the menstrual and child-bearing period. However, women have been going through these biological events in more primitive societies and performing relative feats of endurance, working hard in the fields for some thousands of years. It may be that our clean water running from the tap is washing all the soil minerals off our vegetables and so predisposing to the diminished iron reserves noted in recent isotope exchange studies of London housewives (31).

Regarding diabetes, I have already alluded to the well-recognized association between obesity and hyperglycaemia. It is also becoming apparent that lack of exercise may be a very important precipitating factor: for example diabetes appears on bedrest and disappears with active convalescence. Prior and his colleagues from New Zealand have found evidence that mechanization and lack of physical exertion brings out diabetes in Polynesian people; diabetes is very common among amputees confined to chairs and there is interesting evidence that cold weather which keeps elderly people indoors in Canadian old people's homes is followed by the appearance of new cases. Similarly, lack of physical exertion and easy availability of food appears to bring out the diabetic tendency when various rodents, used to a hard existence foraging for food in desert conditions, are brought into captivity and fed: examples of this phenomenon include the Chinese hamster and the sand-rat, *Psammomys obesus*, which gets obese before becoming diabetic. A more recent example is the spiny mouse from the Israeli desert, among whom, my colleague Peter Wise tells me, diabetes occurs if the food is placed on the floor of the cage, but not, if the animals have to climb for it! His researches and comparative pathological investigations in col-

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laboration with various staff members of the Wellcome Institute of Comparative Physiology at the London Zoological Society suggests strongly that diabetes is a common complication of captivity among animals which have evolved for a life involving hard exertions to keep alive. They become diabetic when kept in a cage and fed well: the same seems to be true of *homo sapiens*, though his motorised cage is of his own making: his exercise may be reduced to walking to and from his car at home and at his place of work and waddling to press a button in a lift!

To these changes is added the fact that the Industrial Revolution, which used to have its boom and cruel recessions, is now moving into a much tamer phase. The major cycles of over-production and unemployment are being replaced by smoother economic developments such as can be controlled by mixed economics of government and private spending based on the Keynesian concept of maintaining nearly full employment. In addition to this generalized prosperity are the social benefits for the sick and unemployed. The vision of a materialistic Utopia is now tantalizing close. But for the two great wars, the British lead in the Industrial Revolution might have given us an even more desirable society than we have—I say more desirable because the other great providers of high standards of living, the Scandinavians and the Americans, seem, rightly of course, to admire many aspects of our lives here today. But, as we have seen, all three advanced societies are paying a price for forcing the changes on our bodies and our natures. One of the main objectives of preventive medicine may be no more than to re-establish conditions like those which obtained in the earlier stage of our development already outlined above. This is, of course, not a new idea: the most famous exponent of this view was Rousseau, who propagandized the notion some 200 years ago, with the phrase 'the

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noble savage'. It is interesting that the only biologist to win the Nobel Prize twice, Pavlov, thought so much of the natural life, bicycling for exercise until shortly before his death, that he had a bust of Rousseau mounted beside the rose garden of his last great country laboratory outside Leningrad.

The Welfare State in a changing Britain: Its relevance to medical planning

In this chapter the basis of the Welfare State, poverty, is discussed in relation to the effect of Keynesian economics and the emergence of the New Society developing in Britain, with its social stresses, changes, mobility, and dissatisfactions. An attempt is made to forecast the trends in the early future.

Of course, during the same period of Industrial Revolution I have just alluded to, medicine was being revolutionized too. It was adapting to the new situation and working out whatever preventive measures it could and striving to get them applied: Florence Nightingale assaulted all the obstructive authorities with statistics to get the new St. Thomas's Hospital built as pavilions to reduce cross-infection. The medical professions and the professions supplementary to medicine have always had to make themselves clearly understood if any new ideas were to be accepted. And making oneself understood sometimes calls for dramatic gestures, as when Frost put chains on the Half Moon Street pump to stop the local cholera epidemic.

Presently I shall be dealing with the medical care resources which have been built up since 1948. But before coming to this, it seemed advisable to point out one of the reasons which may explain much of our difficulty with this and other aspects of the Welfare State, namely the fragmentation of our society and the changes going on in it at the moment. These changes, in brief, consist of a rapid reduction in religious faith, which supported many people of previous generations with the hope

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that, no matter how difficult or atrocious their life might be, there was a life after death, of infinite duration, where the pains and sufferings of this life would be relieved. And, of course, where sin would be severely punished. The extent to which these thoughts maintained a discipline of fear throughout much of society cannot be gauged because we cannot relive the exact emotions of our forebears. But it does seem possible to detect the effects of the disappearance of religious standards in modern society. Doctors are less vocal about this than they might be. Perhaps with their early biological studies, they side with Darwin and Evolution against the Old Testament, with Huxley against Wilberforce and believe that rational men need say no more. However, it is important to realize that the disappearance of fear of sin, the relaxation of the moral code about sexual intercourse, the loss of any expectation of an after life by the great majority of young persons, and the determination to 'have it now', have all come about very quickly—within a generation—and the changes in attitude have left a proportion of people, perhaps a much larger proportion than we realize, in a dazed and uncertain state of mind, without a sense of uplifting purpose, without the support—crutch some call it—of an 'outside binding force' which the Romans recognized as a social necessity. How much of the psychiatric suffering of today would have been spared if religious thinkers and institutions had been able to retain their leadership in people's minds is an imponderable. However, this trend has been going on, one feels, with accelerated speed, at just the time when fear from other causes has been removed, fear of pain, of the anguish of death from infectious disease, of hunger or destitution, and of the power of one's superiors.

There is really very little to be added to the general proposition about the reduction of infectious disease and the disappearance of pain which has come about since the turn of the twentieth century. The statistical tables and graphs showing

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the reduction and now almost complete disappearance of deaths from childbirth, typhoid fever, syphilis, and tuberculosis need no emphasis here. The fear of anaesthesia for surgical operations, which was not infrequent among patients in hospital before World War II, is now almost unknown. The agonies of death, so well understood by Keats that he explained them all to his young friend Severn shortly before his death in Rome, have given way largely to tranquil and largely painless escapes from life in hospitals: people usually shuffle off the stage in a somewhat befuddled state, and the ordinary ward is rarely disturbed by harrowing terminal events in the night. How strongly this contrasts with the scene of say the 1930s when dedicated nursing sisters lived on the ward, when the night staff was as large as the day staff; today a single sister acting as night supervisor can cope with a whole medical block.

And as I have tried to indicate earlier the diseases which were associated mainly with poverty have been very largely brought under control. So, for that matter to a very large extent has that very poverty and the unemployment which went with it to increase the risks and susceptibilities to infectious diseases—living without proper nourishment in overcrowded squalor. The realization by Keynes that full employment was *not* a natural state, even in agricultural communities, that booms and depressions were complex affairs related to personal views of savings and investments and susceptible to some measure of control by government financial policies, providing the government had a large enough part in the working of the economy to be able to affect it, all this has been accepted by the political philosophers and the political parties themselves. As a result, the smoothing process has been brought to bear, the Welfare State established and with it the new health hazard seems to be ignorance rather than an empty pocket.

While the Welfare State has been brought into operation a fourth change has been going on apace, the shift from an

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hierarchical society to an egalitarian one. To a large extent this can be attributed to the social dislocation of two major wars, which in the first resulted in honest Edwardian artisans seeing that not all members of the ruling classes were as able as they were themselves, thus becoming disillusioned and disenchanted, and in the second, permitting a great exchange of political and social views, often reinforced by family experiences during the depression and unemployment of the 1930s. All these effects have produced a new generation, now in its teens and twenties, which Dr. Engel described recently as 'affluent, educated, service-rendering, service-demanding'.

This is the new society for which our medical plans have to be adjusted: we must think about the future when considering priorities.

Among our youth, it is true, there is also a proportion of persons who cannot cope with modern society, whose intelligences and aptitudes cannot be employed satisfactorily, and technological developments will tend to make it a growing proportion. Some observers put this proportion as high as 15 per cent, others have such strong comments to make as 'after automation comes in, and that may be in the next 20-30 years, it will be a privilege to have a job in California'. If these really are the prospects ahead, these important points about intellectual inadequacy must be taken seriously into consideration in working out any priorities for medicine in the future. The profession is going to have to enlarge its activities from simple epidemiology to prospective epidemiology. We have perhaps been remiss in the past for not keeping a closer eye on the whole fabric of society and the directions things are taking. The present U.S. Surgeon-General, W. H. Stewart, has recently drawn attention (32) to the fact that, as recently as 1955, authoritative medical statements like *Medical Care for Tomorrow* by Dr. Michael M. Davis himself contained no ref-

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erence to the idea of a specific activity or a specific person indulging in medical planning.

If this planning aspect of medicine is to become a new speciality alongside all the other new developments, medical statisticians being their very respectable forerunners, the medical planners will have to make early contact with people in many walks of life and many other professions and occupations all of whom are indulging in the same forward looking exercise. Thus, industrialists are responding to the exhortations for productivity with schemes to increase their mechanization of industry, so that the nation can secure economic stability and a balance of payments. At the same time, conversations with senior trades union officials like Lord Collison, Mr. Woodcock, and Mr. Feather, show that these leaders are very concerned about the whole question of occupational medicine and are becoming conscious of the need to consider the opportunities for further social development in quite new terms. It is not too far fetched to say that consideration will have to be given before too long to the general idea of an aptitude-satisfying society. Otherwise the proportion of 'inadequate' dissatisfied people will continue to grow to such proportions as to engender serious anarchy. The industrial psychologist and academic workers involved in developing aptitude tests have a big task and a most important role to play as this development is demanded by an affluent society. For, just as Keynesian economics have produced a Britain largely free from personal economic stress, it is becoming abundantly clear that social and political action will have to be taken as a matter of some urgency to encourage more satisfying work, to encourage industries, both productive and service, to base development on a balance between automation and introducing enough useful activities providing job satisfaction. Parkinsonism needs to be geared to aptitudes.

These general observations, platitudes I suppose, show, it

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seems to me, the sort of background against which medical priorities will have to be thought out. Of course, there are occasionally well-intentioned strong representations for a return to a fee for service basis for medical care. The argument runs that now there is so little poverty, people would get more satisfaction if they had to pay, even if they could reclaim it—it all seems to work so well in Australia and the U.S.A. Wouldn't this give people some personal goals to aim for? It seems to me, however, that this is unlikely to be feasible for a variety of reasons. First let us bear in mind the rising generation. It is probably true to say that the establishment of the Welfare State has influenced young people's view of their earnings. The old idea, that the money one took home was saved to be used by the prudent as a hedge against adversity, is being replaced by the notion that it can be spent largely for pleasure and the teenagers' relative wealth has created an advertisement-stimulated demand for leisure industries. The money spent on gambling in Britain is about half the cost of our health service.

The introduction of P.A.Y.E. and Insurance Contributions makes many young people conclude that they have paid for their health, have insured themselves against such misfortunes as unemployment or industrial accident, and that what is left over is pocket money to spend how they wish. The evidence for this conclusion seems so compelling that it seems to me we must accept the mutation in thought as inevitable, a mutation which makes any suggestion of returning to full payment for medical care and hospitalization fees essentially untenable.

There is now, therefore, as there always has been and no doubt always will be among many of the grey heads, much sad reflection on the rising generation. With the emergency of a better physically developed generation, living in a less anxious society, with greater freedom to voice their opinions and almost complete disappearance of guilt feelings about libido and sexuality and in large measure a remarkable shift towards greatly

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increased sexual licence, there has emerged much emphasis, not on the Utopia being approached, but on dissatisfaction, materialism, and cynicism. This disturbs the equanimity of many young people and corrodes the inter-personal relationships between the generations. This conflict between the young and the old represents perhaps the final fragmentation of the old cohesive family-based society. That the conflict exists is easily proven by any frank discussion with the young about the care of the elderly. Many resent the old. Many young doctors even resent their presence in hospital beds. Many young persons describe how they would incarcerate the old in homes, sequestered from the society the young desire.

There is, of course, another cause of dissatisfaction growing up among the rising generation which deserves a moment's consideration, and this is the conflict between this country's state of social welfare and the harsh economic realities in the world at large. It is a wry paradox that, after passing through our own industrialization era first, we are now left with a Socialist-inspired society competing in economic terms with countries less well-developed from a social point of view. We must accept, I think, that our current way of life, especially with all the changes and progress, is inadequate when it comes to responding to this international challenge. We tend to be distracted by all the interesting things we are told about by the mass media—the Press and radio and television—from the job in hand.

The short-term future holds other difficulties. We have many arts graduates with nowhere to work. Either we can demand a great tightening up of the mass media, by less but better-conceived and more careful newspaper articles, and more thoughtful or better-rehearsed television programmes and so on. Or we can give in to these pressures of unemployment, and increase the opportunities in these fields without any increase in quality or supervision. Or we can try to restrain the arts

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graduates and redirect them towards the large gaps in our technological and scientific manpower.

If the need to find more employment becomes urgent in the future, the National Health Service, and human biology generally, can be a great help. For the work which can be done in this field is limitless. In this way, the health sciences offer economists a very useful safety valve against unemployment. One may compare this use of medical care effort to the long-enduring stability of the Pharaohs. Those rulers buried the excess productivity of their generation with their own embalmed bodies. Likewise, if we need to find employment, it could be turned to helping the elderly. In that way, we too, can siphon off any excess productivity. Unless these employment matters are taken into consideration we must expect more and more social casualties, drug addicts, hooligans, call them what you will.

The anatomy of the National Health Service

In this chapter the personnel in the various branches of the National Health Service are enumerated. It is shown that the service rates as the tenth largest corporation in the world, which means that it will probably remain the main agent for medical care for many years. Future economics and social developments are likely to increase the demand upon it.

In the foregoing discussion of the background of the National Health Service, I have tried to show, just as there is a clinical iceberg, there is an evolutionary one and a sociological one, too. The general premise has been that man has been a long time evolving to his present physical and social state, with a rapid technological revolution superimposed, and that, to be successful the organization of the National Health Service has to take these evolutionary backgrounds into consideration. And other thoughts have arisen. Pain and fever have largely disappeared, so that ignorance rather than poverty is assuming more and more importance as a cause of disease. Since the National Health Service was based on the Beveridge Report, which in turn was based on the old order of infectious diseases, we have to examine this instrument in terms of the new challenge. For though we may have been very successful in dealing with disease in the past, there is no guarantee that the same instrument will serve for the future—and the first idea is that the medical planner may have to suggest a completely new solution.

But however attractive such a clean sweep may appear from a theoretical or political point of view, a brief consideration of the actual anatomy of the National Health Service quickly dis-

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pels any such prospects. And whatever one's political allegiance may be at any particular moment, we are a nation in the hands of the political turn-coats, the prospects of major changes in the form of payment for medical care are scarce. The social and economic developments of the last fifty years, and in particular the last twenty years since the inception of the National Health Service, seems to me to preclude any major alteration in its economics. The young are already conditioned to a tax-supported health service, the elderly are too vulnerable to want a return to private enterprise medicine and most middle-aged wage-earners base their support for the present type of service on their experiences of free medicine during their war service. Furthermore it will be shown that over 400,000 persons are involved in providing the country with medical care facilities, of whom 340,000 or more are government paid. To dissemble this work force is a major proposition and proposals to do so are unlikely to be seriously entertained. So it would seem that, to be at all practical, any priorities one cares to suggest will have to be progressive ones from the present position.

We must now turn to the anatomy of the National Health Service. But even this cannot be considered in isolation. For in the conceptual model of Figure 1, it was pointed out that, in seeking medical care, once a decision was taken to act on symptoms there were three main possibilities—the purchase of self-prescribed remedies, the use of National Health Service, or 'resorting' to non-professional aid.

There were, in 1967, some 13,600 pharmacies in the U.K. and some 29,500 trained pharmacists. The present evidence is that these pharmacists provide the community with about half the total self-prescribed remedies sold across the counter, the rest being purchased by the population in shops and supermarkets or even slot machines. I have dealt in detail with the sorts of remedies purchased for the most prevalent complaints by the citizens living near Guy's Hospital, here it is mainly the

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numerical aspects of the whole range of medical care facilities, and their relative economic magnitudes that is being presented. The total amount of money spent by the public on across the counter remedies is over £40 million per year.

How many non-professional healers are there in our midst today? Almost every doctor knows of the existence of a local osteopath or bonesetter or homeopath (some presumably even know about abortionists). It seems most unlikely that the total number of persons rendering one or another sort of unprofessional health care service exceeded the number of general practitioners in the country as a whole, but it would be surprising if the total numbers of such persons did not run into several thousand and, to hazard a guess, one suspects that the rate is about 1-2:10,000 population, or some 5,000-10,000 in all, probably nearer the former suggestion. It is hard to estimate the annual earnings of these people, but it would probably be reasonable to suggest that they are in the order of £1,000-£2,000 each, making the total expenditure by the population on this sort of health care somewhere between £5 million and £20 million in a year.

By contrast much firmer figures are available, of course, for the National Health Service Annual Reports. The number of general practitioners is approximately 23,000, with a tendency to fall. The number of full-time public health officers, and doctors in service in the local authorities was in 1967 about 2,400 (34) together with some 4,800 part-time doctors of whom 2,500 are general practitioners, 1,200 hospital specialists, and 1,100 genuine part-timers including married women doctors working a few sessions per week in ante-natal, post-natal, well-baby, and school clinics. The figures for the numbers of nurses employed by the local authorities for 1967 for England and Wales were: 7,200 health visitors, 7,400 home nurses, 4,000 domiciliary midwives, and some 3,300 combined duty nurses; but only 200 medical social workers. For the U.K. as a whole

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these workers represented some 20,000 whole-time equivalents, a number comparable in size to the general practitioner force.

For the hospital services with 468,295 beds in 1966 treating 4,898,000 in-patients, the numbers of consultants was 8,737, registrars and senior registrars 5,641, and of junior hospital and other staff 7,272, making a total of 21,650 doctors aided by 6,396 general practitioners working part-time. It must be pointed out that many of the junior staff and registrars are overseas graduates, in some regions they represent well over 50 per cent of the total.

These doctors were supported by an army of other workers, some 70,000 state registered nurses, 30,000 enrolled nurses, and 14,000 student nurses. In 1966, the number of registered medical social workers in hospitals, however, was less than 1,000, but there were 4,229 physiotherapists, 3,488 radiographers, and 7,633 laboratory technicians, all part of a total professional and technical staff other than medical, dental, and nursing of 29,129. These professional and technically qualified people, were supported by a host of other workers, the ancillary services. Their over-all numbers were very large, in 1966 some 247,000, with whole-time equivalents of about 161,000 (1965) including some 55,000 cleaners, 38,000 catering staff, 15,000 laundry workers, 12,000 dining-room attendants, and approximately 5,000 porters, 3,600 telephone operators, and 1,000 storekeepers, the rest being made up of secretaries, mortuary attendants, and maintenance staff of all sorts. This staff maintains the services of 468,295 beds in England and Wales, of which 139,436 are used for mental illness, 141,175 for medical and surgical cases, 17,587 are maternity beds, 10,264 gynaecological beds, and 59,186 long-stay and geriatric beds.

When we sum all these grades, and include 44,000 administrators and 13,000 ambulance workers, it becomes clear that the total manpower resources involved in providing medical care in the United Kingdom amounts to something of the order

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of 400,000 persons in England and Wales, or about one per 125 of the population. Similarly it is possible to calculate for those in the hospital service it is about one person per each bed. Unfortunately the turnover among hospital ancillary staff, the largest numbers involved, is very high: Duncan Smith (35) has gone into this in some detail and has found figures as high as 120 per cent turnover in some hospitals. In other words, on average, people stayed in those ancillary jobs for less than one year. And the average turnover up and down the country was about 27 per cent, suggesting that, on average, people kept these ancillary jobs for only four years. Since the wages bill for the whole group is about £150 million per year, some £40 million per year or more goes to pay the salaries of some 40,000 people who will spend only a short period serving in the National Health Service. One can't help wondering how much inefficiency should be attributed to this in the whole organization when perhaps one person in ten is only in the job for such a short period. There must be a continuous process of introducing unskilled ancillary staff to the job and hoping they'll stay in it long enough for the more stable and dedicated workers to get some useful effort out of them. Duncan Smith has pointed out the need for stabilization and suggests that this is most likely to be achieved by pride in the job since few of the dissatisfied workers he interviewed complained about their wages, but rather the atmosphere of their work, and he and others have made a strong case for training programmes to establish a career structure and even hierarchy in some of the ancillary callings.

It will be apparent that I regard the recent moves to foster health education are timely. They might greatly improve the way the population looks after itself, and uses the National Health Service. There is another way of looking at this question of health education particularly with regard to the ancillary workers in the hospital service. Supposing, in our medical

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Utopia, we gave one or two study days for educational purposes to all grades of workers in the National Health Service, at times of the year when pressures for urgent care or staff absenteeism for sickness or holidays were lowest, in May or October perhaps. The sort of programme one has in mind would include simple explanations of important general themes about the most common diseases—we know that in Denmark, for example, and it is probably largely true here, that the common complaints were, for males, colds, rheumatic diseases, chronic bronchitis, gastro-intestinal ailments, and influenza, and for females, colds, menstrual disorders, rheumatic diseases, nervous diseases, and chronic bronchitis. A day's education on this plain fare might be enriched with a few words about the headline medical topics and conclude with a question period. Would not this idea, judiciously applied, have precisely the sort of effect the harrassed personnel officer or domestic superintendent needs so badly, namely encouraging their staff to be interested in the organization it serves? After all most of the major industrial concerns have recognized the need for such cohesive activities, to engender loyalty to the organization through meetings or house journals. And would not this procedure, by affecting one person in 100 in all the social classes and walks of life, carry health education out into the community in a very effective way? And could it not improve the way the population use their general practitioners, the hospital facilities and the social services?

One must conclude this summary about the National Health Service with some figures about the economics (36). The total cost of the National Health Service in 1950, was £477 million, which represented 4.42 per cent of the National Income and it has risen every year since then. By 1966, the last year for which figures are available, the expenditure had risen 10 per cent over the 1965 level reaching £1,434 million, the highest total to date which also represented the highest ever propor-

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tion of the National Income (4.85 per cent). The biggest costs were the hospital services (£873 million) and Local Health Authorities' health services (£146 million). While none of these proportions represented any auspicious redistribution of expenditure over the previous year, it is interesting to compare the shifts in proportion of the total budget under the separate heading which have occurred. Thus, the hospital service proportion has risen from 55 to 61 per cent, the pharmaceutical services from 8.4 to 11.2 per cent, and the Local Health Authority services from 7.8 to 10.2 per cent. In contrast, the general medical services—the general practitioners—have fallen from 11.7 to 7.5 per cent, and the dental services from 9.9 to 5.2 per cent. In other words, there is a general tendency to concentrate resources on the hospitals and local authorities, away from the more peripheral services, general practice and dentistry. As was implied earlier this trend may have to be counteracted as medical Utopia approaches and patients demand more care in their high-standard-of-living homes of the future.

The pharmaceutical costs were £160 million, considerably more than the general medical services (£108 million), dental services (£75 million) or the supplementary ophthalmic services (£22 million).

One view of the National Health Service is to regard it as a nearly-monopolistic service business—in the medical care industry, under a single management, the Minister and his Department. How does it compare in the scale of its financial operations with other big corporations? Remarkably well. In 1966 the world's biggest single corporation was General Motors, with a turnover of \$20.7 billion per year, followed by other U.S. companies, Ford (\$11.5 billion), Standard Oil of New Jersey (\$11.5 billion) and Anglo Dutch Shell (\$7.2 billion). But only five other companies, General Electric (\$6.2 billion), Chrysler (\$5.3 billion), Unilever (\$5.1 billion), Mobil Oil (\$4.9 billion), and U.S. Steel (\$4.4 billion) exceeded the

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National Health Service which rated tenth, with a 1966 turnover of \$3.92 billion, far ahead of Britain's third highest commercial company, the National Coal Board (\$2.5 billion). These figures, surely, make several points. First they point up the large scale of the organization which has been built up over the last twenty years to cope with sickness and health protection in this country. Secondly, they highlight comparisons between both the tightly controlled industrial efficiency of, say, the production line at Ford's, with the sight of the disorderly queues of people attending many out-patient departments. Thirdly, they may remind us of the stringent servicing procedures demanded for industrial products compared to the casual ones we adopt for our own physical frames. Finally, they re-emphasize the strong loyalties engendered by the large corporations in contrast to the continual carping heard throughout the National Health Service.

General considerations about priorities

In this chapter, it is deduced that it will be necessary to increase the efficiency of the National Health Service to meet the growing demand for medical care. This increase could occur if there is more research to improve management. The long-term objectives of the National Health Service must therefore be considered and the major requirements needed to achieve them are selected in the order: priorities for the patients, for practising doctors, hospitals, and administrators.

What sort of general interim deductions does one make about priorities at this point, before considering in the next chapters of this monograph some specific points of attack, aimed at collecting detailed information in limited fields? First and obviously, whatever resources we have here for medical care must be used to the best advantage of the patients. All the evidence available suggests that there will be a period of increasing demand for medical care for less dramatic, less acute illnesses and even cosmetic reasons, for example unsightly but not incapacitating varicose veins.

It is well recognized that this is the trend which goes on with the increasing mechanization, industrialization, and wealth so-called affluence. For improving power resources, increasing technology of all kinds and mass media for communication and advertising all, in their separate ways, contribute to the demands for a longer, less painful life, more pleasant in physical as well as mental terms—and spiritual terms where they matter for the individual concerned. This trend is clinched by the facts about national expenditure on health being negligible in undeveloped countries and highest in Western Europe,

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4-5 per cent of the gross national income, North America (5-6 per cent), and Scandinavia (6 per cent expected to rise towards 8 per cent in Sweden).

In the United Kingdom at its present stage, where there are social, political, and economic forces trying to generate or regenerate many developments including education, transport, housing, and so on, it would be quite wrong, morally as well as factually, to expect greatly increased financial resources to be made available for health in the early future. Many years must elapse before we have a significant increase in medical manpower or hospital buildings, since in the very nature of things it takes five to ten years to make very much impression on these two aspects of the National Health Service. Until there is some tangible prospect of our getting on top of the increasing demand by the public, often for conditions medical students despise, all imposed on limited medical personnel, there is scant possibility of securing the second prime priority, namely happy general practitioners and health workers. Far more likely there would be a continuation of current trends, namely far too much discussion about salary scales and pay differentials, far too much medical emigration, and far too much resentful conversation about patients' unreasonable demands. No matter how one looks at the whole question, or from whose view-point, or from what angle, one comes back again and again to the same inevitable conclusion, that our only prospect of getting on top of the situation, so frequently described as deteriorating, is by better management to use our resources more effectively.

However, the simple fact is that better management demands fuller understanding and fuller understanding will only come from collection of information and research. To achieve a healthier nation and happier doctors, it is inescapable that the National Health Service running at over £1,400 million per year, must expect to emulate the other successful major cor-

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porations by investing at least several million pounds per year on research, whereas the figure, though rising, was not yet quite £0.5 million in 1966. A total national medical research investment of some £30 million per year is going on through the Medical Research Council, the charitable trusts, and the pharmaceutical companies, but an over-all figure of £50 million per year would be more in line with other big businesses. Thus the main theme which will recur in what follows will resemble a loop of interacting ideas: better information about the actual workings of the organization leading to better management, and better management requiring more research. In this loop, research and understanding interact—more understanding usually begets a demand for more research and vice versa. Equally, understanding and management interact, better management requires better understanding and better understanding encouraging better management. But in general, it falls to management to sponsor and support research. In this country, in contrast to many other advanced countries, notably the U.S.A., research is still not sufficiently well established as to have an automatic place on the boards of directors and in places of decision. It has to be fostered by interested management. This loop of ideas, will recur in what follows as the priorities are considered for each group ranging from the public and their general practitioners to medical administrators.

Now the decisions behind establishing priorities implies some objective. Should one choose here the short-term objective aimed at trying to circumnavigate the immediate problems of demand, or look for long-term ones? Should one begin by asking, what are the urgent short term priorities in medical care of the health service? They must have changed from those which formed the basis of the original plan laid in the year 1920 but not enacted until 1947: just making this comparison between the original plan and that enacted might be enough to reveal needs for short-term action. Or would it be

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wiser to take a longer view, and to consider the ultimate medical Utopia as the challenge, and then examine the present situation and see how it falls short and ask what one can do to move in the desired direction?

In general decisions and priorities taken with the long view seemed better ones to put forward, particularly where the writer has no executive authority and presumably where his main objective must be to stimulate thought and hope to improve understanding.

The long term target must be perhaps an unattainable, but generally desirable, medical Utopia. A brief personal list of some of its features cannot be put off any longer. In the medical Utopia the great majority of the population would be fit from cradle to terminal illness. (I'm neglecting the easy solution for the intelligentsia, euthanasia.) To achieve this fitness, the population would need health, immunological health by inoculations, and as far as possible mental and physical health by medical care. Many citizens and their children will certainly require psychological support in a rapidly changing world, together with easy access to advice about avoiding any chronic illness to which they were susceptible—such as gout, diabetes from hypernutrition, bronchitis and lung disease from smoking, and so on. One can see here the value of a good family history—one can't help suspecting that genetic factors should be countered. If one's father smoked and died of cancer of the lung, the lesson in avoiding smoking should be all too painfully clear. If one's mother became obese and developed diabetic complications, the need to keep to a low-calorie diet is clearly important, if other relatives have a history of hypertension, then one must avoid of the established aggravating factors, salt, obesity, diabetes, smoking, too much coffee, hyperlipaemia, and so on.

Against this improbable Utopian background, there would have to be adequate care for the acute episodes; uncontrollable

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virus diseases, physical and mental trauma, other infective illness and occupational hazards. The future extension of our present hospital facilities should aim to provide the proper organization of this emergency care, which might include organ transplantation on an economic basis. In such a Utopia, because of the infrequency of illness, it would be necessary to concentrate such patients in hospitals with diagnostic facilities, and perhaps even computer data storage banks which would be needed to protect patients from the relative inexperience of future physicians who should, of course, see little illness! Finally, the Utopian situation would demand social and industrial rehabilitation coupled with on-going domiciliary care and counselling especially for those—the most needy—with incurable chronic conditions—such as the muscular dystrophies or demyelinating diseases. Help for many such people would not be accomplished only by administrative medical developments: research would be needed, too.

In the British situation it is clear that other developments would be proceeding *pari passu* and that with such medical changes, by the turn of the century, when such ideas might be gaining a foothold in the mind of medical planners, there would have been comparable improvements in housing and education. Indeed, the perceptive physician can already detect this interaction between social and housing developments and the practice of medicine in hospitals. The Office of Health Economics tells me that numbers of hospital beds have fallen slightly since 1921 but dwellings have risen by 50 per cent. No wonder that a patient with a peptic ulcer could get more relaxation and a better chance of relief by a six-week ward stay in the 1930s, when home might have been a Victorian slum; but in the new housing of the 1960s he is often much better off at home than in a noisy open ward in hospital.

Rosemary Stevens (37) has made the point that the hospital is currently the centre of gravity of modern scientific medicine

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and one may discern the changes likely to go on there. From the hospitals of the nineteenth century, with wards overcrowded with infectious diseases, we are already witnessing the change towards the care and attention of more chronic cases. At a recent informal inquiry at Guy's, some 25 per cent of the in-patients were there primarily for investigation and diagnosis and 35 per cent were over the more demanding initial phase of their acute episode and needing only light nursing. And not all of the remaining patients needed heavy nursing in a hospital environment, some were elderly cases awaiting discharge to suitable long-stay geriatric care units. The expectation must be, therefore, that these changing social patterns will continue and as preventive health measure for the chronic and metabolic diseases follow the pattern of the infectious diseases, the hospitals of the twenty-first century are likely to be organized to deal with emergencies and otherwise distressing incurable illnesses—paraplegia for example—while hostel-based out-patients attend for diagnosis or check-ups. The main bulk of the burden of preventive medical care might well be moved away from the expensive manpower-demanding hospital in-patient pattern into the community where the British style general practitioner, a mature doctor available for consultation in the community, might come back into his own, with a heavy responsibility for health education and advice.

And so it seems, as was indicated earlier, that the periphery and the activity going on there will become increasingly important in the future. Unfortunately, many of us are most ignorant about what is happening at the periphery where most help must be given. Understanding what is happening there will become an increasingly important basis for better management. For that reason, the present inquiries and the chapters which follow will begin there, among the public, asking what we ought to be prepared to do at present for them in their quest for medical care outside the hospital and at the fringes of the

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National Health Service. Consideration will then be given to the various branches of the health services, general practitioners, consultants, and public health authorities, teaching hospitals, administrators, and planners. The inauguration of the National Health Service changed the relationship between the medical profession and the public. Before, the Hippocratic Oath notwithstanding, doctors could and did take up a position (in certain cases) of being unable to do anything. With the coming of the National Health Service, I think we must make the assumption that the profession as a whole took the Hippocratic Oath with society as a whole and such evasion is becoming progressively less easy. If the patient is really dissatisfied, he widens his contacts with the National Health Service, reduplicates his consultations in another hospital. He or she can demand and probably will get help somewhere in the end; all this tends to put a heavy burden on the conscientious general practitioner. It is not unreasonable therefore to rank the priorities in medicine in order of the distance from the symptoms, that is to say, first the patient, then his general practitioner, then the hospital and administrative organizations. And in this order of presentation, the importance of education and research for patient, practitioner, administrator, as well as student or nurse, will be a central theme.

9

The need for actions to help the public and practising doctors: Health education

In this chapter the needs for health education to help the public and protect doctors from the mounting demands upon them are considered and some possible steps are put forward.

As far as the community is concerned, it seems clear that there are a great many unspecific symptoms (95 per cent of Bermondsey had them) hiding a good deal of significant disease. This is true elsewhere. For example in a survey in Baltimore, Maryland, a third of the sample population who responded to an invitation for a health check-up were found to have significant disease and although only 29 per cent of those invited responded, it is clear that anywhere between 10 and 30 per cent of people have unrecognized illnesses which would receive medical treatment if the patient presented his case to the medical profession as one might say, 'in the right light'. This touches on one of the anomalies of much current medical thinking. If a patient asks for insurance coverage and is subjected to the very respectable procedure of an insurance medical examination and at that occasion some latent illness is discovered, the person becomes a bona fide case and medical attention is forthcoming. By contrast, we discovered in Bedford that if a much more severe case were found by a screening procedure, in some strange way, a stigma was attached and the patient wasn't a 'proper' case: they had not come to the medical profession asking for help in quite the right way!

Part of this may be explained by how busy our general practitioners are. The prospect of their having to face the tidal

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wave of symptoms which lie outside their present terms of reference is a daunting thought: it will be remembered that people had over four symptoms on average, and that there were some eight times as many symptoms, which are the key to an ordinary medical consultation, at large in the community as were being coped with by general practitioners in Bermondsey. Of course, the ratio may be smaller in communities of higher average social class, because it is already becoming clear that better off people in general pay more attention to their health than poorer people.

But, whatever the ratio, be it 4 : 1 or 8 : 1, what are we doctors going to do about it? In general, at meetings one addresses, there is a very understandable antipathy to doing anything, though, as the general problem becomes more clearly defined, and the possible steps towards a solution of some sort begin to make themselves apparent, one senses that the medical profession is starting to brace itself for this new challenge. The antipathy, of course, is engendered by the complicated tangle of thoughts which are being thrust forward about screening procedures, at one moment popular as a means whereby the doctors can 'organize' their practices—at another unpopular because it is not clear whether any good can really be done for various categories of patients, even if one does detect their disease early. Health education is talked about, but this involves the risk that poorly presented medical information will result in more confusion than education, and the poor general practitioner sees himself caught up with trying to explain what it is all about, correct fallacies, and reassuring the anxious. He perceives, too, that if patients are screened by some other agency, such as the Local Health Authority, all sorts of new diagnoses about persons on his list of patients will be coming through the letter-box, requiring sorting from the already large amount of pharmaceutical advertisements, and demanding more letters, more visits, more consultations, more referrals to

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hospital, and more on-going surveillance for any chronic illness put onto chronic treatment. He fears that his prescription rate will rise. Worst of all, the busy practitioner must worry as to whether he himself will be expected to find more time in his overcrowded day to do the screening tests himself. And if not the general practitioner—who? The local Medical Officer of Health seems an obvious person to deal with this new form of public health problem and many of them, like Dr. Sharp in Bedford, have expressed their willingness to undertake this work. But they do not have the on-going responsibility of explanation, certification, prescription, follow-up visits, and surveillance tests which the practitioner would have to deal with. Furthermore, the general practitioner, moving about in the community, is not convinced that we have arrived at a time where latent disease merits a very high priority. He can see a different order—the lonely geriatric patient, the harrassed mother of young children, persons with incurable diseases and their families, the tragedies in his district, the mentally ill. He asks, are the ivory tower academies and administrators really suggesting that we now add a mass of new cases? No wonder, therefore, that the idea hasn't caught on—it's easy to talk about, easy to write about, hard to carry out.

Clearly the situation has to be handled delicately. And the fact that there may well be sicker people unknown to the doctor on his list than he has on his visits that day has to be conveyed very gently. And observing the situation from the patient's viewpoint—haven't we got to do something, if only to help the patients to help themselves?

From what has gone before, it would seem that a rational approach would be to begin health educational activities with the idea of stopping any further deterioration in the nation's general health as technological advances proceed, and sales promotions threaten it. Indeed health education should perhaps precede introducing screening activities.

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HEALTH EDUCATION AND THE DISEASES OF CIVILIZATION : PRACTICAL CONSIDERATIONS

To take health education first then, a good deal of lip service is paid to it. It appears as a final paragraph, or a final recommendation, in articles, pamphlets, and books. The time must be coming when it deserves a much higher priority especially when one sees how much chronic ill health can be attributed not to infective agents or occupational or living conditions, but to the affluence we have all been seeking. It is sobering thought that under-exercise and obesity, the fruits of modern power technology, agriculture, transport, and marketing, must between them cause more over-all sickness than all the side effects and adverse reactions of all the pharmaceutical preparations marketed today. No doubt a medicines commission will be set up in response to the Sainsbury Report: if health education proceeds apace, one can foresee inquiries into the morality of profits from hyperalienation in the U.S.A., and Royal Commissions into supermarkets which put cigarettes and chocolates within sight and reach of the queues at their pay counters!

Of course, a certain amount of important work helping health control can be brought about by Regulation and Act of Parliament: the recent inquiries into the ethics of retail price maintenance over confectionery disclosed a government argument against easy access to too much carbohydrate. The introduction of legislation by Local Authorities for smokeless zones and the continuing propaganda against smoking factory chimneys has had a sensible effect on the extent of detectable atmospheric pollution.

Perhaps the most brilliant health legislative measure appears to have been the introduction, by a lady Minister of Transport, of means which at the time of writing anyway have had a significant effect on the epidemic of night traffic acci-

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dents, namely compulsory tests for alcohol levels of drivers of motor vehicles. Anyone who has felt faint-hearted about the possibility of stern legislation on health matters can take considerable encouragement not only from the legislation itself, but by the extraordinary acceptance by the public of this supervision of its health behaviour. This latter point seems to me to be of great significance in the present context and suggests, I submit, that carefully and properly presented, based on factual information, a great deal of successful health education is feasible. The importance of careful presentation, and of avoiding any precipitate action which may cause successful vigorous reactions from undiversified commercial enterprises, cannot be over-emphasized.

But there has not only been official educational activity on health matters from the Ministry of Transport. For years the Ministry of Health has, of course, been conducting a strenuous campaign of education about the risks associated with smoking. The urgency of this matter is the increasing evidence of association with cancer of the lung and the fact that four times as many people die from carcinoma of the lung as in traffic accidents and that deaths from lung cancer in 1966 in the U.K. rose by a further 1,000 cases. There is evidence that school children are reading and remembering the anti-smoking posters. The Tobacco Research Council, which is supported by the tobacco industry itself, reported splendid improvements in non-smoking percentages from 1961 to 1965: among young men 16-19 years of age non-smokers rose from 38 to 49 per cent, and young women, 55 to 61 per cent. The figures were not sustained, falling back to 43 per cent and 53 per cent respectively in 1966 (33). This provides sobering thoughts about the powers of persuasion through advertising: for no-one in London in the last year or two can have failed to notice the appeal being directed towards the young in many of the posters advertising cigar-

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ettes—young people dancing in idyllic streams of water, riding horses in sunlit woods, smoking among the racing stables, beside the blue sea, and so on. Perhaps we doctors need an advertising agency; or the tobacco manufacturers an attractive, disposable, addictive but safe alternative product!

The Minister of Health also inaugurated a campaign to assist practitioners, the 'Help Your Doctor Campaign', in October 1966 and dispensed 3.7 million leaflets, 39,000 display cards, and 4,300 posters, to general practitioners, to public libraries, and to Post Offices (33). Not completely the right places to display them, though. The Bermondsey study suggests that it might have been wiser to make arrangements to put them in chemists' shops too, since that is where most people go for medical care.

Health education has therefore started and is moving forward fast. A council has been set-up in accordance with the recommendations of the Joint Committee on Health Education, 1964 (38), and for the medical profession a high priority will be to offer whatever help or advice it can to this Council, in its own best interests. Experts must be willing to provide basic data for the production of films and film strips for schools; careful B.B.C. programmes should be worked out in conjunction with such experienced television producers as James McCloy, who currently has special responsibilities for such matters. And much more work is bound to fall on the willing shoulders of medical officers of health and their health visitors. The analysis of work of health visitors undertaken at Guy's by Drs. J. A. D. Anderson and P. Draper, in connection with their study of attachment of health visitors to general practitioners, sponsored by the Nuffield Provincial Hospitals Trust, shows, unfortunately, that health visitors spend a great deal of their educational time instructing mothers about baby care (39); they are, of course, so often recruited from the midwives. Their activities urgently need to be extended to advising adults

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about the health risks of modern living, about such things as proper nutrition—the importance of avoiding obesity, with its attendant risks as regards heart disease, hypertension, and diabetes, by indoctrinating people about proper daily intakes of protein, minerals, and vitamins. The easily available highly processed high carbohydrate diet many housewives eat in England is the only explanation I can find for the relative frequency of hyperchromic anaemia in this country and its remarkable infrequency in the surveys carried out in the U.S.A. Whether health visitors can really be expected to reinforce the anti-smoking campaign among the younger members of the family, and give more general advice about the importance of giving up smoking if any member of the family has had a peptic ulcer, or chronic bronchitis, a heart attack, or evidence of peripheral vascular disease is perhaps more debatable—they are in competition with powerful sales promotion! But they might be able to advise individuals against any chronic disease known in the family history, whether it be diabetes or heart attacks to be offset with a low calorie consumption and regular exercise, or advice about treating skin diseases like psoriasis.

One suspects that the strength of the arguments they might be able to muster, and the conviction they will carry to the rest of the family, who have an important role in reinforcing any advices given to the individual, will depend upon careful extension of these aspects of health education in their syllabus and the preparation of a suitable pocket-size textbook with clear drawings and diagrams to illustrate what they are trying to explain.

There is also a good case for selective dissemination of information about other conditions to high risk groups—for example, statistical information about the appalling life expectation found among young American heroin addicts might be displayed in colleges, if not in recreation rooms used by sixth formers at school. And in factories, the health informa-

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tion should not only be about safety first: the prevention of accidents and what to do if someone is electrocuted. These important topics should be extended to include sensible posters about the ten common conditions observed in Denmark, mentioned earlier. Coughs and sneezes do spread diseases, but unwashed hands may do more so.

But most important of all, it seems to me, is to obtain at the earliest moment, the co-operation of the chemists' shops. For here, we know for certain, a very large amount of self-diagnosis and self-prescription has been going on and will continue. In an earlier chapter I set out some examples of the misdiagnoses people make, and the improper therapeutic remedies they prescribe themselves. Surely here is a place where a great deal of good could be done, and probably with the advantage of the sales and advertising expertise of the pharmaceutical companies themselves. Might one not make the respectful suggestion that a meeting between, say, the Minister or his Chief Medical Officer, the President and some senior officials of the Pharmaceutical Society and Association of British Pharmaceutical Industries with perhaps some representations of the Society of Apothecaries, Local Authority Medical Services, and the Council for the Training of Health Visitors, to thrash out this first step? One realizes, of course, that there will be conflicts of interests, but these are the sort that this country has got to begin to resolve if the present 'warfare' between private and public sectors is to give way to a buoyant mixed economy where enterprise, government or commercial, is harnessed to achieve the next stages of our national development rather than to defend old ones.

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Screening for disease considered from various viewpoints

In this chapter screening procedures, which would appear to be needed to support health education, are considered from the viewpoint of the public, the overworked general practitioners, the medical officers of health and academic and administrative doctors, and various conflicts emerge. Screening is then considered in historical perspective and recent developments in the U.S.A. and Sweden are described in some detail.

Despite all educational efforts, the problem of ignorance will remain to a greater or lesser degree—not only the ignorance of low intelligence, there will also be patients with relatively severe but asymptomatic disease say, like occult renal tract infections which lead to hypertension in later life, or pre-cancerous changes in the cervix uteri. Surely, the cry has gone up, we must begin to make plans for the earlier detection of these cases? I have acknowledged earlier that screening is not a universally popular concept—but nevertheless I think it must be explored, because such a large proportion of the population seem to want it.

If the medical profession does not face up to it, and begin to lay plans for trials of it, one suspects it may become a political issue. In that case it is not unlikely—indeed it is likely—that the reactionary views in the profession might be over-ruled as they were in 1946-7 over the National Health Service. One must be impressed by the number of persons who indicate their personal interest in having ‘a complete check-up’, and no matter how one explains that no one can provide such a com-

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plete examination, the desire for even limited reassurance about health matters is undoubtedly stronger than many members of the profession, concerned primarily with curative procedures, realize.

It would be wrong, of course, to give the impression that all the public are strongly in favour of early arrangements for mass screening—about a third do not seem so inclined. Equally, it would be erroneous to suggest that all general practitioners are opposed to screening procedures—it will be pointed out presently that almost all practising doctors indulge in screening activities of one sort or another already. The innovations about which there are discussions, enthusiasm in some quarters, scepticism in others, are concerned with multiple tests, largely of a blood chemical analytical type and we have already seen that the interpretation of results for such well-known measurements as blood sugar presents difficulties in many cases.

Medical officers of health have shown interest in the ideas of modern screening: to many of them, the endemic of chronic ill health constitutes the public health challenge of their day, just as enteric fever did a hundred years ago—Dr. Clive Sharp was so motivated as is Dr. R. J. Donaldson of Rotherham (40). The main difficulty with over-enthusiasm by the local medical officer of health without the wholehearted co-operation of the local general practitioners and hospital services is that disease may be detected by one part of the National Health Services, but not accepted for treatment in the others: there is no need to labour over this problem any further. Two major difficulties which medical officers of health have to overcome to get local general practitioners to co-operate are, first the implication that another agency is interposing itself between the practitioner and the care of his patients—there have been enough grumbles in the past about ‘hospitals holding on to interesting cases’ to make this a very real issue—and secondly, the inevit-

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ability that screening will, temporarily at least, increase the local general practitioners burden of therapeutic work.

By contrast to those two branches of the National Health Service, members of the hospital service have been less vocal about screening procedures though, of course, they have been carried out in hospital clinics and on patients admitted to hospital—blood pressure measurements and urinalysis is what I have in mind. As out-patient clinics handle 7 million cases per year, and accident and emergency attendances reach 13 million per year and general medical, surgical, gynaecological, obstetric, and geriatric beds involve over 4 million cases per year there is clearly a great deal of opportunity for screening in hospitals and a great deal is going on as part of good medical care. It is only when one realizes that the hospitals are frequently dealing over and over again with the same part of the population, rather than working their way through the entire population, that one realizes that these numbers, impressive though they are, do not reach the very people one most wants to screen.

Among medical administrators and the research and academic epidemiologists who tend to advise them, there is natural concern about the implications of screening before its value for any particular disease is proven. An all-out bid to provide a supposedly comprehensive screening programme for the entire population would be a major undertaking. Is the evidence for its potential value strong enough to justify the vast sums of money which might be involved? In general, the academic viewpoint is that the evidence is not yet strong enough to recommend the investment of such a potentially large proportion of medical resources into this one aspect of medical care. There is a healthy scepticism about the accomplishments of their clinical colleagues in terms of cure and relief of suffering (41). Until satisfactory clinical trials have been carried out and confirmed—as I suggested they may soon be for the treat-

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ment of mild diabetes—it is difficult to provide the Ministry of Health with any other advice than cautious extension of present research activities and the establishment of a committee to advise on screening ideas. However, as we shall see later, this form of decision makes the assumption that screening will be for certain diseases, and that it will be 'prescriptive', that is, once diagnosed, such cases will be referred for treatment: consideration of screening for priority or to find those needing health education and/or therapy might be more acceptable and deserves more detailed consideration and some experiments.

SCREENING IN HISTORICAL PERSPECTIVE

One of the main difficulties with all innovations like screening is seeing it in proper perspective, devoid of too much bias. Historical considerations often help, and it is therefore quite interesting, as Wilson and Jungner (42) point out, that the idea of examinations for apparently well people is certainly over a hundred years old. As they say:

The idea of the periodic health examination goes back a long way. Dobell published a monograph advocating periodical examinations in 1861. In 1925 the American Medical Association published a manual for physicians. The commission on Chronic Illness (in the U.S.A.) was in favour of 'all persons having a careful health examination including selected laboratory tests at appropriate intervals' (43). The commission advocated screening tests only as a substitute to personal medical examination, recognizing that shortage of medical manpower made universal routine medical examinations impossible.

There is no doubt that nearly everyone regards the periodic examination by the personal physician as the best procedure and this would put the problem of screening back on to the general practitioner, provided of course that he had appropriate access to all the physical resources, and suitable assistance: today this includes, equipment for X-rays of the chest, an up-to-date chemical laboratory, probably facilities for bac-

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teriological examinations, proctoscopy, vaginal swabbing, and so on: the provision of these facilities for every general practitioner (over 20,000 of them) is clearly not feasible at present. So there is compromise already in so far as any screening means a sharing of resources and responsibility between different doctors. There is a good deal of this sharing of responsibility for screening going on already: the major risk being, of course, faulty communication between, say, the midwife finding albuminuria or hypertension at an antenatal clinic and the general practitioner, or between general practitioner and the doctor at the factory clinic performing a periodic health examination there which, again as everyone agrees, is in the best interests of both employer and employee in the event of legislation about industrial compensation. The same risks of failure of communication obtain between doctors doing insurance examinations and general practitioners. So the ideal is ideal because it centralizes all the information about any person in the single mind of that person's personal physician. All fragmentations of responsibility carry attendant communication problems.

These communication problems were not so difficult when the number of tests being performed on behalf of the personal physician was small—I am thinking of the time when mass miniature radiography was being carried out. What really has put the cat among the pigeons has been the development over the last ten years of automatic laboratory techniques and the possibility that electrocardiographs can be read and 'interpreted' at great speed and without fatigue by computer techniques. This means that multiphasic surveys of health, that is involving many measurements, including tests for syphilis, chest X-rays, blood sugar, blood pressure, etc., such as were carried out in the 1950s in the U.S.A. as major research projects are now feasible as a service. For example, two multiphasic studies under the auspices of the Commission on Chronic Illness in

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Hunterdon and Baltimore (44) and one in California, by the California State Health Department, the Long-Shoremen's Union and the Kaiser Foundation (45)—all of which were major research undertakings involving a good deal of laboratory and records manpower—could now be easily undertaken on a larger scale, with correspondingly increased medical treatment responsibilities, but without corresponding increases in medical manpower being available to match those clinical responsibilities.

What is happening is that the output of new techniques in terms of health data (blood test results, etc.) is far outstripping the productivity of doctors. It is true, and this has to be said, that work study shows doctors do not perform medical tasks all their working day. One study suggested that, in the U.K., they did the sort of medical activities for which they were trained in medical school for only 11 per cent of their working time: a considerable proportion of their ordinary working day is involved with administrative work—even waiting on the telephone, and of course, in cars visiting patients. There is no doubt that doctors could be used somewhat more efficiently, as I hope to show later in my chapter about Thamesmead, but they just will not be able to keep pace with automated laboratory techniques!

This point deserves a little more detailed consideration. I became aware of it first when I was privileged to visit the Jungner Laboratory and the Värmland Study in Sweden with Dr. Richard Cohen of the Ministry and Dr. E. B. Hendry of Glasgow. One saw the automated apparatus in action, producing large numbers of blood chemistry results each day, and appreciated why the organizers had difficulties in finding young doctors to work in Värmland among the people, to follow up any abnormalities of blood levels detected. The young physician is trained to take a history and perform a physical examination and then think out which laboratory

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tests to perform to help him reach a diagnosis. We teach that the intellectual aspect of medicine is the central and rewarding part and may be compared to solving crossword puzzles: the Värmland project wanted doctors, not to discover if blood constituents were abnormal so much as to treat the cases, which often means a relatively tedious activity rather like explaining why such and such is the answer to the crossword clue. One suspects that it wasn't easy to find young physicians who would take kindly to the idea of following up the automated laboratory, to being dominated by the machine's output of results.

And yet this is an unfortunate paradox because the ideal of the clinical chemists with his automated laboratory is to help the doctor, and the patients, by doing tests to save the doctor time. In their excellent monograph, Wilson and Jungner show how, by screening before letting the patients see the doctor, they can reduce the number of interviews with the doctors—from five to two in their model (46). However, this assumes that everyone is going to see the doctor, and perhaps this is a clue to how professional attitudes may become more tolerant of the procedure. Namely, if a certain number of people have to be examined for fitness, then screening might reduce the number of persons referred to the doctor which would relieve him of a good deal of tedious work looking at 'normal' people. So screening techniques might be appreciated as part of induction examinations, for industry, the Forces, insurance examinations, etc. But the yield might need serious consideration, for the age-groups involved would certainly be those where relatively few abnormalities would be expected. There is, however, the point that, over the years, such an activity among a certain age-group would provide a baseline to detect any trends in the nations susceptibility to diseases, and that the chemical analyses would help to monitor the

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'diseases of civilization'; I shall refer to the use of screening in induction examinations again.

What sort of schemes have been carried out since 1962? In the Sweden Värmland study (1962-4) there was a short questionnaire, followed by measurements of height, weight, skin-fold thickness as an index of obesity, blood pressure, chest X-ray, the urine was tested for sugar and protein, and ten blood constituents were measured: haemoglobin, haematocrit, sialic acid, cholesterol, Beta-lipoproteins, gamma-globulin, thymol turbidity, transaminase, creatinine and serum iron(23). Since then, in California, Collen and his colleagues (47, 48) have gone a step further and extended the tests. The history taking is much longer: there is a form of physical examination—everyone is weighed and measured for height and fat-fold thickness, has a six-lead E.C.G. and phonocardiogram, a chest X-ray, supine pulse and blood pressure measurements, visual acuity tested, tonometry of the eyes as a screening procedure against glaucoma, a vital capacity and F.E.V., as a check against airways obstruction and respiratory disease, a hearing test, a retinal photograph; everyone over 40 is recommended to have a procto-sigmoidoscopic examination for disease of the rectum and lower colon and women over 40 have a gynaecological examination and cervical smear for cancer of the cervix, and over 45 years of age have X-ray mammography of the breasts. The urine is tested for bacilluria (chemically) and for pH, blood, glucose, and protein. Finally, an attenuated glucose tolerance test is performed and blood tests undertaken for haemoglobin, and white cell count, for syphilis, rheumatoid factor, and blood groups, and eight chemical levels are estimated on serum—glucose, creatinine, albumen, total protein, cholesterol, uric acid, calcium, and transaminase. A formidable screening procedure; much in demand and so organized that 4,000 persons a month can be examined by the single unit. The problem, of course, is the follow-up by the personal physi-

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cians: the prospect, for doctors, of course, is the same as it was for the craftsmen at the beginning of the Industrial Revolution. A big change in medical methods is inevitable.

SCREENING AND THE NATIONAL HEALTH SERVICE: PROBLEMS OF ADVICE AND CONSENT

In the United States, the Collen type of development is tested by its financial implications. The cost of the examination is \$25. If people continue to demand it, it will go on, if more demand it, the arrangements will be reduplicated over and over again. This is one way of deciding priorities about screening, by the laws of supply and demand. And so long as health education is being extended, and the American Press makes so much news out of medical items that this process is being stimulated almost daily, and certainly carried on every week in *Time* and *Newsweek*, one can predict that a bigger demand will be created. This is an important point of which we must take cognisance in the United Kingdom, namely that health education will make people health conscious and demands for periodic examinations and screening procedures will rise accordingly.

But here, with a National Health Service financed by central funds, a different problem about settling the priority for screening arises because screening will not thrive or wither as a result of the operation of laws of supply and demand; it will have to be instituted on advice that this is a reasonable way to spend public funds. A cautious attitude to the wholesale introduction of screening is implicit throughout Wilson's and Jungner's World Health Organization publication. The technology is available, but will it really do anything to help? They discuss the possibilities for screening throughout life—in the prenatal stage the mother could be tested for toxæmia, the Rh factor, anaemia, syphilis, and asymptomatic bacillurias, which may lead on to hypertension later in life,

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to the neonatal stage, when congenital dislocation of the hip, congenital defects (heart), and inborn errors of metabolism including phenylketonuria could be looked for, through infancy (anaemia, amblyopia, and congenital deafness), childhood (mental development, congenital heart disease) during adolescence (pulmonary tuberculosis, obesity, and venereal disease) and in adult life (anaemia, otitis, and conduction deafness, arthritis, hernia, and perhaps breast cancer, diabetes, and ischaemic heart disease, hypertension and mental illness) and so on to old age (cataract, and perhaps diabetes, simple glaucoma). They go on to consider eighteen diseases which might be considered as worthy of screening because of their importance, all the above, together with exfoliative cytology for cancer of the lung and of the cervix, gout and other diseases of the respiratory tract and of the eye. And after considering the need for proof that anything useful can be done by mass screening in any of these conditions they conclude with recommendations for much more epidemiological research, and pressed for proper standardization between workers. They provided a list of conditions which seem to them to warrant most consideration, as follows: carcinoma of the uterus, glaucoma simplex, mental illness, asymptomatic bacteriuria, cancer of the breast and because of its toll of life, cancer of the lung.

We have already seen that the last is probably a health education problem; the possibilities for cervical cytology as a screening procedure in the U.K. is examined though, I submit, the difficulties in terms of hospital beds needed for cone biopsies were over-emphasized: in the text, Wilson and Jungner say a cone biopsy needs seven days in hospital, but in their calculations to show the difficulties, for some inexplicable reason, they use ten days. But their tone is rightly cautious, we do need much more information before screening can be recommended.

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Since then, G. McLachlan and R. Shegog of the Nuffield Provincial Hospitals Trust have called together a small group to go further into the matter, and again, caution is sounded. The Chairman, Professor T. McKeown, has expressed his views about screening as follows.

When the patient seeks medical advice the doctor's position ethically is relatively simple: he undertakes to do his best with the knowledge and resources available to him. He cannot fairly be criticized when the state of medical knowledge does not enable him to treat effectively or even to diagnose accurately the condition for which his advice is sought. Nor can he undertake in all cases to assemble the full range of facilities for investigation and treatment from which his patient might conceivably benefit.

The position is quite different in screening, when a doctor or public medical authority takes the initiative in investigating the possibility of illness or disability in persons who have not complained of signs or symptoms. There is then a presumptive undertaking, not merely that abnormality will be identified if it is present, but that those affected will derive benefit from subsequent treatment or care. This commitment is at least implicit, and except for research and the protection of public health (for example, finding open tuberculosis or typhoid carriers), no one should be expected to submit to the inconvenience of investigation or the anxieties of case finding without the prospect of medical benefit. The obligation exists even when a patient asks to be screened, for his action is then based on the belief that the procedure is of value and if it is not, it is for medical people to make this known.

The implicit undertaking to diagnose and prove treatment or care profoundly affects the criteria which should be met before a screening procedure is introduced as a form of medical practice (41).

And McKeown goes on to say how important it is to ensure that public funds really will be used to improve the patient's prospects, and how important it is to know what sort of costs are likely to be involved. In the publication, for the first time, serious considerations are given by the group to the costs of screening, though it was not possible, of course, to estimate the availability of manpower, nor were any comparisons

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attempted with possible costs and savings which might be involved in health educational activities. While it may be difficult to assess the value of therapy in chronic disease, the behaviour of individuals in response to health education is at present even more imponderable.

The diseases the Nuffield Provincial Hospitals Trust Group considered were anaemia, carcinoma of the breast, pulmonary tuberculosis, Rhesus haemolytic disease of the newborn, diabetes, glaucoma, phenylketonuria, and inborn errors of metabolism giving rise to mental retardation, cervical cytology, and bacteriuria during pregnancy as a precursor of hypertension. Rough cost estimates for case finding and treatment were possible for each except bacteriuria, for which reliable information does not yet seem to be available. The costs per case found for the other conditions were, anaemia £10-40, diabetes £20-30, glaucoma £60-110, early cervical cancer £300-600. Rhesus haemolytic disease of the newborn £560 per life saved, pulmonary tuberculosis £600, early carcinoma of the breast £1,000, and inborn errors of metabolism, perhaps £7,500 to achieve each normal child, rather than leave them as a burden on their family in the state. As a very rough estimate, including treatment, screening for these diseases and hypertension, and treating the cases found would involve some £100-150 million per year. It is interesting to recall that this is roughly the order of increase of expenditure on the National Health Service in 1967, about 10 per cent increase over 1966. It is also important to point out that we would need to recruit a very large staff to accomplish this.

It is natural, of course, that the manufacturers of automated laboratories and easy diagnostic procedures are anxious to see the demand for screening extended: they claim their profits are less 'vile' than those from, say, tobacco. It is also clear that industry would do the medical profession a great service if it would now turn its attention to automating means of taking

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care of people detected by automated laboratories! Experiments are needed in the value of teaching machines not only for health education, but for the dietetics of diabetes, and machines are needed to dispense medicines, and perhaps even to recognize abnormal cytology.

If we make the nation health conscious, these subsidiary developments will be necessary to accomplish that original idea, that screening procedures could save the doctors' time. At present the error in thinking seems to be far too much concern with automating diagnoses and far too little with automating treatment and management to back it up. However, one should not regard the manpower situation as insoluble. The new universities are turning out increasing numbers of graduates in paramedical subjects; physiology, biochemistry, zoology, and botany, and there is no reason why these young women and men should not be recruited for the sort of work health screening would involve.

There is one other point. We have to be careful to avoid any hypocrisy in condemning screening for lack of effectiveness on the one hand, without, too, acknowledging the wastefulness and ineffectiveness of the hospital service itself: wasteful because, for example, Forsyth and Logan showed that 25 per cent of male and 42 per cent of female patients did not need to be in hospital on clinical grounds alone, which suggests that some alternative to full serviced hospital beds would do for a lot of cases (49): inefficient because Ferguson and MacPhail (50) have shown that hospital-treated patients do not do so well as those of us who work in hospitals are inclined hopefully to think. By two years after discharge, in their survey in Scotland, a quarter of the patients had died, a seventh had deteriorated, and a fifth were no better—so by two years, less than half the hospital cases could be regarded as being improved for their treatment! In a later study (51), much the same was found again, and they concluded among other things that

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'real long term benefit can only come from more intensive attack on the earlier stages of disease. . . .'

May we pause to take stock of the situation before going on to see what the future may hold. We see there is a strong case for health education, we perceive that this of itself will increase the demands for periodic examinations. One course would be to let things proceed along these lines. A second course is to let screening become a private enterprise, and find its own level that way. We are, I think, set against this because the chances are that this would discriminate against both groups we consider most in need of screening—the ignorant and the poor—and let it be said here that ignorance in health matters is not confined to persons of low general intelligence, it is often found in surprising places and extremely able people may hold tenaciously to beliefs of dubious value and to fads of doubtful use.

II

Why screening is likely to be extended in the future

In this chapter various reasons for believing that more and more screening experiments and studies will be carried out in the future are put forward. These range from the natural comparison of the profession, to the increasing demand for reassurance engendered by health education in the future, to the use of screening to establish priorities for treatment and to establish quality control of the medical services rendered. It is also important to remember that screening is already in existence. Further screening is likely to develop on a local basis and could profitably be directed towards preventive geriatrics.

As, it seems to me, the demand for health examinations is bound to grow, whether it is stimulated by health education, or people who may have a commercial interest in it or howsoever, the medical and allied professions must accept the demand and realize that stern strictures against it will not prevail. In a way, accepting screening as an extra burden would demand of the profession more compassion, the ancient impulse of medicine. For screening demands that the profession go out of its way to help, by its appreciation of the fact which McKeown didn't mention, that the missing patients don't complain to their doctors about their illness because they are ignorant, or can't communicate, or don't want to bother doctors, just because they 'only feel run down'. The profession will have to follow its impulse for compassion about these people in the same way as the Good Samaritan went out of his way to help. If it doesn't, I think it will damage its reputation by

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taking refuge behind a mass of data on cost and effectiveness. It is for administrators rather than doctors to take the responsibility for rejection. It is for the doctors to make plans, to show the administrators what their needs are, what instruments, what supplies, what staff is needed to accomplish a useful task over the next five to ten years. This is not to suggest that there should be continuous animosity between the doctors and administrators, the reverse is my wish. There must be a continuous dialogue and the doctors must take the role of conscience, dissatisfied and urging action, so long as sick people don't get treatment.

Shortly I will discuss what these actions might be. But first let us go over some points which must be considered before screening can be introduced. The first must be that screening will have to be tested along the same general lines as obtained for new pharmaceutical preparations, that is, through, clinical trials and close scrutiny for effectiveness. We cannot risk the awkward situation in the early future of screening procedures being in as poor repute as certain drugs being prescribed—the drugs of doubtful efficacy. That screening, like drugs, should be 'safe', in the general philosophical framework of the Dunlop Committee is not enough. Screening procedures must also meet the stringent criteria, of the sort that the MacGregor Committee applies to medicines. Screening procedures must be supervised by something equivalent to the Medicines Commission proposed by the Sainsbury Committee, following the lines recommended by the group led by Professor McKeown meeting under the auspices of the Nuffield Provincial Hospitals Trust. Such a body or committee will need to consider screening projects proposed to it from several points of view. For example, someone must represent the public. For from the individual's viewpoint, whatever we academics may think, say or write, there is reassurance in being told that one does *not* have a certain condition and since for every condition consid-

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ered so far, the chances are strongly in favour of ruling out any particular disease, that is, only a few per cent and less of people screened will be found to need further evaluation, there will be a great majority of relieved persons—in the Värmland Project, it was over 90 per cent, but the percentage depends on diagnostic criteria, which had to be high in that study because of the difficulties in finding doctors to follow up cases.

Secondly, consideration will have to be given to the community point of view. Suppose some local health planning officer—a new grade of person, who might or might not be the local authority medical officer of health or a member of any area health board—is able to show that the local diabetic clinic could accept an additional 100 cases spread over a year, and that the local hospital automated laboratory could accept an extra 3,000 blood sugar analyses a year. Then one envisages that the Screening for Diseases Commission referred to in the last paragraph would be willing to acquiesce in a local screening programme aimed to find the 100 persons with high blood sugars and most in need of the facilities at the diabetic clinic.

Of course, there is an interesting conflict ahead concerning the quality of evidence for efficacy of treatment of diseases screened for in any population. When the professional epidemiologists and leaders of Departments of Social Medicine began to criticize old studies about the efficacy of treatment for conditions, treatments accepted without doubt or scepticism by physicians (e.g. the treatment of hypertension or anaemia), surgeons (e.g. surgery being efficacious for carcinoma of the breast) and medical students, it became apparent that specialists in various diseases were upset. They were, so to say, miffed that their disease was not on the list of 'scientific' diseases, conditions where the strict criteria of scientific endeavours are applied. A new 'club' of élite specialists is therefore foreseen whose clinical trials not only show that a drug is efficacious as far as its effects on some measurement is con-

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cerned, but that it has affected, beneficially, the natural course of the disease! This point, rightly strongly emphasized by Wilson and Jungner and by the Nuffield group, may have a very salutary effect on medicine and surgery generally: it certainly provides a serious challenge and one that will take many years to resolve. Research grants in this field will have to be long term and probably open-ended.

There are certain other aspects of screening. If it is to gain the necessary respectability, it must be far more like applied epidemiology than a case finding scheme. And if this becomes so, then screening performed on a sample of a population may provide a valuable form of quality control for medical care services. During their recent visit to the U.K., Dr. Paul J. Sanazaro and his colleagues from the United States said they were surprised how little research effort was being expended in the National Health Service to evaluate the quality of medical care offered. While there must obviously be follow-up studies for medical and surgical treatments, there is also the point that the overall quality of medical care may be judged, at least in part, by the health of the community. When we were discussing the arrangements for the Thamesmead project one of the main points was whether or not we should have a comparison of medical care arrangements within the project. After a good deal of discussion it was decided that this was not feasible, and we sheltered behind our suggestion that the case-finding qualities of our arrangements could be checked by screening surveys for comparison with other new town developments: a poor second best, but a possible means of evaluation. On the other hand, perhaps not such a poor proposition: we certainly would be much better off in our understanding of the trends in diabetes had anyone done a study in applied epidemiology and performed a few hundred glucose tolerance tests on a random sample of a British town in 1902 for comparison with Bedford in 1962! The important point is

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to realize that, just as we used them in Bedford, screening facilities do provide powerful tools for applied epidemiology and this aspect must always be borne in mind when proposals for financial support for screening projects are being put forward or scrutinized. Everyone who has made any detailed consideration of the whole field is deeply impressed by our need for many, many more factual, properly based, epidemiological measurements: this was certainly strongly emphasized both by Wilson and Jungner and by the Nuffield Group.

There is one other aspect of screening that will deserve consideration. Obviously the economic question will loom large in any firm proposals, but we should not exclude the idea that screening be considered in relation to eventual therapeutic costs. For example, the point may be made that bacteriuria of pregnancy can lead to renal failure, currently requiring some £2,000 per year to treat by intermittent dialysis in its terminal stages and survivals of over five years are now occurring in this regime: one young doctor on the programme has recently got married! When costing screening, one needs to estimate possible eventual savings. And the matter can also be looked at the other way round: what conditions are expensive in terms of hospital treatment. Could the prevalence or demands on hospital beds of any of these be reduced by screening? Recently, Guy's Hospitals accepted responsibilities as a district hospital, and at the same time the Ministry designated two local hospitals to the Governors of Guy's. An analysis of the diagnoses of the 200 longest stay cases has been undertaken in conjunction with the Medical Superintendent, Dr. P. Helliwell, and his assistant, Mr. Myson, to see if there are any clues about diseases making large demands for hospital treatment which might be reduced by health education or screening. The results for 1967 showed that, of the 200 longest stay patients, all of whom, of course, had complications of one sort or another delaying their discharge, 53 had neoplasms, 5 of

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the bronchus and 5 of the cervix, involving stays of 90–137 days. Fifty patients had cardiovascular diseases, 10 with arteriosclerosis, 7 with coronary disease, and 3 with the complications of varicose veins (88–201 days). There were 7 cases of cerebrovascular disease (86–227 days) and 5 of diabetes (109–169 days). Clearly the cost, in terms of hospital beds, of neoplasms, cardiovascular, and other non-infective vascular disease, and the need to prevent as many of such cases as possible is confirmed by this information.

From a national point of view, similar analyses from other hospitals would be interesting and might prove extremely helpful. Varicose veins is an important example. Acheson (52) has recently reported that varicose veins were the fourth most frequent cause of admissions among females in the Oxford area during 1966, and fifteenth among males. Operations for this condition involve 6 per cent of all surgical beds in England and Wales. How much this might be reduced by earlier detection and compression sclerotherapy (53) must be worked out as a matter of urgency, particularly when the very large waiting lists for surgical operations are borne in mind, 400,842 on 31 December 1966 for admission to 73,596 beds! It is apparent that more detailed Hospital Activity Analysis is likely to reveal many similar interesting possibilities; a further example of the loop of ideas—research and analysis giving new information improving understanding, better understanding improving management! In the case of varicose veins, the possibility that health education could help even more than early treatment also arises. Professor Schilling with Drs. Mekky and Walford found a far lower prevalence of varicose veins among women textile workers in Egypt than in Britain. Why? Varicose veins were associated with wearing boned corsets and standing at work. More research in this field could produce far-reaching savings.

The most persuasive reason for the prediction, or expecta-

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tion, that screening procedures will be introduced on an increasing scale in the National Health Service, probably at first for one disease in this locality and for another disease in that, is the fact that this is already starting for cervical cytology. The Ministry have already set out the main lines for setting up services for cervical cytology and advised the establishment of local organizing committees, and encouraged the procedure by a payment to general practitioners for examining women aged 35 years or over, right down to such details as recognizing the problems social mobility cause when compiling lists for re-examination, and suggesting methods for inviting women to re-attend for follow-up examinations through a central organization, National Health Service Cytology Recall. Furthermore, the need for on-going research has been recognized both into new techniques, validation of the procedure, and studies of response rates to cervical smear tests. But, as Dr. Max Wilson has pointed out, the framework of the National Health Service as organized at present is not really suitable for efficient or selective screening for chronic illness, partly because we do not have easy access to the population at risk—for example, lists of women aged over 35 years—and partly due to the problem of people moving from place to place. Important practical issues arise, therefore, when one moves from theoretical considerations about screening into the practical situation of providing the service. Wilson has said we are entering uncharted water, but the Ministry must be given great credit for their courage in setting off.

If screening is going to get started, it will almost certainly be started on a local basis—indeed it is impossible to conceive of any other way. This being so, it is appropriate to review quickly the principles which seem to be developing about screening, principles which will be taken into consideration and discussed by those energetic persons in the different locations who will pioneer programmes in their district. We can

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then move on to discussions of ways and means. Wilson and Jungner (42) make the following points: multiple screening is well suited to public health departments, whose role is changing; it is essential to be able to diagnose, follow up, and treat cases; it is essential to use validated tests; in the enthusiasm for screening one must be most careful to avoid neglecting other aspects of medical care; screening demands on-going research. They also make the point that the medical conditions sought 'should be important'. This will raise various considerations. For example, in relation to the clinical iceberg, decisions will have to be taken on the order of priority as between numerous conditions like, one assumes, cervical cytology or perhaps mild but preventable conditions, bad footwear giving bunions or low back ache for example, and serious but less prevalent preventable conditions, like blood screening for inborn errors of metabolism, phenylketonuria, galacto-aemia, histidinaemia, tyrosinaemia, and maple syrup urine disease which, once recognized, may help prevent mental retardation. Presumably one factor which might affect this decision is whether the gynaecologist or orthopaedic surgeon or the paediatrician is the driving force!

If there is excessive demand for screening and resources are limited, it may be wise to explore local possibilities before choosing between prevention of illness and screening to find and treat diseases. Diseases can be divided into relatively rare, potentially lethal but relatively successfully treated conditions—like Rhesus haemolytic disease of the newborn—or more difficult to treat—like carcinoma of the breast. And there is the final subdivision, the very prevalent, relatively easy to treat but chronic conditions, such as anaemia, hypertension and diabetes, all of which might be reduced by a health education programme.

Again, local developments will almost certainly depend upon the energy and enthusiasm of certain individuals with certain interests and the resources they can command. And the last

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group of prevalent and easy to treat diseases should perhaps be of special interest to the public health authorities because they often involve the double aspects of education and screening activities. But this does not absolve the general physician and geriatrician from giving his wholehearted support, because the activity under consideration for these last conditions can be regarded as a new and highly desirable venture into 'preventive geriatrics'. This seems to me to be so important a concept that I would like to consider it in a little more detail.

SCREENING AND PREVENTIVE GERIATRICS

One of the compassionate reasons for organizing screening programmes for diabetes was the concern that, after the end of their working life, elderly people, American society calls them 'senior citizens', should have reasonable prospects of enjoying their retirement. All too often a patient aged 66 presents himself with intermittent claudication which has appeared with the extra exertions of the gardening or the golf he's been looking forward to as the theme of his retirement years: examination quickly shows he has vascular disease and testing that he has mild diabetes. The Bedford findings would suggest that it may be of many, perhaps ten, years standing. So instead of a fuller retirement, the prospect is a confining one. One had hoped that earlier detection of diabetes might reduce these risks and the evidence is proceeding that way. Preventive geriatrics may well prove a feasible proposition.

It is not unlikely that the early detection and control of hypertension will reduce the stress on the vascular bed, and diminish the secondary degenerative changes in the arteries to the vital organs, heart and brain, as well as the nutrient vessels to the calf muscles. Hopes that preventive geriatrics might reduce the prevalence of little strokes (54) and their progression seems reasonable. As so many strokes are now due to infarction of the brain rather than thrombosis or haemorrhages, and as

Why screening is likely to be extended in the future

there is growing evidence that the systolic blood pressure falls to low levels during sleep, it is clear that screening and finding hypertension, reducing the level with the currently available diuretics, low salt diet, and adrenergic blocking agents, and coupling this with an educative programme to reduce the risks of cerebral infarction at night by urging older people to sleep flat, or with as few pillows as possible, to offset nocturnal hypotension—all this should improve the chances of an active old age and reduce the ever-growing geriatric burden on the National Health Service. Again, with diabetes, a mixed educational campaign for weight loss during the fifties, as well as extending life span, must reduce the prevalence of diabetes during the seventies. This, coupled with treatment of such cases of hyperglycaemia as do arise, should improve the enjoyment of retirement. A similar campaign against smoking has perhaps less chance of success, except that avoiding the attendant chronic bronchitis becomes even more important if old people are to sleep flat, and the importance of early treatment of acute exacerbations of bronchitis is obviously important in the elderly.

In addition to the compassionate case for such activities, there is also economic argument in favour of preventive geriatrics. Consider what may be thought of as the economics of a life. The community supports us now for the first 17–20 years of life through delivery allowances, family allowances, with annual grants for school education of over £1,000 million per year, for universities of over £200 million per year all for preparing the young people for their working lives. During this time, whether it is a popular concept or not, the truth is that they are incurring a debt with the community. This is a debt which no one begrudges. But when they start work, each young person represents an investment of several thousands to many thousands of pounds of the community's money, some £6–15,000, according to the extent of the pre-work

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training received; medical students are, of course, very expensive, ordinary school-leavers, much less so! But from that time, as work begins, taxes are paid and perhaps rates, too, and money is contributed back to central funds. If employment is interrupted, this repayment is interrupted. After the age of 40 or so, the individuals are probably in balance with the Treasury and their Borough Treasurer, so, from then on, they are contributing more and more to the general wealth through the taxes they pay. The object, of course, should be to enrich the community as a whole, by ensuring that national resources are drained as little as possible between the end of active working life and death. And clearly anything which reduces the demand for hospital beds, which costs some £1,500-2,000 per year in a Regional Board Hospital, and over £2,000 per year in Teaching Hospitals, will leave the community better off as and when it becomes possible to reduce the total number of hospital beds. This is already beginning to happen for there was a reduction of expensive general medical beds by about 800 during 1966, but an extra 3,000 (representing 10 per cent), had to be established for geriatrics in the same year. These geriatric beds have much less medical care in their maintenance and cost less than £1,000 per year. Thus, long-stay geriatric cases, who have no family or whose family won't or can't look after them, but who do not require continuous medical attention are half as expensive to house than those who do need medical attention. We could take care of at least twice as many fit old people as sick old people.

It would therefore seem wise to consider ways and means of preventing geriatric illness, and to use screening if and when it will help in this endeavour.

12

Ways and means of screening

In this chapter ways and means of screening are considered. The case for multiphasic screening of patients admitted to hospitals is discussed, it is pointed out that this is becoming feasible as automated laboratories are developed and installed in hospitals: the educational impact is mentioned. Details of how this might be followed by local screening programmes in the community is then gone into.

MULTIPHASIC SCREENING IN HOSPITALS

There is no immediate prospect either in terms of finance or personnel for the early establishment of a nationwide screening programme. What is much more likely to occur is a slower development, probably grafted on to the hospital service. One of the limiting factors in screening for diseases of civilization—anaemia, hyperlipaemia, hyperglycaemia, hyperuricaemia, and diseases of the liver, kidneys, and cardiovascular system is the demand for blood examinations. Suitable laboratories are not likely to be available to either general practitioners or medical officers of health. But the demand for blood chemical analysis in hospitals has been rising steadily, roughly doubling every five years, and automated laboratories have been developed to meet this demand. The Auto-Analyser has proved an extremely versatile instrument and almost all biochemical estimations of blood constituents have been adapted for it: methods are even on trial for using the same technique for radio-immunoassay of insulin and other hormones. The method, which Skeggs developed from the principles of the artificial kidney, involves dialysing off the constituents to be measured

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from a gas-segmented column of blood being pumped along one plastic tube. The constituents to be measured move along in a second tube, the reaction line. The apparatus has now been designed on a module basis and twelve estimations are possible on a single blood sample: the machine side of screening is rapidly becoming available.

There are only two difficulties with this excellent American system. First, its speed of sample testing is limited by the bubbles in the blood and reaction tubes: it seems unlikely that speeds in excess of 100 samples per hour will ever be feasible, at present speeds over 60 per hour are not easily achieved. The second point is that the measurements offered by the system do not correspond with measurements sought by the admitting medical officer. In a study of this aspect of laboratory determinations undertaken in association with Dr. I. A. Sutherland while he held a student appointment in the Department of Medicine showed that in a London hospital several estimations were required which were not possible in the Auto-Analyser. Another important point which emerged was how long it took for the results of the initial laboratory investigations to be reported back to the clinicians: an average of five days elapsed between admission and the ward receiving the full report due to 'rarer' estimations being done only once or twice a week in the laboratory.

In discussing these results with my colleague Dr. A. L. J. Buckle and later with Dr. Clifford Riley, Clinical Chemist at the Royal Sussex Hospital, Brighton, who had come to exactly the same conclusions, it was agreed that steps must be taken to design and construct an alternative, faster machine than the Auto-Analyser; in fact we specified 300 samples per hour, with the idea that laboratory technicians would draw blood samples on the ward first thing in the morning, and in out-patient clinics during the morning: estimations would then be carried out at midday and results transmitted back during the after-

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noon. Discussions took place with Dr. Gale, Dr. Allott, and Dr. Cohen at the Ministry of Health and presently it was decided to set up a joint project in association with the newly formed Medical Division of Vickers Limited, a company with a long industrial experience in munitions, aircraft, and warships who were interested in diversifying their activities into new fields, including medical care. After discussions with Sir William Dumphy and Sir Leslie Rowan, arrangements were made to share any ideas we had with the Vickers Medical Division under Dr. Kenneth Williams, and, as a considerable sum would be involved in the developments, support was sought from, and granted by the National Research and Development Corporation. Work got under way in 1965.

The central ideas behind the apparatus to be developed were that, as stated, a speed of analysis of 300 samples of blood or more an hour should be possible: that this would require a special new system of sample identification, and would demand discrete (i.e. in test tubes) analytical procedures, with arrangements to dispense accurate aliquots of serum and reagent quickly, heat them if necessary and perform spectrophotometric or other measurements on samples. The test tubes would have to be cleaned and re-used, in a rotating circular block and facilities for blank estimations would be essential if the machine was to achieve the sort of accuracy Buckle and Riley's professional standards demanded.

At the time of writing this machine is in the prototype stage installed at one of Guy's Hospitals (St. Olave's). Dr. Riley has been seconded by the South-East Regional Board to carry out stringent testing and the Automated Laboratory Committees under Dr. J. P. Bull and Professor Ian Wootton are taking active interest in the programme. Fourteen estimations are made on each 10-ml. blood sample: the discrete analytical procedure permits a much more flexible choice of estimations or method and a single sample is analysed in about

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twelve minutes. It will be appreciated that this means that data accumulates at 3,600 measurements per hour, and very fast computer techniques and automatic print-out methods have had to be incorporated.

It is to be hoped, therefore, that a large step forward in clinical laboratory productivity is possible within the foreseeable future, and the rate of estimation of the apparatus, providing it is free from too many maintenance problems, will raise various possibilities for reorganizing hospital and community laboratory services. Obviously, these machines could make out-patient screening tests much easier. Several hospitals could share such a fast machine, leaving the individual laboratories freer to concentrate on more sophisticated measurements. Obviously these facilities will bring various screening programmes into the realms of possibility. In view of the findings with Sutherland that there is often considerable delay between admission and completion of the initial investigations, one idea is to get all patients screened for fourteen measurements automatically on admission by an apparatus such as the Technicon or Vickers automated laboratories, choosing measurements which have hospital clinical diagnostic significance and adding any others which might usefully screen for the more prevalent diseases in the hospital's neighbourhood. This would save hospital bed occupancy by speeding up what is loosely termed 'the admission workup'. And as Dr. T. P. Whitehead has shown, it would permit admissions to be used with a new level of efficiency, by allowing time for the patient to be examined in detail for any abnormality detected, education started and treatment instituted, all this in addition to taking care of the actual reason for the admission.

One can envisage various other important points about this suggestion. First of all, as the Ministry of Health Report for 1966 (33) records hospital beds for general medicine are declining and will probably continue to do so—the number of

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medical beds fell from 67,790 in 1965 to 67,038 in 1966, whereas the number of surgical beds rose from 73,596 to 74,137. This must mean that the trend is for hospitals to be the centres of surgical science. But since our medical education demands a year of pre-registration house appointments, partly medical, partly surgical, and since the prospect of the future must be less and less medical activity occurring in the hospitals, pre-registration house officers in hospitals must be given experience in medical therapeutics. Any resources which increase the medical content of pre-registration surgical appointments will be to the general good. Thus one cannot neglect the potential educational impact of such a screening programme on young pre-registration surgical house officers, especially as general medical beds continue to diminish in number.

STARTING SCREENING IN THE COMMUNITY

How can one foresee this sort of screening of hospital in-patients getting under way? In the first instance, as automated clinical laboratories are installed one expects that, given that they do have 'free time', projects will be set up to discover whether this procedure is effective, whether the procedures detect a reasonable number of cases of previously unrecognized disease suitable for treatment at the time of the current admission. Whether it will be possible to extend the screening procedures to the full range suggested by the papers on the ideal periodic medical examination, including sigmoidoscopy, for every case admitted for an acute exacerbation of chronic bronchitis complicated by severe airways obstruction, is probably going to depend more upon the interest and supervisory activity of the consultants and senior registrars than exhortations from administrators. In the early stages, therefore, research will have to be undertaken to find out whether the more intensive biochemical tests do yield useful clinical information, whether they do help engender a livelier interest in taking

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every opportunity to look for unrecognized disease, whether these diseases can be treated and the patient's education effectively carried out without greatly extending the hospital stay, and whether routine use of a battery of biochemical tests on admission does or does not shorten hospital stays.

What one can envisage happening is the establishment of more carefully randomised trials of the use of batteries of biochemical tests on all patients with, say, even hospital numbers over a period of one to two years, with appropriate arrangements for suitable hospital activity analysis to be undertaken to detect any effects on length of hospital stay, and careful recording of the abnormalities found, and what difficulties arise in trying to manage them. But, provided suitable care is exercised in designing the investigations, it should not be too difficult to evaluate such screening in practical terms, and one has little doubt that suitable funds would be made available to pilot studies either from the Ministry of Health's own research monies, or through the Clinical Research Committee Budgets of the various Regional Hospital Boards, both of which sources of support have been increasing steadily over the last five years.

This, of course, brings up a most important point which cannot be over-emphasized strongly enough, namely that research, operational or clinical, usually operates so as to improve the quality of medical care. The initiation of such projects, the involvement of the consultant staff in them, and the enthusiasm which might be generated in the junior staff, the nursing staff, and other departments of the hospital might well have an important influence not only on the collection of new information, but also increasing the understanding of the administrative problems of the hospital among medical and related professional people. The problem would arise, as it always does, about switching the expense for this type of activity from central or regional research funds to recurrent

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hospital costs. However, since the medical staff tend to control this through priority committees and house committees, it seems unlikely that the situation would get out of control. If the project were deemed a failure, it could be dropped, if a success, the senior staff, being involved themselves would see in hospital in-patient screening a valuable form of surveillance for their junior staff, and this, coupled with its instructional values and the way it would encourage thoroughness in junior staff, would be likely to give it a suitably high priority. The main expenses would, of course, fall on the laboratory and communication services in the first instance, and the pharmaceutical services as diseases were discovered. Despite costs, on balance, a strong case can be made for the initiation of such projects whenever the interest can be aroused and sustained. This seems the most likely way that screening will evolve. Later, the junior staff will become general practitioners and, if screening is regarded by them, or some of them, as worthwhile, the more energetic and enthusiastic will begin the next phase, extending screening out into the community, where it must go if it is to reach those most in need, but where experience shows it only has chances to flourish from the interest of practising doctors rather than by imposition from other sources. When that stage comes, and it must be at least several years away, it is probable that population screening for many diseases will become more generally practised. It would be wrong to expect this to develop on a national scale very quickly. It will inevitably start locally, first here, then there, as has already happened in the cases of, for example, successive monophasic screening in Bedford and multiphasic screening in Rotherham. In Bedford, the late Dr. Clive Sharp pioneered in the fields of diabetes and then glaucoma, and his enthusiasm at World Health Organization-sponsored international meetings resulted in his undertaking to edit a book about screening procedures and results. His sad and untimely death left this

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work unfinished, but fortunately Dr. H. Keen has, in a typically generous and modest way, taken on the responsibility for bringing this work to publication within the foreseeable future. Its availability, with chapters on screening by authorities from many countries, should also help to stimulate local interest.

One can envisage, therefore, a different sort of procedure than obtained through the Medical Officers of Health of Bedford and Rotherham growing up in the future, involving the local medical profession generally. This certainly seems possible when the opportunity is right, anyway judging by the sort of response waiting to be harnessed at meetings in Basingstoke, Woking, and elsewhere. There is no doubt that there is a good deal of the basic compassion which I have suggested screening demands; and if one were in earnest about it anywhere, I believe that discussions should be initiated at the level of the local medical meeting. This should be followed by educational sessions, reading and considering and discussions of Wilson and Jungner or Clive Sharp's books and the forthcoming publication by the Nuffield Provincial Hospitals Trust Screening Group.

It would be imperative to consider any special circumstances surrounding the locality under consideration—air pollution or industrial aspects—and a glance at the regional distribution of diseases shows how different diseases occur in different parts of the country. No central or even regional authority could be so intimately informed about local factors as the general practitioners themselves. It might even be worthwhile conducting a local survey on a random sample of the population, before laying plans. Obviously, in accordance with the general principle laid down, preventable diseases of civilization should be regarded as having high priority for health education activities—this would demand thought about the age, social class and mobility of the community under consideration. There

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would also need to be a careful evaluation of local resources and attitudes. A newly established automatic laboratory should not stimulate a survey for diabetes if the local diabetic clinic is already overcrowded or understaffed or not enthusiastic. Obviously the interests of the local consultants and general practitioners, many of whom were at medical school when the conditions now becoming the topics of very heated discussions were rather despised. This sort of aspect would have to be plumbed carefully by frank discussions, and a thorough understanding of the age-structure of the local medical resources would be advisable.

It would also be essential to know the views of the local Medical Officer of Health, whose control over nurses, midwives, health visitors, and other educators, and means of re-duplicating and disseminating literature could be a great help if he were interested in helping a screening programme, as we found in Bedford. Alternatively, his rejection of the idea for any reason, personal or professional, should make any enthusiast pause to consider carefully before going much, if any further with his exploratory or planning activities. One would hope that, as the ground work was proceeding, meetings, perhaps one or two a year, attended by general practitioners, the medical officer of health, local consultants, industrial medical officers, school doctors, and representatives of the ancillary staffs, would be called to keep everyone abreast of developments and give them the chance to see and raise objections, or ventilate grievances.

One can foresee the possibility of local discussions at many levels on such topics as whether or not to try circulating questionnaires to those on doctors' lists not seen in the previous five years. Or whether health education could be undertaken by the health visitors? This is an important idea and topic for discussion because there is a slow increase in the numbers of health visitors employed by Local Authorities who are being

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seconded to work with specific general practitioners. This interesting scheme, which began in a small way years ago, and was later expanded in Oxford under Dr. Warin on a larger scale, is slowly extending to more and more towns and cities up and down the country, although at the beginning of 1967 only 15 per cent of health visitors were reported to be working in general practice attachment schemes (55). Is there any need for local enthusiasts to give refresher lectures to the health visitors about any special diseases, or therapies? What is the proper relationship as far as health education is concerned between the general practitioner and the health visitor: should she be guided by his views or the more general view? And so on.

Most important of all—who is to fire the process, collate all the information about the local resources, persuade the obstructive minority, or dampen the ardour of the over-enthusiastic? In the best of possible worlds, it should be the medical officer of health, as a natural extension of his historic functions. Or his deputy, if he is too busy. Or some new type of appointment which certainly cannot be far off, namely local or area medical planning officer. This would be a joint appointment, including joint representations at the time of selection, between the medical officer of health, the local general practitioners through their representatives at the local executive council, and the local hospital consultants, probably through the clinical pathologists and general physicians. Whether all three branches of the service should share his expenses, his salary, his car, his office, secretary, and the books and filing cabinets he would inevitably accrue, and his postage and telephone bills, would be a matter for discussion. I envisage that such a person—and there is no reason why it shouldn't be a woman if she possessed the right personality and other leadership qualities—would manage communities of up to 250,000 persons—which would mean establishing some 200–400 of

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them. Whether or not they are the same as the health centre managers envisaged at a recent discussion between general practitioners working in health centres and Sir George Godber (56), is a possibility worth thinking about.

How expensive would they be? Their budget today might involve £5,000–6,000 making a total investment of £1–2 million per year in say ten years. This is well within the scope of our present and any foreseeable growth-rate, if one considers the figures in the earlier chapter about the finances of the National Health Service—and if it did become a career for women—where familiarity with and skills in actual up-to-date clinical methods were a less important attribute than logical thought and economic ways, it might be a very reasonable way to increase the quality of medical management at the same time as preventing the wastage of a similar sum, or more, each year on the education of young women to become doctors only to lose them to their social functions as wives and biological functions as mothers. Two birds with one stone?

All too Utopian, I hear you say, introducing screening like this and making it an excuse for bringing in managers, maybe lady managers, and expecting us to work with Health Visitors and give them lectures and so on! Perhaps it is too Utopian. But perhaps not. After all, some of our very best young women are applying for medical school places and getting qualified. After learning how to manage first their husbands and their homes and then their children, they might be well qualified to manage the rest of us! Gently, of course.

13

Post-war trends in general practice and their impact on medical students

In this chapter some of the factors which have lowered the esteem for the general practitioner are considered: unfortunately many members of the profession outside general practice have unwittingly contributed to this trend. The nature of the work and the challenge it presents to young doctors are then presented.

We have dealt with the priorities so far, first the symptoms suffered and how we must educate people to interpret them and then begin to consider assisting this process of disease recognition by screening procedures. We have also taken into consideration the communication problems which exist between patients and their doctors, how patients may fail to understand the questions put to them, how doctors often tend to concentrate on only one symptom whereas half the population has over four symptoms, and have seen how important it will be to assist general practitioners, by using such ancillary staff as can be mustered, so that they have time for more leisurely practice with their patients. All of us who have worked in a busy clinic know the difference in our attitude to the patients and their symptoms if we feel that we are going to be able to cope. Medicine is then highly satisfying. And we know that when we are harassed, our peace of mind is lost and a tinge of irritability comes into our mood.

We must now turn, therefore, to the next group of priorities with which we are concerned, general practice, relationships between general practitioners themselves and between practi-

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tioners and the rest of the National Health Service, the local authorities, and hospitals, both regional board and teaching. For one of the major problems with which we have to deal as a matter of urgency is the tripartite nature of the medical services, as between the general practitioners in the community with very little supporting staff, the public health officers with a very large supporting staff and control over or access to extensive local authority welfare services, and the hospitals, with larger staffs and more extensive facilities. The growth of these three services since 1948 together with welfare services and, to a lesser extent the developments at teaching hospitals, which tend in London to have operated separately from the regional boards, has all gone on without much planning or integration in the majority of places, with the result that there has been reduplicating of effort, with the patients being treated and helped by several agencies. Indeed, the diversity of record-keeping has stimulated Dr. Donald Acheson to organize his record linkage system in Oxford as the necessary first step to complete epidemiological studies (57).

The reputation of the family doctor has suffered severely in the period of general change since the National Health Service was instituted in 1948. Although my own career has been largely concerned with research and work in teaching hospitals, it has been apparent from conversations with my friends and former colleagues in the General Medical Service that their satisfaction in the work, and their morale generally, has often been assaulted by the suggestion that medicine should be concentrated more and more in hospitals, this being the only possible environment for scientific medical diagnosis and work generally. Indeed, the loss of confidence which has slowly grown up in the minds of many practitioners on the one hand and of hospital consultants on the other has resulted in many of the latter expressing the view that general practice should be allowed to wither away. And, of course, this sort of remark

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does not pass unnoticed among the other hospital workers and medical students. This has added to the gradual attrition of the status and reputation of the family doctor.

However, one cannot really accept this view that general practice should wither. One has only to contrast the situation when general practitioners of experience are available in the community to give help and guidance with the conditions which obtain in countries where there are no such facilities and where the population is, in essence, dependent for their emergency care upon the casualty service of hospitals from the late afternoon until the morning. This may have many advantages in terms of the resources available for the emergency, but it also has disadvantages in that the staff on duty is usually the most junior in the entire service and while energetic and enthusiastic, it does naturally make mistakes, as we all do. There are some alarming reports of cardiac resuscitation for young persons who have fainted and other heroic measures being instituted unnecessarily. There is also the important and inevitable fact that such junior staff, being in training, changes frequently. While community-based general practitioners may move, the turnover which involves homes, families, and children's education, is of quite a different order.

There is also the point that, on a single visit to a home, the general practitioner in a glance may grasp much valuable insight into the social or psychological factors in a person's illness. This contrasts strongly with the more time-consuming procedure which has to be followed if doctors are confined to hospitals, merely receiving reports of social aspects of cases. The doctor may not read it carefully or listen to it carefully. It may not be accurate. So basing medical care on the hospital, no matter how much it could be backed up by ancillary medical, social, or psychiatric social workers, seems to me to be less desirable within the foreseeable future than our present arrangement of having a community-based general

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practitioner service. There is the other extremely important point, which emerges from the earlier considerations about the manpower of the National Health Service, namely that there are far too few qualified medical or psychiatric social workers to undertake the work which would be involved if we concentrated medical care on the hospital service.

If, as has been suggested, we put the patient highest on our list of priorities, it seems clear that we must have mature doctors accessible in the community, available for emergencies, for advice, full of general knowledge of local conditions, in fact a specialist in the location where they work, stabilizing society today in much the same way that the priest did in the late Middle Ages. It is a wry, but not completely inconsistent idea that priests encouraged worship as a means to ensure for well-exercised agricultural people the best prospect for life after death. The modern practitioner must replace morning prayers with floor exercises and confession with guidance as to how to avoid a living death before life is over! There is really no need to extol a list of the virtues of the good community-based general practitioner—much of his important work just happens, fostering children's aptitudes, advising adolescents, encouraging the anxious and uncertain: one knows such people, admires and appreciates them, respects them and secretly envies them the satisfaction of their work and the affection they command.

Why, then, has what is popularly called the image of the general practitioner declined? Partly, of course, because in an era of expansion of scientific knowledge, the conscientious practitioner may be ignorant of the latest innovation, whereas the patient has read all about it in the daily Press. Partly, of course, because that same daily Press reported in the past many cases of litigation against general practitioners for negligence. Partly because the division of medicine into a tripartite system in cities results in segregation of consultants from general

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practitioners. There are stories of forgetful medical teachers saying to students at the bedside, 'I hope you won't confuse renal colic with biliary colic'—and of the subsequent admonition of the poor general practitioner by his Cockney patient, 'Ere, the doctors at . . . Hospital said the students shouldn't mistake wot I got for wot you said!' There has also been an impairment of the relationship between practitioners and doctors at the time of consultations: these used to involve three people all together, the patient, his practitioner, and the consultant, and the ethics and etiquette were well established and scrupulously adhered to: my belief is that the public today consider matters of medical etiquette far more than the profession. Of course, when a consultant's livelihood depended on rendering the general practitioners a good service, it was more likely to be given! There has also been another factor, stemming perhaps from the attitude of medical students. With no disrespect to them, the truth is that they have grown up in an egalitarian and permissive society, and persons in a permissive society seek a permissive job: research is therefore the plum, for one is completely free: teaching comes next, with its intermittent responsibilities for instructing students and some time left for personal research: consultants who are shielded from too many broken nights by their house staff comes next, and so on. In this hierarchy, the poor general practitioner, who has a responsibility to make help available whenever the patient demands it—not necessarily needs it—comes last. And this view, it seems to me, has been spread far and wide into society over the last ten to twenty years.

This is certainly borne out by many conversations with students today. The brighter ones almost all indicate a preference for academic or hospital medicine, the less bright say, usually apologetically, that 'they suppose they'll have to go into general practice'. These attitudes underline two points. First, that not enough good students are being attracted into general

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practice and indeed if they fail in their quest for an academic or hospital appointment they do not easily change their personal target towards general practice: they are much more likely to look for a suitable appointment overseas. Secondly, the less successful student appears to see himself as already doomed to a second-class job. It seems a poor professional training that ends with about half its opportunities on graduation and registration being regarded as undesirable. As I shall hope to show, I think it would not be too difficult to correct this situation and thereby improve the current trend which is to consider emigration as preferable to general practice! The main questions needing consideration are first, preventing the establishment of a group of disaffected partially-trained research-orientated junior hospital doctors who cannot find suitable posts here: this could be done by offering longer research grants, and perhaps fewer of them, and secondly by considering ways and means of making general practice much more attractive professionally and perhaps showing more clearly its financial attractions for young men with family commitments.

The urgency of this whole situation, and its claim for a high priority among the medical profession's current priorities, is emphasized by the recent downward trend in the number of persons in general practice, despite a rising population. And also by the very relevant studies of Dr. J. M. Last (58) into the fate of graduates from Edinburgh Medical School—where he has shown that it is the less successful students who end up, rather dissatisfied, in general practice. How much those of us who have pursued a scientific and academic career, extolling the virtues of our enviable and pleasant life, can be held responsible for the bitterness and perhaps jealousies among general practitioners, I prefer not to contemplate!

What is the nature of this professional appointment in general practice about which there is so much dissatisfaction? Analyses of diaries of such doctors suggest that they spend one

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ninth to one sixth of their time doing medicine as they learned it in hospitals, about a quarter of their time 'prescribing' themselves, that is giving active reassurance to their patients, and over a third of their time is taken up in administrative affairs and, of course, travelling from place to place in their cars, on visits. We can of course predict that, with more and more chronic diseases the active reassurance fraction should increase, and perhaps with safer drugs, the amount of revisiting might be cut down. It is also interesting that, applying the Bermondsey figures for symptoms referred to doctors to the population as a whole, one calculates that each general practitioner has on average some 200 symptoms to consider and deal with each week. And this is very close to figures for workload deduced from studies carried out in various parts of the country.

Besides any personal satisfaction that the Bermondsey findings therefore seem to give a reasonable indication of general picture, some points emerge from this figure. Consider the difficulty which exists in trying to get through all 200 decisions together with all the travelling and telephoning and paperwork in a working week of a reasonable number of hours. For the average office worker, this would mean 200 decisions in a 40-hour week, or one decision every 12 minutes. But when we allow for the other things the doctor does, and realise that these 200 decisions are probably taken in about half his time at work for the National Health Service, we can see why general practice consultations are on average so brief, being estimated as on average 6-10 minutes. And when we bear in mind how much symptomatology there is behind those persons who use the doctors, i.e. the other symptoms for each patient which the doctor doesn't have time to, or even dare to, explore, we can see that one of the most important features of general practice is a skill in getting straight to the heart of the matter, or working very long hours. And because doctors in general are

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so concerned about their patients and upset by any errors they make, especially of omission in history taking, it is not surprising that conscientious ones do overwork and have such a high death-rate from coronary artery disease—one of the highest rates of all the occupations. A working week of 50–60 hours is common and some men and women drive themselves to 70–80 hours a week, which may include perhaps a broken night or two. And lastly, it has to be borne in mind that the sorting activity of the general practitioner is largely concerned with rather mundane, undramatic complaints.

We begin to see what demands the job makes and what sort of man is needed for it. We need to explain to our students that in addition to their general medical ability as a diagnostician, therapist and manager, they will be better general practitioners for having a feeling of the locality, its people, their lives and their work. They need to be fast workers and well organized. Their attributes should also include some sort of intuitive sorting system, so that they are able to smell out the case that needs referral. I don't know exactly what this faculty is, only that some people seem to have it: it may be related to paying attention to the possibilities. Anyway, general practitioners must have the energy to do this and have the intellectual honesty to admit defeat and refer cases at the right time. They need an optimistic spirit and enough reserves not only of energy, but of kindness, to accept the unexpected load with equanimity. And, heaven knows, they need understanding spouses and a loyal staff around them!

To recruit young doctors into this life and offset the attractions of hospital work, it is clear that various problems will need solution. The first is that the doctor must have some time for himself and his own life: if the other occupations are going to demand only a four-day week, which incidentally will give them more time to consult the doctor, the doctors will need some form of additional protection. There can be little doubt

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that group practice in health centres will be the best solution. And if the demand for the doctor is, as I believe, going to increase with increasing leisure and affluence, then it's clear he will have to be used more and more as a doctor and manager of medical care and welfare resources and less and less as a welfare services secretary or car-borne purveyor of medical care. He also needs the reassurance that comes from contact with his colleagues and some special interest to provide a focus for his continuing education.

Most of the criteria for ideal practice were met, as Lord Taylor pointed out, in the market town of 25-30,000 where there would be two groups of doctors in friendly competition with close association with the local consultants and deep social roots in the local community (59). There is no doubt that these conditions do obtain in a dwindling number of communities up and down the country. The numbers are dwindling because, as the population increases and as slum clearances and rehousing programmes proceed, this size of community, excellent though it may be from the medical point of view is not the sort of size favoured by the planning authorities. Indeed, by the end of the present century they foresee the majority of our population living in one almost continuous conurbation stretching from Manchester past London down towards the south-east coast. These expectations must mean that we cannot base our ideas for general practice in the future on the foundations of the eighteenth century, because these pleasant prospects will be open to fewer and fewer rather than more and more practitioners. The main difficulty, of course, and this will be a major responsibility for the planners and sociologists as well as doctors, will be the loss of a sense of locality: the inevitable movements of patients across boundaries for one use of the health service, and back to their own for another, in exactly the way Londoners behave today. The only way to stabilize these disintegrative and potentially

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wasteful trends will be by such careful planning so that it is more convenient for the patients as well as the doctors to use their local facilities.

These were the sort of thoughts in mind when the opportunity to attempt an *ab initio* integration of the various branches of the National Health Service, and couple them to teaching facilities, arose in connection with the proposed new town of Thamesmead, to be built on the old artillery proving grounds at Woolwich, some twelve miles, and twenty minutes by train, from Guy's Hospital.

I4

Thamesmead: A health and welfare demonstration project

This chapter sets out the way the Thamesmead project started as a possible demonstration of general practice in a new setting, where it could be integrated with other health and welfare agencies. The procedures, how the ideas were developed and the initial planning activities are described, and the general plan is to concentrate the medical and educational aspects of three to four group practices in a main centre in the new town, with peripheral units where other activities not requiring major diagnostic or other equipment, and welfare, can be carried out and supervised by the practitioners.

GENERAL BACKGROUND

The general background to this project may be set out briefly as follows.

The birth rate, rising until recently, has fallen perhaps due to new contraceptive methods: whether easier access to termination of pregnancy will reduce the live birth rate still further remains to be seen. Nevertheless the population of the United Kingdom has been rising steadily as the result of longer life expectation and immigration. The result has been an extra pressure on planning authorities for rehousing developments, in addition to those created by the loss of houses during the wartime bombings and the projects for clearing nineteenth-century slum dwellings. The effects of the latter on the clinical demands at hospitals in the centre of London has been mentioned. Here we are concerned with the opportunities the new towns offer the medical profession for forward planning and

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perhaps reorientation of our thinking about health facilities by integrating them, and about medical education and manpower in the future.

Unfortunately, there has not been much medical planning in the majority of the twenty or so new towns under construction in the United Kingdom since the war. The two notable exceptions to this trend have been Harlow New Town, where Lord Taylor organized a model plan based on the accessibility of health centres to the home and particularly the pram-pushing housewife; and Livingston in Scotland, where the Chief Medical Officer of the Scottish Home and Health Department, Dr. J. Brotherston, has been particularly concerned in testing out health planning and has brought together a lively and extremely able staff to go into these matters. That medical care which after all takes up nearly 10 per cent of government expenditure and over 4 per cent of our gross national product should have been neglected so generally, however, is a sad reflection on us doctors as a profession. One has only to hear planning and architectural authorities like Lord Holford talking about the complex networks of ideas and services, such as electric and natural gas lines, drainage, communications by road, telephone, and so on, all involved in planning new towns to realize the social implications of medical care, and the networks of communication and use of resources it involves. The medical and allied professions should have devoted more effort to keeping their activities well to the fore in the minds of planners.

In Greater London itself, special problems exist. The post-war rebuilding has been going on without sufficient concomitant road development to carry the extra demands created by motor-car sales and use, and there is an urgent need for new highways. This will inevitably lead to the compulsory purchasing of land and demolition of houses, and living accommo-

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dation will have to be found for those persons who will be rendered homeless and so have their names added to the long waiting lists for local authority and private housing. The prospects of solving this problem within the boundaries of the old London County Council were small until military and strategic developments, particularly the emergence of nuclear weapons, made the field gun redundant, so that the ordnance proving grounds and various other establishments at Woolwich Arsenal which had been concerned with armaments and the testing of guns since the time of Elizabeth I, were no longer needed. Consequently a large area of low-lying marshy ground on the South Bank of the Thames below Greenwich became available for other uses. With the development of new if expensive building techniques, which would involve construction of promenade platforms above the natural ground level, the London County Council considered that the need for accommodation for an extra 60,000-70,000 people on this site was an attractive and technically feasible proposition and they therefore purchased the Woolwich Arsenal site for a new town development. In view of the drainage and other problems involved, this would obviously be a particularly expensive operation compared to going into the more distant countryside; but the site in close proximity to the river, the prospect of local industry as well as commuter train services to central London, and a possible bridge over, or tunnel under, the Thames at this location, all, no doubt, rendered the project more attractive to the planning authorities.

By good fortune, when the announcement of the London County Council decision to go ahead definitely with the project was reported in the evening newspapers in London, on 24 December 1963, Dr. Robert Smith, a general practitioner with considerable experience of the Stanmore district which had itself developed rapidly in association with the construction and operation of London Airport nearby, was discussing

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the need for an attempt to interest medical students in general practice by a 'demonstration' practice within reasonable access of Guy's Hospital, and pointing out the difficulties that would be faced—not insurmountable difficulties but in 1963, formidable difficulties—if one tried to establish such a practice close to a teaching hospital like Guy's, with the inevitable repercussions on other practices nearby. Our eyes fell on the news item and the possibility of trying to organize a model of integrated medical care services in a completely new and rather isolated community such as the proposed new town was an attractive proposition. Providing preliminary enquiries revealed that it would be remotely possible to accomplish what was at that time unheard of, namely co-operation between general practitioners, local authorities, a regional hospital board, and a teaching hospital, we resolved there and then to pursue the matter as best we could.

It so happened that the Chief Medical Officer to the London County Council at the time, Dr. I. A. Scott was unwell, but by a further favourable twist of events, Dr. Smith knew his deputy, Dr. A. B. Stewart, and an early meeting with him was arranged. To our delight, Dr. Stewart was extremely cordial in his reception of our ideas and very kindly undertook to explore the possibilities of pursuing the matter further. He arranged for us to explain our general ideas to Mrs. Dennington, the first Chairman of the Greater London Council Housing Committee and she, too, was gracious enough to evince interest in the idea of a model medical care project, and also agreed to help us as best she could. It is to be hoped that the trust we generated will not be found wanting when the town, which incorporates many new ideas, such as relegating road traffic along the lines suggested by Professor Buchanan, is occupied.

A proposal was then made to the Nuffield Foundation for a research grant to set up a General Practice Research Unit in the Department of Medicine at Guy's Hospital with the object of

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finding out if it was possible to integrate the various branches of the National Health Service and develop plans for this. The Trustees generously agreed to support it and Dr. Robert Smith became Director, and appointed his staff which included M. P. Curwen, a statistician, and Dr. Jocelyn Chamberlain, who also had experience in earlier planning studies at Guy's, in the Out-patient Department and with the medical care scheme in Baltimore.

PROCEDURES AND INITIAL PLANNING ACTIVITIES

The first tasks were getting the interest and support of the various statutory bodies involved. To a certain extent, we were fortunate that the London County Council was translated into the Greater London Council because, so when the new organization took over the planning side of Thamesmead, we were already established as persons interested in the medical care aspects, and this is obviously an easier relationship than having to act as supplicants for a new idea. There were, however, some interesting administrative problems for although the Greater London Council is to be the landlord and organize the building of the new town, most of which lies in the Greater London Council boundaries, in the new Borough of Greenwich the first part to be built lies across the boundary in Kent, in Bexley. This has meant that negotiations have had to be duplicated as far as general practitioner Local Executive Councils are concerned. London and Kent (Secretaries, L. P. Willis and F. E. Miles) and the Local Authorities, Greenwich and Bexley (Town Clerks, G. C. Turk and G. B. Hodgson, and Medical Officers of Health, Drs. J. Kerr Brown and H. L. Settle). The other bodies whose active co-operation we needed were the Greater London Council through the Educational Medical Services under Dr. A. B. Stewart, the South-east Regional Hospital Board, under Dr. J. Fairley, S.A.M.O., and, of course, Guy's Hospital, through the Dean, first Sir Rowan Boland and

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later Dr. J. C. Houston. We also needed to establish working relations with the Ministry of Health, with the local Hospital Management Committee (Woolwich Group Hospital Management Committee) and local general practitioners and branches of the British Medical Association, to ensure that they were acquainted with the project and in general sympathy with our attempts to produce a model educational demonstration medical service. Fortunately we were able to secure the co-operation of all these groups, and many of those named above have given most generously of their time and knowledge to guide the project forward.

The next set of tasks involved establishing contacts with the diverse organizations which would be involved with the medical care of the new town: the dentists, the ophthalmic and pharmacy services, local consultants whose work would be particularly affected by the new group of patients coming into their area, the local geriatricians and psychiatrists, and, of course, a very large number of other groups working with doctors; social workers, the Family Planning Association, and the religious groups who are anxious to make active contributions to the social and welfare services through a plan, led by the Bishop of Woolwich, to draw themselves together under ecumenical arrangements. Merely listing all these organizations and people may give some indication of the complexities involved in trying to integrate the medical services and join them with the welfare services. It is quickly apparent why integrated medical care and welfare does not just happen; it requires arduous pursuit of ideas, and a great deal of effort and sometimes tact in communicating them to the interested parties. Indeed, it seems to me highly unlikely that integration of professions so fragmented and diverse as the medical and paramedical ones will ever be possible unless an organization such as the General Practice Research Unit is established with the specific responsibility of acting as secretariat, communications

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centre and general sorting house of ideas and work: those with ideas of integrating these services in their locale would be well advised to seek ways and means of setting up a similar organization if they are to have much prospect of success. For one of the major disadvantages of specialization of modern society and the very reasonable ambitions of various professional groups to have separate organizations for purposes of self identification is the corresponding responsibility generated for accurate and open communication.

The various expressions of interest or of willingness to co-operate therefore had to be followed by a long series of meetings, which were usually convened over a light lunch, when there would be frank, sometimes hard, discussions among the representatives of the organizations involved about our general objectives, our intentions and priorities, as a preliminary to exploring the feasibility of any plans we might wish to submit. Of course, in these discussions, the experiences we had had as a Department at the Bedford Diabetic Survey, and the preliminary information available about the Bermondsey Health Survey, had an influence on our general strategy, particularly as it was to house people of roughly the same social strata as Bermondsey that the new town was going to be built. It will not be surprising, therefore, that the priorities we established in our discussions were essentially similar to those that are being presented here, namely the population, their health education, the possibilities of screening them for disease and ensuring that they had easy access to the health and welfare services. We decided that support for the general practitioner and other front-line workers came next. Clearly the general practitioners would need all the administrative and professional help which the local authorities could supply: they needed, too, proper time off and such protection as was necessary from really trivial or time-consuming unimportant activities, coupled with much better facilities for the practice of

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medicine in a modern setting—X-ray and laboratory facilities—and the opportunity of face to face consultations, where the patient would be present with the general practitioner and the specialist. And we hoped that the intellectual and professional content of their lives would also be extended by establishing suitable on-going educational facilities.

When it became apparent that there could be no new hospital for the Thamesmead project, because the number of hospital beds per 1,000 population in the general Greenwich-Bexley district was already well above the national average, it was decided that the best way to meet the requirements would be to recommend a single central unit, and several peripheral stations. We did this without realizing that this emphasized community-based rather than hospital-based care, which is likely to become increasingly important in medicine in the future. The main centre was envisaged as housing the three or four group practices of doctors, together with their predominantly medical facilities, laboratory, X-ray, consultative, and educational. It would represent the usual interface between general practice and the hospital service—the out-patient-type facilities—whereas the peripheral units would represent the interface between the medical and welfare, or local authority, services. In the main centre, it was envisaged that the general practitioners would have working conditions where they could, on a first visit, devote a longer time to their patients, and have the benefit of biochemical or other laboratory diagnostic facilities. Furthermore, it was clear that, if there was to be no hospital, a strong case could be made out for consultants' visits on a sessional basis in much the same way as consultants visited outlying hospitals under the arrangements of the wartime Emergency Medical Services. Dr. A. F. McKenzie of the South-east Metropolitan Regional Hospital Board looked into the national averages of population for various types of consultant session, and found that the national average number of persons

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per consultative session was, for general medicine, 17,000, for general surgery, 20,000. This suggested that a physician could visit the main centre 3-4 times per week, and a general surgeon, 3 times a week, for the whole population of 60,000-70,000. Other sessions based on these calculations were, paediatrics (1), chest diseases (2-3), E.N.T. (1-2), orthopaedic and traumatic surgery (3) and gynaecology and obstetrics (3-4). McKenzie also calculated that a good case could be made out for radiographers and consultant cover, and a pathological laboratory with 60 technician sessions and 7 consultant sessions. There would also be a case for at least 2 full-time physiotherapists.

All these figures improved the prospect of discussions between the specialist and the general practitioner, with all the attendant educational as well as therapeutic advantages to the general practitioner and patient respectively. The possibility of testing new ideas such as automatic laboratories and computer techniques could also be based on such a centre.

By contrast, the idea behind the peripheral units for 15,000-20,000 people was that they should provide those services which needed to be based in the community. Particular emphasis would be placed on such preventive activities as antenatal, well-baby, and well-women clinics and innoculating together with health education and screening procedures. It was also envisaged that repeated certifications and prescriptions for chronic illness and physiotherapy could be dealt with, together with arrangements for general dental work and school medical examinations. As it is to be expected that the people moving into Thamesmead will include quite a large number of persons at present low on the priority lists in several London boroughs, and because it is inevitable that the upheavals of moving families from their familiar surroundings to the new town will produce a large number of social and psychiatric problems, it is also envisaged that the peripheral centres will

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have to deal with these kinds of problems as a matter of urgency: consequently it is anticipated that the case-load of psychosocial cases will tend to be high, which in itself provides an excellent opportunity for training students, both medical and social workers, in these important matters.

It was envisaged that the doctors from the main centre would take turns supervising activities at the peripheral units, ordering minor treatments, prescriptions, surveillance or screening tests, welfare services like meals on wheels or laundry services, injections, and treatments—all the less scientific aspects of modern medicine—just as is done in hospitals.

It was also perceived that peripheral units, dealing with large numbers of relatively trivial conditions, would need some special function such as a general service to the whole new community like centres for psychogeriatrics, or occupational health and rehabilitation, or physiotherapy, or minor surgery. We therefore hope to enrich the peripheral units by associating these special functions to each one of them, so helping the staffs by relieving the tedium of the more humdrum activities with which they will inevitably be involved.

These ideas would have to be dovetailed in with the building schedule for the new town: the rate of growth was expected to be slow at first, reaching an intake of perhaps 6,000–8,000 persons per year and then slowing down again as the whole project was completed. This has meant that important demographic as well as geographic considerations had to be borne in mind. Furthermore, the medical plan, and the extent of its ramifications with society generally, had to be sufficiently emphasized with the architectural planners to get it good ground sites. There would have been little prospect that the best laid plans would have been very effective if the health services had not been given the best ones we could negotiate at places people would find accessible and even attractive, especially if we were to encourage preventive medical activities.

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When the general outline of our plan had been worked out as a result of a very large number of discussions, and we were indebted to suggestions and ideas put to us by interested visitors from many countries—Scandinavia, the United States, Canada, Australia, Russia, Yugoslavia, and many of the Mediterranean countries, and even under contacts through the World Health Organization—we brought it all together as a short article which has become our first main reference point (60).

As the plans have gone forward, it has become apparent that activities have to be carried on at many levels. For example, it was clearly of great importance to ensure that all those who had offered their co-operation and help should be kept acquainted with the developments in hand and the overall direction things were taking, points of difficulty, and of general agreement. For this purpose we set up an *ad hoc* Medical Planning Liaison Committee, with very broad representation of all those in the medical and allied professions who might have either interest or axes to grind. Although this was a very large and apparently unwieldy committee when it stood waiting for its first meeting, it quickly settled down and showed an excellent spirit in fostering co-operative activity. Probably an important point to make here, and one which must be made, was that making proposals of a Utopian nature was less difficult in connection with Thamesmead for the very simple reason that we were dealing with an as yet imaginary population and imaginary doctors. This is clearly a much more manœuvrable situation than would obtain in dealing with an established community with established practices. However, one was not too concerned about the theoretical nature of the task and forces involved because exactly the same imaginary activities have had to go on in the initial stages of all new projects, whether they were military campaigns, where the attacking division had not yet been identified, or civil, com-

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mercial, or sporting enterprises, where the workers or staff or team had not yet been selected. The important thing was to ensure that there was no irrational obstruction to good ideas or suggestions, and proper airing of all controversial issues.

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In this chapter the administrative, architectural, organizational, and record and computer aspects of the Thamesmead project are set out in detail. This has been done as an indication of the complexities which exist even when real people are not yet involved, and to show how many things have to be considered. No apology is made for the amount of detailed information presented because the point which, unfortunately, has to be made is that understanding such details becomes an essential feature of organizing and managing modern medical facilities. The chapter concludes with some remarks about the impact of the financial realities of general practice on medical students and some optimistic forecasts about future medical emigration rates.

We soon discovered that there was a great deal of administrative pioneering to be undertaken. The first and most important aspect was defining the structure and membership of the many sub-committees which had to be built up, convening meetings and agreeing on the outcome of discussions of such diverse topics as pharmaceutical services and the optimum number of students who might be in attendance. Another extremely important point began to dawn on us. All the goodwill we could generate would be of little help if it could not be channelled into effective action. We met this point in a dramatic way at a meeting of the Liaison Committee called to discuss with the Ministry of Health a plan drawn up by Dr. M. E. Abrams, Senior Lecturer in the Department of Medicine, a man with very extensive medical computer experience, and G. A. Barnard, Professor of Mathematics, R. A. Brooker, Pro-

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fessor of Computing Science, and Dr. K. F. Bowden, Senior Lecturer in Computing Science, all in the School of Mathematics at Essex University. They wished to carry out a feasibility study of the use of computers in general practice. Considering the rate of development in this field it was clearly important to explore this topic in a town which would be taking some ten years to complete. However, we learned that this could not really be countenanced because the Thamesmead project did not exist as a statutory body. Since very large sums of money were concerned, this was clearly an important prerequisite to ensure proper accounting for and disbursing of any research grant. It was extremely frustrating to find that, instead of being strengthened by our willingness to co-operate together, we were in fact rendered impotent: our chances of a successful research application would have been far greater if it had been made on behalf of any single member of the consortium, even though the consortium itself represented almost every interested party and had achieved a remarkably unified opinion in favour of exploring a question which obviously might have far-reaching effects.

The Ministry of Health observers recognized and respected our dilemma and on returning to their Department initiated discussions which may eventually have an important impact. With all the ideas that have been aired since the Porritt Report about Area Health Boards, and the present prospect of a Green Paper on the structure of the National Health Service, it would have been a major precipitate step to arrange for a statutory body to be set up for the administration of the medical and welfare services in Thamesmead in the future. A much more practical solution was found by the Ministry. They have suggested that a Joint Health Services Advisory Committee be established and have undertaken to grant £1,000 per year towards its secretariat expenses from their research funds, in

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the expectation that the other statutory bodies would also contribute in due course.

This solution, it will be seen, meets all the requirements of the present situation without prejudicing the future in any way. The demand for more official status is not likely to arise in connection with research grants, and it now seems likely that the Ministry's move can be interpreted as making Thamesmead a respectable research project. It may be worth while reviewing these developments very briefly, since they represent the usual pattern, the recognition of which becomes a valuable catalytic agent in the minds of administrators of organizations as large as the National Health Service. I refer again to the loop of ideas, how investigations trigger off a new research project, how this in its turn leads, as Thamesmead has done, to operational research, how this increases the understanding and grasp of the situation by administrators, and so change is tested, tried, and if not found wanting, accepted or approved. Exactly the same loop of ideas may be found in the development of a new therapeutic agent or procedure. It is the stimulation of this loop of ideas at every level in the National Health Service which must have a high general priority, for it automatically translates the Service from a rather turgid, reactionary, and dull organization into a stimulating and lively one.

As far as Thamesmead is concerned, therefore, the present position is that a Joint Health Services Advisory Committee has been established and has elected Dr. James Fairley of the South-east Metropolitan Regional Hospital Board as its Chairman. As far as is known, this is the first such committee of its kind in the country. It consists of representatives of the following bodies: South-east London and Kent: Executive Council (1 member), Local Medical Committee (1), Local Dental Committee (1); Inner London: Executive Council (1), Local

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Medical Committee (1), Local Dental Committee (1); the Borough of Bexley (2), the London Borough of Greenwich (2), the South-east Metropolitan Regional Hospital Board (1); Woolwich Hospital Management Committee (1), Inner London Education Authority (1), and Guy's Hospital Medical and Dental Schools (1). The General Practice Research Unit acts as secretariat and all members of the Committee agree that it is a great tribute to the careful and patient efforts of Dr. Robert Smith and Michael Curwent that this consortium has been achieved and approved officially. It is also clear that the ongoing expenses of secretariat and operational research after the initiating grant from the Nuffield Foundation can be assured for a reasonable time—'during pleasure'.

The functions of the Advisory Committee were defined in November 1967 as:

1. To advise the constituent bodies on the co-ordination of all aspects of the medical, dental, and related personal health and welfare services for the area of Thamesmead.
2. To undertake, on behalf of the constituent bodies, any tasks as they may from time to time request.

One can see, therefore, that the Thamesmead project is providing a very useful proving ground, not for the ordnance and field guns of the past, but for future social planning. One is beginning to see the sort of possibilities which exist for Health Planners, possibilities which interested the U.S. Surgeon General, Doctor Stewart, as mentioned earlier. The approximate cost of the present operation is £10,000 per year for the development of the whole area. Managers in the Health and Welfare Services might eventually extend right down to the Health Centre Administrator, an idea which was discussed at a meeting called by the Senior Medical Officer in December 1967, when doctors with practical health centre experience met to pool their ideas and recognized the need for someone to

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take charge of the staff and perhaps the doctors! The same meeting came to the important conclusion that Health Centres could serve about 25,000 people, which suggests that the number of practices that should be concentrated in the main clinical centre at Thamesmead might be three or at the most four; though three fits well with the mushroom shape of the town itself, with its three extensions from the main centre.

ARCHITECTURAL DEVELOPMENTS

As plans for the medical care services have proceeded, the emphasis has naturally had to be placed heavily on questions of design and building. This, of course, has been a good discipline because it has demanded accurate forecasts and brought all concerned working on the project face to face with real-life situations.

The Greater London Council planners were very receptive to the general ideas of our scheme and provided us with an excellent and commanding site for the first permanent health centre. The initial health services are to be provided by a moveable structure, on skids, which can be set up in successive locations, following up the main building operations as new houses become occupied. This has set in train an interesting exercise because, as the town builds up, the first permanent health centre, which is envisaged as being eventually one of three or perhaps four peripheral units, has to act as the main centre for the first years, and perhaps as a test bench for the general view taken initially about the optimum arrangements, while the mobile centre on skids must act as an experimental peripheral unit. There can be no doubt that the practical experiences obtained as the town building proceeds should prove invaluable as each stage of planning has to be carried out.

Various other important problems have, of course, arisen. The space requirements for all the different branches of the health services, the possibilities of sharing office space, the

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lighting required for clinical and dental services, the possibilities of progressive developments in computer services, medical records, screening activities, and welfare services have all had to be considered very carefully and a large number of architects experienced in health centre and hospital design have co-operated and given their advice to the General Practice Research Unit in drawing up its schedules of space and services. This list of helpers includes A. Bennett, the Architect to the Greater London Council and the Chief Planner, B. J. Collins, the Medical Officer of Health of Bexley, Dr. H. L. Settle, the Medical Architecture Research Unit, whose Director, Raymond Moss, kindly arranged for an assistant, John Osbourn, to work at the General Practice Research Unit to guide us, Derek Stow and his partners, together with Mr. R. H. Smith of Edward A. Pearce, who have given advice about mechanical and electrical engineering problems, Mr. Trinick, who has helped with quantity surveying, and Charles Weiss, with structural engineering problems.

Of course, important questions about costs have arisen during this phase. The General Practice Research Unit has naturally developed its plans around the idea of a demonstration unit, with a high standard of building and equipment. However, it must always be borne in mind that the funds for integrated medical care health centres will come from local authority budgets, supported only in part by central funds. It is therefore extremely important to point out that much heart-searching and possible disappointment can be averted by early consultations about the building costs with those having responsibility for carrying plans through local authority committees—medical officers of health and town clerks—before proceeding too far with them. It must always be remembered that ultimately, whatever their political ambitions or persuasions, it is Aldermen and Councillors who have to act on behalf of their constituents and settle the level of the local rates and

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how they are spent. Over-enthusiastic planners should be cautioned that palatial medical centres are likely to be exposed to close and critical scrutiny, and the planners themselves likely to be asked searching questions as to whether it really is defensible to put forward architectural drawings of buildings which may be 'several pence on the rates'. And while there is no doubt that medical and welfare facilities should and usually do rate high in the list of local priorities, it would be foolish for any medical group with Utopian inclinations to neglect the facts of local politics. An interest in community health and medical planning leads academic doctors into unexpected corridors and into all sorts of new acquaintances and topics of conversation. It requires snap decisions and judgements, empiricism, and *ad hoc* statements and pronouncements for which we are not at all prepared by our training nor by the nature of our normal environment and endeavours. The corollary is, of course, that no-one who wishes to influence the course of medical developments in the future can have any scruples, or doubts, about the need to be quite straightforward with local committees. It is a chastening thought, but one worth considering, that medical facilities in the future will have to be weighed against such local projects as municipal swimming pools, new street lighting, and even parking meters and road signs. Those who neglect these realities do so at their peril. Those who have lived in ignorance of these realities should recognize their debt to the medical officers of health up and down the country who have been grappling with such problems over the years.

MEDICAL DEVELOPMENTS

This monograph is not an appropriate vehicle for extensive discussion of all the medical developments which have arisen over the last four years in connection with the Thamesmead project. The three main features selected for some consideration here are: the problems of organizing the medical and wel-

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fare personnel in the most effective and appropriate fashion; the feasibility of using computers in medical practice; and the impact of an attractive form of general practice on medical education, recruiting and its possible repercussions on medical emigration.

Perhaps the best way to provide useful details on the first two questions is to quote from a memorandum and from a paper recently published in the *British Medical Journal* by members of the department concerned with detailed planning.

ORGANIZATION OF MEDICAL AND LOCAL AUTHORITY WELFARE SERVICES

The following is taken from a paper prepared by Dr. Jocelyn Chamberlain which brought together our general ideas and elaborated them. It was circulated for consideration at the meetings and discussions on Thamesmead. It summarizes succinctly the direction our thoughts were taking and sets out the details that must be gone into before one can go far towards providing an architect's brief.

The community medical services for the people of the new town could be provided by three or four group practices, each of which would be responsible for all aspects of medical care needed in its particular sector of the town. People would register with one of the doctors in the group, although, of course, there would be no barriers to them registering with a doctor from one of the other groups or one practising outside the new town. The final decision as to the exact number of practices cannot be made until more details are available about the final geographical distribution of population within the area, but the size of practice envisaged would be that needed to look after a population of up to 20,000. This may seem large by present-day standards but it is felt that this population is of an optimum size to provide full-time work for some of the disciplines in the group (e.g. psychiatric social workers) and to provide opportunities for some of the doctors to be able to develop particular interests within the group, while allowing the patients

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to think of the group in a personal way knowing that there is full communication between all members of it.

I. STAFFING

The numbers given for each discipline are approximate, those for home nurses, health visitors, and district midwives being based on the numbers at present provided by Greenwich Borough Council. Further continuing study is obviously needed to determine the correct numbers for each group, but the following could be used as a starting point for discussion.

(I) 7-8 doctors, who would be responsible for the medical care of up to 2,500 patients each, and who would also teach medical students. They would all be general practitioners but would be encouraged to take an interest in one particular specialty if they wished. Within the group one could thus find doctors interested in paediatrics, obstetrics, geriatrics, psychiatry, etc. For any particular episode of illness the patient would consult his own doctor first, but if this doctor felt that one of the other members of the group were better qualified to advise on the management of the illness he could consult this partner or refer the patient to him for the duration of the illness. In this way it is possible that many referrals to hospital out-patients could be avoided. For emergency work at nights and weekends a duty rota system would operate within the group with two or three doctors being on call at any given time. The doctors would also staff the schools, special units (see below), and occupational health service.

(II) 10 home nurses who would work in the main surgery premises, would staff the satellite units (see Premises below) and would do all the home visiting necessary in the practice. The figure of 10 (based on numbers at present provided G.B.C.) may well be too large, and with full co-operation between the nurse and all other members of the group, it might be possible to cut it down to 6 or 7.

(III) 10 health visitors, each of whom would have her own list of families (current case-loads in Greenwich are about 600-700 families per health visitor), and would look after old people as well as children and mothers. They would also act as school nurses.

(IV) 4 domiciliary midwives. Ideally one would like to see the development of a general practitioner unit within the grounds of one of the nearby hospitals which do specialist obstetrics, to which

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normal obstetric patients would go for delivery and which would be staffed by the district midwives and general practitioners supervised by the local specialists. The patient would thus go into hospital for delivery accompanied by her midwife and the general practitioner who had looked after her antenatally and, provided the delivery was normal, would return home after one or two days, still under the care of the same two people. All abnormal pregnancies and obstetric emergencies would be transferred to the specialist obstetric department of the hospital. With this system it should be possible to eliminate all home deliveries without depriving the district midwives of the satisfaction of attending the deliveries of their patients. It is probable that if this system materialized, more patients would be delivered in the general practice units than are at present delivered at home (thus relieving the hospital of some of its load), and hence more midwives might be needed.

(v) 1 *Psychiatric social worker*

(vi) 2 *Medical social workers* (trained in community work rather than hospital work).

(vii) ? *Dentists*: We have no idea yet of the number needed for a population of 20,000. They would cover the work normally done by the local authority (i.e. mothers, infants, and schoolchildren) as well as general dental services. They would also teach students.

(viii) 5 *telephonists*, who would staff the satellite units as well as the main premises. A larger number might be needed to operate a rota system.

(ix) 6 *secretary-receptionists*

II. PREMISES

(i) *Main Surgery Premises*. Each such group practice would have its main surgery premises in the town centre, and here the doctors would hold their general consulting sessions, seeing patients by appointment. Staggered 'surgery' hours could be arranged between the doctors and nurses in the group, to avoid unnecessary multiplication of consulting, examination and treatment rooms and thus give more economical use of the building. Nurses, social workers (including psychiatric social workers) and dentists would also see their patients here by appointment. There would be a conference room, in which regular case-conferences would be held, with all the

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workers in the practice making contributions about particular patients whose cases fell into more than one category.

(II) *Satellite Units.* In addition to the main surgery premises, each group practice would be responsible for 1-4 units, scattered in the town—possibly in close association with the primary schools which are being planned to serve a population of 5,000-20,000.

At these satellite units, patients could consult at any time, without appointment, for their minor ailments, and would be seen in the first instance by a nurse, i.e. she would treat such minor ailments as she could cope with herself, and refer the remainder to the doctor, either by making an appointment for the patient to see his own doctor at the main surgery or in urgent cases, referring him immediately to the doctor who was on duty for the satellite unit at that time. (Needless to say, patients could also make a direct appointment to see their doctor at the main centre whenever they wished.)

The practice would hold its antenatal and child welfare sessions (including immunization) at the satellite units, these patients being seen by appointment. Other preventive medical services, which well people would be encouraged to attend, such as cervical cytology clinics, regular examinations of the elderly, family planning clinics, etc., would also be held in these units.

The health visitors, and possibly also the midwives, would have their main offices at these units, and the social workers, although their main offices would be in the main centre because they would be covering the whole practice population, would have rooms available to them in the satellites.

(III) *Special Units.* With a population of 60,000 various socio-medical units will be needed for particular groups of people. These units would not be attached to a particular practice but would be used by all practices for their patients in need.

(a) Old people will need one or more residential homes and one or more day centres, both these types of unit making allowance for physical handicap as well as mental.

(b) Children in care will need at least one residential home as well as a variable number of foster-homes. The Children's Officer for Greenwich would like to see a day-unit attached to one of the residential homes, to look after some of the many children (60 per cent of all those in care) who are only taken into care because of

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short-term illness of their mother. He thinks that if day-time provision were made for these children many of their families could cope with them at night.

(c) Day-nurseries for working mothers to leave their children.

(d) Junior Training Centre for mentally subnormal children.

(e) Psychiatric day centre for adult patients.

(iv) *Industrial Health Unit.* To be discussed.

III. SITING OF THE PREMISES

The main surgery premises of each group practice would be sited together in the town centre. Thus it would be possible for the practices to share many of the services which encourage good and satisfying general practice (e.g. diagnostic facilities, efficient records system, etc.) and to site many of the social welfare agencies within easily communicable reach of the practices. It should be possible, within one perimeter, if not within one block, to position the main premises of each practice, together with a central block.

The central block would comprise:

(i) *An administrative department* for administering and co-ordinating all activities.

(ii) *A records department:* All the records would be kept here, and there would be a direct link (possibly with closed circuit TV) to all the satellite and special units. The question of storage of some part of the records on a computer (with instant retrieval) is being discussed. This would necessitate a direct teleprinter link with the computer.

(iii) *A diagnostic and consultative department* in which there would be a laboratory, E.C.G. room, minor surgery theatre, etc., but not necessarily X-ray facilities if St. Nicholas's Hospital can cope with the extra load. Providing the demand justified it, one or more consulting rooms would be provided in which hospital specialists could hold sessions, seeing the patients together with their general practitioners.

(iv) *Accessory medical services* for all the practices—e.g. physiotherapy, chiropody, ophthalmology, child guidance, speech therapy, surgical appliances. Workers in some of these fields would also attend some of the special units—e.g. chiropodists to the old people's units, child psychiatrists to the junior training centre.

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(v) *Research department* in which long-term monitoring of the system of medical care would be carried out, as well as epidemiological studies within the population.

(vi) *Home help organizer's office*

(vii) *Students' common-room.* Living accommodation for the students could also be provided here, or alternatively in association with the peripheral units.

The *satellite units* as already mentioned would be scattered through the town, being at the very maximum within a half-mile walk of any household. They might be associated with the primary schools.

The *special units* would also be scattered through the town possibly in close association with the satellite units.

The main medical centre will be sited at the town centre because our aim is to provide an organization of maximum *efficiency* at a point most *accessible* to the majority of the population.

(1) *Accessibility.* Consumers of all services are tending to travel further than 'the shop on the corner' in search of more comprehensive and more efficient services. The town centre, as at present planned, will be within three-quarters of a mile of more than half the population and it is likely that the vast majority of the population will frequently come to the town centre for services not so comprehensively or efficiently provided at the periphery. Adequate transport facilities and car-parking space will presumably be provided in the Great London Council plan for the town.

(2) *Efficiency.* The main centre would be more efficient in the *care of illness* than the satellite units because of:

- (i) On-the-spot diagnostic aid.
- (ii) On-the-spot treatment facilities (see 'accessory medical services' above, in section on main centre).
- (iii) Continuing social contact and easy communication with colleagues of all disciplines working with patients.
- (iv) Easy communication with other agencies likely to be provided in the town centre, with which medicine has not been very much associated in the past but which obviously contribute towards total medical care—e.g. (a) national governmental organizations such as N.A.B., D.R.O.s from Ministry of Labour, Probation Office, (b) local governmental organizations such as the Children's Department, Mental Welfare

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Officers, and (c) voluntary organizations such as Marriage Guidance Council, W.V.S., Old People's Welfare Committee.

The peripheral centre would be more efficient in the *prevention of illness and detection of hidden illness* because well (i.e. 'symptomless') people will need to be actively encouraged to attend and therefore the service must be made as easily obtainable for them as possible.

The satellite unit would also serve as a first point of contact with the medical team for patients who need advice for some complaint but who do not think the complaint justifies their making an appointment to see their doctor in the main centre. Patients however should *not* be encouraged to think of the satellite as a substitute for the main centre which, if it is to survive, must remain the main area of patient-doctor contact, and not a 'mini-hospital' to which patients have no direct access. Some patients with chronic diseases who would find it difficult to attend the main centre could, by arrangement with their own doctor, be seen at the satellite for follow-up visits, but the majority of reattendances would be seen at the main centre by either the doctor or nurse.

COMPUTERS IN GENERAL PRACTICE

It was apparent from the beginning that Thamesmead would be a useful place for experiments with new ideas, not only of administration and screening, using such equipment as the laboratory devised by the Jungners, or the Technicon Company, or developed by Vickers Limited from the idea of Buckle and Riley, but also completely new innovations like the computer. One must admire the electronic industry and its technical development when one presents oneself at an airline desk and after one's name and ticket number have been recorded, the ground staff receive a typewritten sheet of previous flights and the rest of one's itinerary as planned, indicating whether or not reservations have been confirmed and so on. It is apparent that a great deal of medical data storage could be accomplished using computers, and now that magnetic discs rather than tapes are available, access times have been correspondingly shortened.

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The possibilities of using computers for medical research purposes have not been missed and there is a great demand for time on such instruments in most active academic units. Likewise, computers are being used for clinical, chemical, analytical procedures, for hospital activity analysis, and even for diagnostic tasks, either from analysis of an electrocardiogram or a bank of thyroid function or haematological tests. There have been recent developments, too, in using computers to link records in the Oxford Record Linkage Study, and their place in hospitals is to be evaluated by Professor J. Anderson at King's College Hospital. What about computers in ordinary clinical practice? Computers have been used by a group at Exeter to study general practitioner-patient contacts, and in the Wessex region to call children up for their inoculations, but we wanted to know whether they would have any place in easing general practice in the same sort of way the air transport companies help their ground staff.

That we have been able to look into this at Thamesmead is another example of the benefits of putting planning into an academic environment. Obviously this is not the only way to get new ideas pursued vigorously, but the presence of work on a project like Thamesmead certainly excites interest in the minds of university staff, who might otherwise not realize what useful and even important contributions they can make to social medicine: and, of course, vice versa.

The idea of using computers on the Thamesmead project was put to Dr. M. E. Abrams, who was working on gas-liquid chromatographic identification of lung lipid constituents, and who had been using computers to solve difficult equations concerned with the elasticity of lung surfactants and respiratory movements. He began to think about and discuss the possible role of computers in clinical practice with the rest of the planning team. It was clear that there would be a very large number of symptoms in the Thamesmead population, with a larger

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number of possible ramifications to be recorded, for example the site, duration, intensity, extent, aggravating factors, and so on, for each symptom. There would be fewer physical signs to record, and roughly the same number of possible laboratory tests or other investigations. But what struck us most was that, given the clinical diagnosis, and whether or not it was 'documented', the most informative information seemed to be the treatment record. This summarizes not only the symptoms but the over-all evaluation of the illness. At a later visit, say, a doctor often gets an excellent *aide memoire* from the previous treatment and this also conveys most to any other doctor who has to follow-up the case. Certainly on ward rounds we observed that the best information, giving the clearest indication about the clinical states of any case, was the working diagnosis and the therapy given.

In 1966 Abrams visited the United States to discover if we could find a suitable computer data storage and retrieval system for our purposes at Thamesmead, but we were disappointed. We therefore established a computer sub-committee of the Medical Liaison Committee to consider whether we should initiate our own feasibility study. Although a short-term study was made with the King Edward's Fund for Hospitals about possible use of the Teaching Hospitals computer now to be installed at St. Thomas's Hospital, it soon became clear that we would be more likely to make progress if we obtained expert help and guidance from a University Department of Mathematics and Computing Science and appropriate contacts with a computer company. Regarding mathematics and computing science we held a meeting with Professors G. A. Barnard and R. A. Brooker and Dr. K. F. Bowden of the University of Essex and forged a link with them, a move we have never ceased to appreciate. Regarding a computer company, after many discussions and meetings, we had to face the difficult decision of choosing one to work with: difficult because sev-

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eral companies had important features to offer. However, in the event we settled on International Computers and Tabulators Limited, and Mr. Mark Roach of that company has been of great assistance to us, indicating what is and what is not practicable. At the moment we are awaiting the outcome of our latest application for research funds from the Ministry to carry out a feasibility study, and as our consortium is now a Statutory Body, at least from a research point of view, we have high hopes that this work will be able to go ahead rapidly, and find out what if anything is a really practical proposition to help general practitioners. Helping them is not quite as simple as it might seem, especially as the average consultation elsewhere is of the order of six minutes, though it may well be longer in due course at the Main Centre at Thamesmead.

To present the details and intricacies of the problems involved, I refer to the work of M. E. Abrams, K. F. Bowden, J. O. P. Chamberlain, and I. R. MacCallum (61).

They set out plans for a single comprehensive integrated record of all health care outside the hospital on the grounds that the present records for General Practitioners, Local Authorities and other agencies are too fragmented, as Acheson has pointed out and overcome in the Oxford Record Linkage Study (61). The ideal, they suggest, should be single, complete, accessible, legible, and easy to store. Accessibility would demand a hierarchy of storage to make such items as allergies, current drugs, and recent consultations easily available, with older and lesser episodes taking longer to retrieve. Safeguards for privacy would be implicit.

They suggest that a suitable computer would not only handle this record problem but offer certain advantages. The practising doctor could be helped on the clerical side for example, by recording simultaneously the drug he prescribes and printing out the prescription itself, ready for his signature and the date. The computer could warn the doctor that a certain

drug was contra-indicated due to previous disease or indicate the social complications of admission to hospital for investigation. It could also provide lists for surveillance tests or screening, and analyse the results of tests and questionnaires. Computer systems must, of course, be considered in terms of their acceptability to the practising doctors and other users, of their undetected errors and of retrieval and analytical facilities. In general Abrams and his colleagues cautiously prefer recording results from check lists displayed on visual display units with a minimum of free narrative included through a teletypewriter: the check-lists, 'frees', and free narrative being used to generate a dictionary so that words would be replaced in storage by codes. They point out that the content of the complete record should cover:

1. *General information.* This section would contain patient identification, family medical data, and basic personal medical data such as blood group, known allergies and drug reactions, immunization status and results of certain frequently used measurements (weight, height, blood pressure, haemoglobin, etc.).
2. *Medical history.* This section would consist of a summary of the person's episodes of illness, for parous women a summary of their obstetric history, and for children a summary of their birth and neonatal record.
3. *Consultations.* This would be the record of episodes of illness, each episode being made up of a series of contacts or consultations between patient and health staff. The record would indicate whether different episodes were running concurrently. At each contact, some or all of the following data would be recorded about each complaint the patient might have:
 - (a) Presenting complaint.
 - (b) Progress since last contact.
 - (c) Specific and related symptoms.

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- (d) Signs.
- (e) Investigations.
- (f) Provisional or final diagnosis.
- (g) Treatment.
- (h) Outcome.

In addition, the record would indicate who it was that the patient had consulted and the place of the consultation. It is thus possible to amalgamate the nurse's record, for example, with that of the doctor so that a complete continuous account of the episode is given.

4. *Health surveillance.* This would contain records of the various screening and surveillance clinics attended throughout life. These may be divided into the following groups according to the conditions being sought: child welfare, schoolchildren, antenatal, male adult, female adult, and geriatric. In each of these screening clinics a standard procedure would be performed which makes the automation of these records relatively simple. Any variation from normal discovered in these clinics would be managed as an episode of illness and would be recorded in the consultation record.

5. *Social information.* The social record would have three parts. The first would be demographic data such as that collected in a census, defining the person's marital status, occupation, economic activity, etc. The second would give factual data about the person's environment and way of life such as the type of dwelling he lived in, his smoking habits, and alcohol consumption. The third section would be the record of episodes of 'social illness' and would be treated in much the same way as medical episodes. Social workers and health visitors who provide the bulk of this information record almost entirely in narrative, but experiments are being conducted to see how far these records can be structured.

6. *Hospital information.* This would consist of information

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from specialists about a patient's care in hospital, derived from in-patient discharge summaries and out-patient and casualty letters.

7. *Other professional records.* Of the many allied health professions it is anticipated that nurses, health visitors, midwives, medical and psychiatric social workers will each make a record of their contact with a patient in one or more of the sections already described. For certain other workers, however, the records kept are highly specialized and would not easily fit into any of these. This section would therefore be used for the records of staff such as dentists, chiropodists, physiotherapists, and orthoptists.

Abrams and his colleagues calculate that their system would require 200 magnetic tapes to store the records for 60,000 persons, occupying 25 cubic feet, rather than 200 cubic feet needed for present record storage. The computer system they envisage could spread out to cover 250,000 people in due course. Obviously such an experimental development would be costly, but ways and means of evaluating it to decide if it should be undertaken have been worked out.

We certainly would not like it to be thought that we are unaware of the important developments applying computer science to clinical practice and medical management in other experiments in new organization of medical care service, such as in Livingston in Scotland, where the Research and Intelligence Unit of the Scottish Home and Health Department is actively exploring these possibilities: the purpose of the presentation here is to indicate the wide range of options opening up before us.

EDUCATIONAL ASPECTS AND IMPLICATIONS

For many years since the war at Guy's, during which time a decreasing number of medical students have come from medical

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families, there has been a scheme whereby students can spend two weeks living with a general practitioner, seeing the sort of life he leads and learning about the type of casework he does. These arrangements have largely replaced the introduction to a family doctor's life which came about when the uninitiated students visited their friends' medical homes in the pre-war days. However, most of these opportunities involve rural or suburban practices, and many of us believe that the students now need to see, in addition, the way urban practices must be organized. J. A. D. Anderson has set out a good argument for students being attached to local practices at the curtilage of the teaching hospital along the lines organized by Professor Scott in Edinburgh (62).

There can be little doubt that the best arrangement, but one which we have not succeeded in achieving at Guy's, would be some sort of link so that local group practices had a special relationship with a medical teaching firm, perhaps in rotation. Students could then observe cases before and after hospital treatment and see the problems which arise as patients pass from the care of one part of the National Health Service to another and back again: this might help them grasp the communication problem between hospital and practitioner which they deal with at the time of their appointments as house officers.

The attractions of teaching at Thamesmead, in addition or alongside any other schemes, were that one might, in such a demonstration setting, be able to show the students more clearly the exact workings of medical and welfare services, and of screening and such procedures in the smaller peripheral units, and also indicate the attractions of group practices, and even of group practices sharing resources in the Main Centre. It might also interest them to see the sort of central consultation we have in mind, with the full educational impact of doctors exchanging views. Though it is much too early to lay

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down any firm plans, we expect the generous new grant from the Nuffield Trust to establish a General Practice Teaching Unit at Guy's charged with working out the best means and establishing the guide lines for the over-all arrangements. It is greatly to be hoped that the students will have an opportunity to see things working at Thamesmead early on in their clinical training: if possible at the beginning of their Introductory Clinical Course, before their affiliations to hospital medicine become too firm. This is a time when it is easy to grasp at one or two sittings the principles involved in management. These lessons should be learned early, before the interesting and more complex matter of such things as acid-base and electrolyte balance crowd them out of the student's mind. Regarding attendance at Thamesmead, one can also predict that a proportion of the students will opt to do one or other of their two three-month elective periods there, and we also have it in mind to explore the possibilities of post-registration appointments for six months in general practice, to follow on their hospital training—the sort of exposure to the problem of community medicine which would be particularly valuable for men with good academic prospects who are likely to become the profession's leaders by the turn of the century and who, one feels, would be the more likely to make broad-based and wide decisions if they had such an experience to give them some insight into affairs outside hospitals. For we cannot escape the risk that, as we recruit more and more medical students from non-medical families, the likelihood grows that they will grow up into succeeding generations of hospital-orientated physicians during an era when the need for community-based physicians will almost certainly be increasing rapidly.

In addition to the experience which could be offered to medical students, there will be facilities for dental students and plans for these have been drawn up by Dr. M. N. Naylor and Mrs. E. Appleyard. The presence of students does impose extra

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space burdens on clinical and dental consultations and this will have to be accepted by the planners and local authorities as part of the *quid pro quo* of having them there, because there is no doubt that they do improve the quality of care, not only by their presence, but by their own helpful efforts. Nor should it be thought that educational opportunities should necessarily stop at this point. For the fact is that older establishments like Barts, Guy's, the Middlesex and St. Thomas's Hospitals, with their well-established Schools of Dentistry, Nursing, Physiotherapy, and their interest in training midwives, pharmacists, medical social workers, dieticians, and so on have already taken many steps towards establishing comprehensive medical schools. However, the remarks earlier show how large is the medical manpower force in local authorities, and one can only hope that the appropriate educational facilities for the many other categories of worker will be grafted successfully on to the whole Thamesmead operation—it would be particularly advantageous if close and co-operative relationships could be established with the local educational institutions. The medical care services are going to need able secretaries and typists, and a wide range of graduates in the social and natural sciences: education in all these fields might, with profit, join in discussions of the best uses to which they could put the growing medical care facilities at Thamesmead, and one very much hopes this will prove productive.

POSSIBLE EFFECTS OF GENERAL PRACTICE TRAINING ON MEDICAL GRADUATES IN REDUCING EMIGRATION

When one begins to consider seriously the details of recruiting young medical assistants to work at Thamesmead, various interesting speculations arise, which must be gone into here because of their educational associations. Many people have heard of the general plans and pointed out that there will be difficulties in recruiting and those interested in the new town

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development at Milton Keynes recently expressed a similar concern. This has very wide ramifications because it is obvious that recruitment will have to be competitive with general practice up and down the country: one cannot expect young doctors to flock to appointments which will have additional teaching burdens at stipends substantially lower than obtain elsewhere.

This is not the place to discuss whether or not we should arrange a salaried service generally at Thamesmead. This is a topic loaded with political implications, and many careful discussions will have to be held with various interested parties to ensure that a wise decision is taken: there are several sensible arguments in favour of salaries in the special circumstances which will arise at first at Thamesmead, where lists will be growing from small to large and where there will be a lot to do with salaried staff working for the local authorities. Furthermore teaching and other commitments may make accounting extremely difficult and so on. On the other hand, it is clear that medical men and women working at Thamesmead must not feel that any salaried service restricts their financial prospects unnecessarily. Perhaps the whole project offers the opportunity for an experiment and by analogy with the hospital services, one envisages some sort of maximum part-time arrangement being worked out as a reasonable first-trial solution.

Returning to the question of recruiting, it becomes apparent that, as general practitioners are becoming scarcer despite an increasing population, the demand for them will increase, especially as young doctors become more and more hospital orientated. It is the opinion of many general practitioners that we shall be hard-pressed to get staff unless they are offered the 'going rate', and the fact is that this is considerably higher than the salary scales for registrars. It will not take long for this financial aspect to become known among the student body in a way which is hardly possible today. It seems a reasonable

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prediction that, with marriages occurring at younger ages, and the advertising pressures for materialistic possessions, an increasing proportion of students will want to consider the possibility of a career in general practice. Furthermore, if this can be shown as an attractive proposition in an urban setting, those students who are less interested in financial reward but want a challenging and rewarding career, will also become more interested in careers in general practice.

All this will have interesting repercussions in the teaching hospitals. The demand for registrar appointments may fall: a salary correction might even be needed to balance supply and demand for hospital appointments. Consequently in the academic departments the present high demand for short-term research appointments as stepping-stones to M.D. theses will probably diminish. This could influence the rate of emigration among younger doctors, because few men in secure university appointments emigrate. The great tendency has been to provide research experience for our young clinicians, who have used this as a way of marking time for promotion. If their subsequent applications for either a permanent post or continuing research support have been unsuccessful they have been discouraged, and naturally very ready to accept posts abroad with scope and opportunity. It must be pointed out that, if there were fewer people with research ambitions, or harsher initial selection of research workers, or more finance for research work, then the terms of research appointments could be made longer and more elastic: this in itself would reduce the number of disaffected men looking for jobs abroad. These ready trained and already carefully selected candidates have had a ready appeal for the Americans and Canadians, and the emigration rate has consequently been high. Exactly how high is a matter of debate; figures between 300 and 900 per year have been quoted, and a level of about 500 per year seems a reasonable best estimate for the 1960s.

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If we take this figure, and apply it to the present output of doctors, we can forecast the medical manpower situation over the next five to fifteen years, because changing it by setting up new medical schools cannot affect it significantly in less than ten years. Our present output is of 470 women and 1,459 men, totalling 1,929 per year, and our present intake, which will affect things fifteen years from now, is about 675 women and 1,929 men, which should produce nearly 2,500 graduates per year by 1973. As very crude estimates, let us assume that 500 graduates emigrate and that there is a further loss of 500 graduates per year to marriage, or leaving practising medicine for other careers. This means we have an effective output of 900 doctors per year for England, Scotland, and Wales. To keep up hospital consultant and academic posts will require some 250-300 per year, leaving 600-50 per year for general practice which will barely maintain an effective working force of 23,000, the present low manpower. Within five to seven years, when the present intake is graduating, the position will be much easier if out of 2,500, 500 emigrate and 500 are lost for other careers, leaving an output in the mid 1970s of 1,500 graduates per year. Suppose it requires 300 per year to maintain the 9,000 consultant posts likely by then, and 800 per year to maintain general practice at about 23,000, then 400 graduates would be left over, about 200 being required for research and academic careers, the rest to build up general practice or for administration and non-practising work.

But if the total annual graduation were raised to 2,750 and the opportunities and attractions of working at all levels in the National Health Service, particularly in general practice, reduced emigration to say 250 per year, a much happier picture emerges, namely that by the end of the century 500 persons per year could be entering consultant posts totalling 15,000, and 1,000 persons per year could be going into general practice, which would be running at a total of about 30,000. These

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figures are the minima to meet the demand thirty-two years from now, especially if general practitioners are to have a life with anything like as much leisure as other people. This production of graduates would leave a pool of 1,000 graduates per year outside the two main branches of the National Health Service, 500 or more might be lost to marriage, and it would seem that academic departments and research would need 300 or more per year (approximately 10 per cent of the output), and administration some 100-50 (approximately 5 per cent of the output), leaving very few for occupational health, medical writing, the pharmaceutical industry, and so on.

Apart from the immediate savings of 250 doctors \times £14,000 which Hill estimates is the cost of training a doctor (63) (I personally believe this is an underestimate and that £20,000 would be more accurate), that is £40 million per year, this sort of development would probably permit much clearer planning of career structures than seems possible at present. If we are to retain our trainees, this is an urgent priority: we need to focus rather more attention on exchanges for appointments at the registrar level as between hospital and academic on the one hand and administrative work and general practice on the other. And we need to ensure that registrar appointments can lead easily into all branches of the medical profession. It is not propitious to attempt any such planning until the full implications of the Report of the Royal Commission on Medical Education have been worked out, but one point is obvious: career structure for young doctors should take a high place in administrative thinking: gearing advice to the number of ++'s in the *Lancet* tables, excellent though this advance has been, must be improved upon to reduce emigration losses. The idea of providing a career advisory service for senior house officers in surgery and related topics, like that for senior registrars being set up in Scotland by the Western Regional Hospital Board under Sir Charles Illingworth, is exactly the sort of develop-

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ment which should be extended, as that one may be, to general medicine and, one hopes, general practice (64).

The other great reserve of qualified doctors who can act as a buffer against manpower demands and perhaps help in screening and management is, of course, the married woman graduates. I have already discussed them in connection with such future developments. If emigration continues as an acute problem more attempts at educational rehabilitation of married women doctors whose children have grown up, or are at a reasonable age, will be needed. That this is a feasible proposition has been clearly demonstrated by Dr. June Howqua at the Royal Victoria Hospital in Melbourne, where there is also a doctor shortage due largely to the fact that general immigration into Australia since the war has exceeded the services which can be rendered by local graduates and immigrant doctors (65).

There is another educational implication of our increasing number of hospital appointments in this country over the next thirty years. It should attract good candidates from the schools. Since schoolboys will continue to be exposed to the notion from career masters that life as a specialist is better than general practice, it will be especially important to keep the quality of appointments at the rebuilt peripheral hospitals high, and the staff happy in its work. Under these circumstances it is possible that we do not need more than two or three new medical schools in the early future. The main requirements would be a general extension of the present arrangement for continuing medical education at regional board hospitals, sufficiently effective through group practices and health centre developments to reach the great majority of doctors rather than the enthusiastic minority, as at present. This will at the same time improve facilities in such hospitals for students who will wish to work during the elective periods of their undergraduate courses or during vacations and more

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especially during their pre-registration appointments in peripheral hospitals, with heavy clinical loads.

The one great indeterminate factor in the forecast is emigration, which could offset the output of two to four or even more medical schools. If we can induce an optimistic and buoyant mood in medical practice, and secure a happy staff in the National Health Service, emigration, anyway to more affluent societies, will slow down: no one could object to emigration to under-privileged and needy countries.

TWO OTHER POINTS : LOCAL PROBLEMS NEED LOCAL SOLUTIONS AND INTEGRATION DEMANDS INTEGRATED FINANCE

Two other points remain for discussion. The first is to make it clear that the solution suggested for Thamesmead should not be regarded as applicable to all communities: it will be apparent that it is not the general solution, but the principles and the method which are being put forward for consideration probably are. For example, it is already obvious that quite different organizational solutions will be needed for integration of the medical care and welfare services for Basingstoke, where there is a hospital with ample space for group practices from health centres on the same site, or for the plans for Milton Keynes, where the population is to be spread over a very large area. The point which one is trying to make is the same as the one put forward in connection with screening, namely that it is necessary to bring people together, get them to agree to explore the possibilities of better organization and management, collect facts and have frank discussions as to whether or not any proposed changes and integration are first feasible and second desired. Whether this is possible without a district medical planner, I personally doubt. It is apparent that little or nothing would have been achieved at Thamesmead without the continuous efforts of Dr. Robert Smith, Michael Curwen, and their staff, who have been able to collect facts, discuss what

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is possible among themselves and then hold meetings to see if they could secure general agreement to the ideas which were developing. But every local situation is different and will demand a solution which will be specific not only to the place, but the time: delay of a few years may be associated with radical changes in local circumstances. Opportunities come and go.

The last point is concerned with the financial implications of integration. Discussions and experiments in these matters are closely related to the whole question of the administrative structure of the National Health Service, which is to be thrown open for wider debate in the early future by the Minister's promise of a Green Paper on the subject. One of the things which is emerging at Thamesmead, where there will have to be large capital investments, is the need to consider whether it might not be more efficient to sequester funds from the various branches of the service, and put them under the control of a local or area health board, perhaps of the form suggested in the Porritt Report (66). This idea of more efficient locally administered combined budgets has been supported in other connections recently by Lord Longford and Sir John Walley. Obviously it is easier to do this in new towns than for boroughs in large old towns and cities, where people may cross administrative boundaries, where the size of the borough population may not 'fit' with, say, the technology of computer data storage banks which would be good for groups of about 250,000 persons. There is also the problem of rich boroughs and poor boroughs: the latter might need more health and welfare expenditure than the former and some body would have to decide this, and undertake to review it. But if the sequestration of funds and local administration were found more efficient in new town experiments, the whole notion of allocations and reviews would have to be faced and perhaps put into operation.

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Priorities in general establishments: Hospitals, local authorities, suppliers, and administrative branches

In this chapter, some suggestions will be put forward tentatively about priorities which may be considered for the various central establishments.

In the hospitals, it will be suggested that the organization and running of out-patient departments can be improved, and that hostel beds for out-patient investigations may relieve much pressure on in-patient beds. In-patient services may be accelerated not only by this measure, but by wider sharing of beds in the summer as between surgeons, who tend to have long waiting lists, and physicians. The ideas of progressive nursing care and the establishment of more specialist units should be explored, and the role of innovations such as computers defined carefully before much capital expenditure is made. There can be little doubt that doctors will have to be prepared to give more time to management functions, and younger specialists may have to help by organizing ad hoc operational research programmes to obtain the information needed for decisions about hospital developments in their field and rebuilding programmes. There is also a real need, as Revans has pointed out, for consideration to be given to the whole question of communication in hospitals between doctors, nurses, and administrators. The pilot scheme to examine the question and develop methods to improve communication will be briefly reported.

Outside the hospital, the most important suppliers to the National Health Service are the pharmaceutical companies. As well as safe drugs, effective ones which require least follow-up surveillance are urgently needed, especially for the diseases of civilization.

Priorities in central establishments

A Medicines Commission seems bound to be set up: firms would do well to ensure that they spend proper time and give real thought to the education of their representatives, who hold a special position of trust in the National Health Service.

Among the administrative echelons, it is apparent that many more local authorities could with benefit second their staff to hard-pressed general practitioners: a study going on at Guy's suggests that only 15 per cent of health visitors have been so seconded so far. Regional boards should begin to consider the ways and means that will permit delegation of responsibility to smaller areas, perhaps six to ten per region: they will also need to discuss with local authorities and executive councils how central funds could best be sequestered and managed at the local area level. In the Ministry itself, extension of the operation research activities and the emergency of a cadre of persons with expert knowledge from such studies, especially in means of evaluating new developments, will undoubtedly assist in the development of wise long-term plans. Finally, at the political level, the size of the National Health Service, and the fact that it is responsible for some 10 per cent of central funds raises important issues as to whether the Minister of Health should have full Cabinet rank in peacetime conditions.

One feels much less likely to make useful contributions about priorities in the central establishments. Hospitals have their own management organizations and are watchful of possible innovations which would economize on the very heavy costs in-patient facilities involve. Furthermore, there is growing realization that hospital consultants must take an increasing interest in the administration of hospital work. This seems the most likely way to encourage rational and selfless decisions about the best use of these extremely expensive resources. That these matters are well to the fore in current thinking seems evident from the publication *Management Functions of Hospi-*

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tal Doctors (67). The main contents of management teaching for doctors were seen to fit into five main fields :

1. Appreciation of the historical evolution of the provision of medical care, and of changes in function to meet the changing demands on the three branches of the health service.
2. How to determine priorities and plan the use of hospital facilities, short term and long term, to the best advantage of the community and to evaluate the results achieved.
3. The controls and tools of management, in particular the evocative use of costs and statistics in the clinical as well as the administrative field.
4. How to keep communications with all other hospital staff and with patients alive and human and two way : this is vital because of the loose structure of the hospital and even more so because of the presence of anxiety.
5. How to see oneself as part of a changing situation subject in all its parts to constant scrutiny and reassessment of method and of aims and with a growing emphasis on measurement of performance.

This has been followed by the First Report of the Joint Working Party on the Organization of Medical Work in Hospitals, under the Chairmanship of Sir George Godber, which was published in 1967 (68), 'The Cogwheel Report'. The main conclusions and recommendations were that medical care was a single entity provided from a complex of sources including hospital, general practitioner, and community services: that a fresh approach can improve performance, that management in hospitals was lagging and should be reorganized, so that specialities be grouped to form divisions with chairmen, and small executive committee. The Committee foresaw the need for training in administration for these new chairmen, and for the profession as a whole.

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It seems churlish to try to comment on these proposals: all one can do, I think, is put forward a few additional points for discussion.

One of the more interesting features of the health service has been the relatively small amount of attention paid to the out-patient services: these often take care of some five times as many new cases as are admitted to hospital, and represent a very important exchange between the general practitioner and hospital branches of the service. In 1961 the Nuffield Provincial Hospitals Trust stimulated a series of investigations into out-patient activities up and down the country, and, because Guy's falls within the London Area, our participation in these endeavours was supported by the King Edward's Fund for Hospitals. These studies were brought together as a publication by the Trust (69), and among the more important findings one may put forward the following.

It was quite clear that studying the out-patient services and discovering where out-patients came from, by what means, why they chose the particular hospital they did, why their doctors referred them, how long they had to wait for an appointment, how long they had to wait in the hospital, and how they were disposed of, gave unexpectedly clear insight into the catchment areas and precise functions of the hospitals where the work was carried out. Certainly at Guy's, we were interested in the distance patients came to use the hospital, and realized how important the Southern Region railway station at London Bridge was, bringing patients to us (6). We were also most interested to discover the way our local general practitioners used our out-patient services: very much as they wished and not much as we had hoped, for they were little impressed by our reputation. We realized the advantages to them of using nearby Regional Board hospitals in preference to the service we rendered them (7).

In the out-patient department itself, close analysis of what

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was happening soon revealed various interesting points which we would not have appreciated without the study. It was true that patients had to wait long times, but they didn't mind that if we apologized, and particularly if the delay was attributable to our teaching functions. But we were surprised to realize how very many people new patients have to see in their progress from registration to discharge—how often they got lost, how some even did a reconnaissance the day before! We were brought to wonder whether there might not be ways of reducing the number of visits necessary—four was common in many specialities—and whether it might not be possible to organize the out-patient's first visit so that they could get more done with less and fewer waiting times. Finally, we were brought to realize (i) the full importance of proper and quick communications with the general practitioners who referred the cases to us, (ii) the way patients themselves instigate visits to the hospital—a point which the Bermondsey study suggested was because they wanted more time with the doctor in hospital to go into their symptoms in more detail; and (iii) we foresee much more out-patient activity analysis to check on movements between different parts of the out-patient department and different clinics (70).

Interest in out-patients is, of course, immediately and closely linked to studies of in-patient activities, and in particular, to the use of beds in hospitals. There is no doubt that many hospital beds, with full nursing cover and service, have to be used to investigate out-patients who cannot get to the hospital conveniently. The University of Leiden has set up a remarkable new out-patient diagnostic clinic with hostel beds on the top floor, and this sort of arrangement will no doubt be used in many hospitals in this country as time passes: it is certainly planned for the new out-patient block at University College Hospital. The objection to carrying this idea too far, which will require examination, has been the observation from the nursing

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staff that such in-patients who are not confined to bed can often be of great help on the ward, especially if there is a shortage of nurses. Indeed, the expectation must be that hospitals will face an increasing shortage of nurses, and some observers would put recruiting student nurses and maintaining this branch of the hospital as one of the highest priorities of all. But meanwhile one hesitates to plan ward services based on the voluntary help of other patients!

On the other hand it is clear that whenever steps can be taken to reduce the nursing load, they must be examined carefully for all clinical implications and then introduced if possible. With the concentration in hospitals of increasingly specialized units—renal, intensive care, transplantation, etc.—it is clear that highly specialized nurses will be concentrated in them, and if the hospital as a whole is to use its nursing resources correctly, progressive nursing care will probably be essential if the number of wards open is not to be reduced, as is happening in some hospitals. There are, of course, anxieties among clinicians about the wisdom of changing our nursing care, perhaps the best in the world, to a new system: but this may be the only alternative in view of the dwindling number of English girls interested in a nursing career. Many regional board hospitals are kept open by doctors who graduated overseas and nurses who have immigrated. So we can expect an extension of any and all arrangements which spare nurses, whether it be hostel beds for out-patients or discharge wards for those in-patients who can manage with less supervision than obtains on an ordinary busy ward.

There are three other points about hospital activities which deserve brief comments. First is the growing length of the surgical waiting lists: the fear of anaesthetics and surgery has been largely allayed in the lay mind by health education such as the television series, 'Your Life in their Hands'. One sees fewer and fewer trusses among the young heavy labourers and

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more and more scars from hernia operations. As this process of increasing surgical demand goes on for hernias, varicose veins, haemorrhoids, etc., it is clear that any means of lending medical beds to surgeons during the summer months should be encouraged. Otherwise, the physicians should realize the increasing surgical waiting list will be used to bolster the demand for more surgical beds! Which brings one to another crucial point, namely beds allocated to individuals, which goes on in so very many hospitals.

One can see how it holds importance in teaching situations where set numbers of students need to act as ward clerks and dressers: but one can also foresee how the system may have to be changed if one is to make the best use of resources and get useful bed occupancy rather than bed occupancy as a holding operation until the next period of emergency admissions!

Will computers be able to help the shortage of skilled manpower, doctors, and nurses, in hospitals? Examination of this use of computers must take a high priority in testing programmes. It is, of course, true as was mentioned earlier that the ancillary staffs have a high turnover rate and that tasks done by them may be performed by automation and computers more easily than complex tasks. But if computer programmes can be devised which save nurses time, for example, in nursing administration, or nurses duties checking inventories, or doing routine work in the out-patient clinic, the electronic industry will be in a position to make a most important and significant contribution to the hospital service in the future, for nurses may well become the limiting factor.

Consideration of the supply of nursing leads us to another important aspect of hospital affairs, the maintenance of good communications between the nurses, administrators, and medical staff. Professor R. Revans has been particularly interested in this matter and under the general aegis of Guy's and the Hospital Centre, has set up over the last three years a research

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programme to study and foster communications in ten London hospitals. The so-called Hospital Internal Communications project has been supported by the Ministry of Health research funds. It began with a two-week course in hospital administration and communication, attended by representatives of the medical, nursing, and administrative staffs of the following hospitals, Edgware General, Hillingdon, Lewisham, North Middlesex, St. Ebbias, West Middlesex, Sevenoaks, St. Nicholas's, the Mayday, and the London Hospital. The intention was to encourage the members attending the course to pay special attention to communications between the three branches of hospital staffs which they represented and to try to improve communications by setting up research studies in their own hospitals, studies which would give good opportunities for two-way communications between various levels of staff, and thereby increase the insight into the hospital's workings, and its problems. The over-all objective was to improve the performance of the hospital not only in terms of staff relationships, but also in terms of medical care.

The course included general introductory lectures on the design of sociological investigations, personal self-evaluation, and elementary analysis of what happens in any particular organization, so-called case-analysis, to give insight and improve administration in all branches of hospital activity.

After two years, the various hospital representatives, and others, began a series of meetings to present the results of their endeavours, and to discuss the impact of the idea on the hospitals participating in the study. These meetings, usually chaired by Dr. J. A. D. Anderson of Guy's Hospital, have certainly fulfilled their promise and the general impression is that, in six or seven of the ten hospitals, the Hospital Internal Communications project has improved hospital communication and has favourably affected the appreciation of other people's work and difficulties. Many of the hospitals have established

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valuable contacts with social science departments in nearby colleges of advanced technology or universities, so that ongoing interest is probably assured, at least for a few years. A report on the project is currently being prepared by Mrs. Leigh and Miss Barnes, and it is being evaluated by an American social scientist, Dr. George Wieland, who will present a separate report. At a recent meeting of the hospitals concerned, the future of the project was discussed: most of those present were in favour of retaining some core of experts on the methods for studying hospital management communication problems. The possibility of extending the ideas to more hospitals will have to be considered when the reports of Revan's central organizing team, who were based at the Hospital Centre, and of the evaluation team, come to hand. Clearly, if these are regarded as favourable by the Steering Committee, which has representatives from the Hospital Centre, the Ministry, and Guy's as the academic host hospital on it, recommendations for an extension of the project to other regions should be recommended. This sort of work could provide useful career opportunities for graduates in social science, at the same time as helping the administration of the hospital service.

We see, therefore, that the same 'loop'—research to provide information, information to provide understanding of the situation, improved understanding leading to better management, better management needing more information—is applicable in the hospital environment as elsewhere, and that this must include a communications element if it is to be effective in such large and diversified organizations as hospitals.

Before leaving this topic, it should perhaps be pointed out that another stage in the investigation is the collection of more detailed information about the management activities by consultants in hospitals: an extremely detailed questionnaire has been worked out by Drs. J. A. D. Anderson and W. F. Coghill and it is expected that results will be available before the end

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of the year. The findings will provide very interesting material for comparison with official remarks about management roles for doctors, summarized earlier.

No list of priorities in medicine would be complete without remarks about the pharmaceutical industry. Possible tasks for them in connection with health education have already been presented. It will also be apparent that whenever the industry can produce safer therapeutic agents, or preventive measures which will reduce the burden on the professions, they will be assisting greatly in the over-all medical care programme. There seems little doubt that, following the establishment of procedures to ensure the safety of drugs, a Medicines Commission as suggested in the Sainsbury Report will be set up to ensure that drugs prescribed in the National Health Service have efficacy. Although it will be difficult to be certain that some compounds do not have efficacy in idiosyncratic individuals, and to separate any such effect from placebo actions, an attempt must be made to grapple with this problem, because the nation's drug bill is rising so quickly.

The other point of importance with the pharmaceutical industry is the need for it to train its sales representatives properly. These men and women have a very privileged position in the medical care services: they often have access to information about important new therapeutic agents, and they see general practitioners, many of whom qualified before, or anyway in the early days of, the therapeutic revolution. The representatives can present all sorts of useful information and greatly assist with the on-going education of many of our doctors and thereby provide an invaluable service. They must never be tempted to break their trust with the industry and National Health Service as a whole, and resort to giving biased and inaccurate information in the privacy of the doctor's surgery or office, with the object of improving personal sales. This must be carefully guarded against. The pharmaceutical indus-

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try spends a great deal of money each year on its representatives, about £13 million. It must not allow itself to be exposed even to the possibility of criticism of their ethics: it is welcome news that the Association of British Pharmaceutical Industries is setting up a suitable training programme and certificate.

It is with considerable temerity that I now move forward to the closing remarks which must be about priorities for the central administrative bodies. With one's short journey almost done, getting into the haven is fraught with all sorts of difficulties, largely because one is inexperienced in these matters.

For medical officers of health and local authorities, it would seem that the idea of seconding staff to busy local general practitioners is a good one. Much credit has been given to the scheme and the latest analysis of its progress by Dr. J. A. D. Anderson and Dr. P. Draper suggests that it certainly has been of considerable help to most general practitioners: of course, occasional mutual incompatibilities must be expected and have occurred. The rate of growth of the scheme seems to have been exponential, rising from 100 or so health visitors seconded in 1962 to well over 1,000 in 1966. But this still represents only a relatively small percentage of the total force available then (equivalent to over 4,000 whole-time persons). The numbers of district or home nurses seconded in 1966 was still under 500, out of a total force of over 8,000 workers, and of midwives about 200 out of over 5,000. It is clear that, if there is to be integration of these local authority staff with general practitioners, we still have a very long way to go.

It would seem that regional hospital boards should include in their forward thinking the general notion of 4 to 10 areas within their regions and that they and local authority medical officers of health and local executive committees should not be afraid of discussing sequestration of funds and the handing over of responsibility for the expenditure of pooled financial resources to area health boards or committees, and perhaps de-

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ciding what items should not be so delegated. Such discussion would help clear the air and settle whether or not area organization of the National Health Service is going to be easy or difficult: one can imagine that it will not be easy for regional boards, local authorities, or executive committees to relinquish the very great financial powers which have become invested in them—this will be a test of their real interest in and concern for a concerted National Health Service, integrated at the level of the practising doctors.

Should one say anything about the Ministry itself? Only that, whenever funds are diverted to establish research divisions, the move must be applauded. That whenever operational research is encouraged, there must be widespread approbation. That whenever it is announced that, over a period of time, a cadre of Ministry officers will have accumulated experience in, and detailed knowledge about, the various operational research projects going on up and down the country, we shall know that the chances are that central decisions will become, if it be possible, wiser. And no one can doubt, I suppose, that if the medical care services are to get their just desserts in modern society, we shall have to find alternative ways of bringing influence to bear than the word in the ear of sick but powerful politicians. For politics is now a younger man's game and we may wait too long for that old sort of influence in the present hierarchy of power. It were far better to get the matter on an official footing and writing to *The Times*, and lobbying generally for the notion that, as he's head of such a large corporation, the Minister of Health should certainly have full Cabinet rank in all peacetime governments! Indeed, as he has responsibility for some 10 per cent of central and local authority funds, it is possible to make a sound case that this political step should have the highest priority of all, for all the rest could flow from it.

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Some priorities selected

In this short chapter, I set out ten priorities I have selected.

1. The first priority is the attitude of mind of those working in medical care services. We need better understanding of the overall situation and about the details of our own work. More research, both operational and academic, would help: the N.H.S., for its size, is not supporting enough. Throughout earlier chapters I have tried to make the point that the loop of ideas—research leading to better understanding, leading to better management: better management usually demands more information and so initiates research—should engender the buoyant attitude that should permeate our affairs.
2. Because the patient is the main theme here, health education must take a very high priority. Medical practitioners, pharmacists, health visitors, the pharmaceutical industry, and responsible leaders of the so-called mass media, the Press, radio, and television, all have important potential roles in this work, which should aim especially at preventive geriatrics.
3. Experiments in the integration and financing of the various branches of the National Health Service on an area basis are urgently needed.
4. Since more and more long term medical care will have to be undertaken in the rapidly improving environment of our homes, students, medical and nursing, and those of the professions supplementary to medicine, should be exposed to any such integration experiments to demonstrate what sort of possibilities the future could hold for community (general) practice.

Some priorities selected

5. It seems that this trend, coupled with more attention to career structure and training programmes could improve the morale of junior staff and general practitioners and so reduce the tendency for medical emigration, which is causing serious losses in terms of financial investment and manpower.
6. At the same time, in view of the increasing demands for medical care which can be confidently predicted, special attention must be given to the recruitment of nurses and members of the other professions supplementary to medicine. It is possible that area or local medical managers should be nominated or employed as part of this supporting structure to ensure efficiency.
7. All manner of drugs, medicines, automated laboratories, computers, etc., should be developed by industry with a view to helping practising doctors: the emphasis must be on helping them, not overloading them with new burdens.
8. There is a good case for supporting experiments in screening procedures providing always that they are aimed at collecting information about the costs and benefits of this procedure. An organization to monitor this activity and give advice seems appropriate.
9. Funds should be available for operational research by administrators at all levels, particularly for operational research which will increase the level of communication in the service.
10. In view of the magnitude of the National Health Service operation in terms of finance, which would rate it as the tenth largest corporation in the world and the largest all-British one, and considering the numbers of persons working in its various branches, well over 400,000, there seems a strong case for full Cabinet representation again. Indeed, elevating and keeping the Minister of Health in the Cabinet could be regarded as the major priority.

Some priorities selected

11. On the broader front, biology must contribute more to social development: there is a strong case for future societies being moulded to people's physical and mental aptitudes. Mechanization of industry and economic growth is leaving so many people without a sense of purpose in life that there is a growing risk of social anarchy.

I must conclude with a brief apologia for these priorities being based so outrageously on personal experiences, leaning so heavily on the efforts of members in my own department, orientated to the situation in London. It is likely, I fear, that they will generate all sorts of reactions among those working in other environments. But if they act as a stimulus for others to consider and set down their own list of priorities, which are bound to be different for different circumstances, and to be a better considered list than mine, I believe I will have discharged my responsibilities to the Nuffield Provincial Hospitals Trust.

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