

Public Lecture, Medical Congress

THE NEW MEDICINE*

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I am deeply conscious of the honour conferred upon me by the invitation to deliver the so-called 'Public Lecture' at the commencement of the 45th South African Medical Congress. As Chairman of the Organizing Committee for the Congress held in Cape Town some four years ago, I am aware of the importance attached to this lecture and of how wide we ranged, within this country and without, in considering speakers for the occasion. I am honoured to have been included in the short list. I can guess why my name was put forward: I was born in Port Elizabeth, educated at Grey High School, my family name is fairly well known locally—my father having been associated with the Prince Alfred's Guard for over forty years, and last year, I understand, my son was making the headlines in the *Eastern Province Herald* as a schoolboy gymnast. Now I find myself Dean of the Faculty of Medicine of the University of Cape Town where many of the practitioners in the Eastern Cape were trained, and I accept the invitation to deliver this lecture as a compliment to our Medical School.

The Medical School of the University of Cape Town, the birthplace of medical education in Africa, has had a tremendous effect on the practice of medicine in Southern Africa. In addition, our graduates are well known throughout the English-speaking world, and many occupy chairs and other posts of distinction in Universities and institutions across the seas. I am sure it will be understood if I express a prejudice in favour of my Medical School, in fact, I am sure it is expected of me.

There can be few men who have had the exhilarating experience that has come my way, namely, after having been completely divorced from the academic atmosphere for over twenty years, to be precipitated into the position I now hold, in the centre of a dynamic academic organization devoted enthusiastically to teaching and research on a level that is second to none in the English-speaking world.

When I received the invitation to deliver this so-called 'Public Lecture' at Congress and to name my subject, I had no hesitation in accepting with alacrity and giving the title of 'The new medicine'. I should like to try to convey to you some of the stimulation and enthusiasm engendered in me. It is a new medicine I hope to tell you about this evening. The title was not haphazardly chosen; the word 'medicine' in the English language has many meanings. English idiom is associated with such phrases as 'take your medicine like a man', 'a taste of his own medicine', 'sugaring the pill'; all of which imply that medicine is something unpleasant, distasteful, something to be born and, to paraphrase Churchill, something up with which to put.

I hope I am not going to disappoint those who have come to hear of a new panacea for all ills. What I am

going to tell you about has little to do with liquids in bottles, pills in boxes or drugs in syringes; nothing even to do with *the* pill, nothing to do with the major disciplines of medicine, surgery, and obstetrics and gynaecology, etc., as we knew them. I rather want you to share with me some of the fascination engendered by the medical events and the medical thinking of today bearing on tomorrow—events and thoughts which in any other age would be incredible, and even then I am not going to touch on matters brought about by the splitting of the atom, no mention of nuclear physics, no mention even of psychological problems so dearly loved today.

I shall not reminisce or make comparisons with the past but shall stick rigidly to the present with perhaps a little peep into the future. It would be easy for me to speak of the days of my childhood when, to the best of my memory, there were 5 medical practitioners in Port Elizabeth; when the motor car was just coming into its own as a means of transport and when one of the doctors had the reputation of visiting his patients by tram; or of the speculations in the dormitory at Grey on the eve of a routine medical examination as to whether the doctor could pick out those who smoked—a crime then as it apparently is today.

I am aware that this lecture has in fact little popular appeal among the lay public. It has become traditional for medical practitioners attending the Congress to attend this lecture in support of the guest speaker. I thank my colleagues for their support and would explain to the members of the public present that probably what they will listen to is an exposition, in semi-technical terms, from one medical practitioner to a captive audience of other medical practitioners, with the odds on the speaker, since there is no time for questions at the end. For the benefit of the public, however, I shall try to avoid the use of technical terms as far as possible; this I am sure will be to my advantage and to the advantage of my colleagues. The new language is as difficult to understand as is the new medicine.

Medical Education

Occupying as I do a Chair of Medical Education, I like to think that the new medicine starts with medical education. In the handbook issued by the statutory body which controls medical education in South Africa, namely the South African Medical and Dental Council, dated January 1954, the aim of undergraduate education is given in one sentence, and I quote: 'The main task of medical schools is to train general practitioners'. In the current handbook of the Council, dated 1960, the aim of undergraduate medical education is set out in a paragraph numbering some 300 words, which include the phrase 'he should at all times be taught to be critical of old and new knowledge' and ends with the sentence: 'In order to maintain and promote the health of future generations in the atomic age, he must be taught the principles of genetics, particularly an understanding of the dangers to man

*Public Lecture, delivered in the City Hall, Port Elizabeth, on 27 June 1965, at the commencement of the 45th Medical Congress of the Medical Association of South Africa.

of nuclear and allied radiations'. Present-day medical education might be summed up as 'fitting the undergraduate to become a postgraduate' or, put differently, 'teaching them to teach themselves' or again, 'to form a basis on which the knowledge of the practitioner may be added to from time to time'. With the progress of medicine 'continuing education' is a phrase becoming a catchword in writings on medical education, as is the term 'the eternal student' (a term which I might say strikes terror into some of our final-year students).

Medical schools are constantly being criticized for teaching too much detail, for concentrating on the theoretical and not the practical. Today graduation is no longer synonymous with qualification. South Africa was one of the first countries in the world to realize this, and in 1948, some years before the United Kingdom, introduced the compulsory hospital intern year before admitting the graduate to qualification as a medical practitioner. Practitioners of previous generations are apt to compare the intern of today with themselves who were qualified to practise the day they graduated. They should rather compare themselves with the graduate of today at the end of his intern year. The intern year is in fact a seventh year of study, in which the senior student has greater responsibility and of course receives a salary.

To satisfy myself in regard to the constant accusations by the profession concerning the teaching of theoretical detail, I sat in on a number of oral examinations a year ago since this seemed to me the only way to assess what is being required of the students by their examiners. It was a most stimulating experience, and I hope at some time to find the means of taking this investigation further to convince my non-academic colleagues that their implied criticisms of modern medical education are not wholly justified. My experience reminded me of the student of economy who called on his professor after 20 years. In the course of conversation the student asked to see an examination paper. The professor pulled open a drawer and handed him a copy of the most recent paper. The ex-student looked at it and said: 'But, Sir, these questions are all exactly the same as I had twenty years ago'. The professor nodded wisely and said, 'Yes, the questions are the same, but the answers are different'. That was my experience: the same questions were being asked, the same lumps palpated, the same differential diagnoses called for; I could go so far with the students and then was lost. For instance, with the thyroid I could go as far as the swelling, the exophthalmus and the tremor, but when it came to the iodine uptake with labelled isotopes I was lost. I would say I was in the position of a graduate of 1915 drilled in inspection, percussion, auscultation in the examination of a chest, looking in on a clinical examination conducted in the 1940s to find how the use of X-rays had simplified and made more accurate the diagnoses of pulmonary conditions. I am sure that the same criticism of 'lack of clinical acumen' and 'new-fangled ideas' was levelled in those days.

A practitioner who qualified in 1925 could, no doubt, have practised medicine in 1945 with little, if any, postgraduate study or reading. But I make bold to say that today it is impossible for any practitioner who qualified in

1945 to practise good medicine in 1965 without reading and without some measure of postgraduate study. Medical education can thus no longer be directed at didactic instruction but must be directed along the path of reason. Just as a hundred years ago in the United Kingdom an undergraduate medical student decided for himself what courses of study he would follow, and wandered from hospital to hospital following a line he thought was best. In his own time he presented himself for examination and in those days qualification to practise. Likewise, today postgraduate study is left to the decision of the individual. With the new medicine this is not entirely satisfactory, and already we see the new trend in that the College of General Practitioners requires its members to undertake a minimum amount of postgraduate study annually to retain membership. The detailed requirement of our own Medical Council for specialist registration is another indication of the increased awareness of the need for constant or even compulsory postgraduate study if the new medicine is to be brought to the public. We, in Cape Town, in addition to formal refresher courses, have facilities for a limited number of practitioners at any one time to be attached to our teaching departments. A matter of two weeks ago I had a letter from a senior practitioner who had spent a month with us, and he wrote: 'To think that once qualified one need never read a book again; it is all wrong'.

Medical Students

From medical education to medical students. A worldwide phenomenon today is the demand for places in medical schools, a demand which is far in excess of the number of places available. I have tried in vain to find a reason for this phenomenon. Is it the status? It cannot be the kind of life; and rising costs together with the inability of the fee and salary structure to keep pace with these costs and the increasing tendency to make medical services available to all with as little of a financial barrier as possible, must take away any financial attraction there might have been. However, the problem is with us, and the University of Cape Town is no exception. The number of applications received by the University for admission to the first year of study in the Faculty of Medicine in 1965 was 6 times the number of students it is possible to accommodate. When I discussed our problem in London, I was laughed at; there the problem, and I am speaking of 1962, was of the order of 2,000 applications shortlisted to 500 to be interviewed for 60 vacancies at a particular hospital. Let me at once say that this is a false figure in that with 12 teaching hospitals in London applicants are applying to 6 and 7 hospitals in the hope that they might be selected for one. This has now been overcome since 1963 by having a central office to deal with all applications, and perhaps a truer figure will emerge in the future. The problem of the selection of medical students is a very real one. Although a great deal of work has been done on it, and many opinions have been expressed, no really satisfactory solution has been found. In Cape Town the students are selected on the basis of academic merit—the legend of a first class matric is not strictly true. The position is that the University thus far has not received more applications from candidates with a first class pass

than there are vacancies for students. So it has always, thus far, been possible to take a certain number of the better academically qualified second class passes. How relieved many of us in this audience must be that this rule was not applied some 20 years ago! So great is the demand today that I am sure you would be amazed if you knew how I suspect even my greatest friend when he asks to speak to me alone for a few minutes. Inevitably it is how to get his son or the son of a friend or the son of a business associate or the son of a voter in his municipal ward or parliamentary constituency into the medical school. It has been said that those who support the interview procedure in the selection of medical students are influential men whose sons or the sons of their friends will not be accepted on academic grounds. And for my own protection after this meeting and during this whole Congress, may I now publicly state: *there are no exceptions.*

I cannot agree with the contention that every person who wishes to study medicine should be permitted to do so, particularly in a young country such as ours with a shortage of intellectual man-power. If we were to accept into medicine the 600 or so basically qualified applicants, one wonders what would happen to other professions and callings requiring intellect. Further, the medical course is the longest and most expensive; a medical student is non-productive academically for at least 6 years. Professor Hill of the United Kingdom has estimated that in that country it costs £10,000 to train one medical practitioner. It is very much of an estimate, the hidden costs, etc. are difficult even to guess at, but it is a very expensive course of training both to the father and to the State.

Against my opinion we have the opinion of an eminent authority on medical education, Sir George Pickering, Regis Professor of Medicine at Oxford. He says: 'Those who are responsible for the selection of medical students are anxious to ensure that academic merit is the only basis on which university entrants are selected'. 'This', he continues to say, 'is all very tragic; I fear that what we are selecting for our future doctors may be nothing more nor less than swots. If some of them happen to be boys of spirit and character—well, that's a fortunate accident. Pedantry and the pursuit of mediocrity are in the ascendant and they will be until some group of university teachers has the insight and the courage to say "this has gone too far—if we systematically neglect character we shall ruin our society and particularly medicine".'

I make bold to say I cannot agree; to me there is no high road to the selection of students. The new medicine is so wide and all-embracing that the selection of medical students at the school-leaving age can be likened to an attempt to select carpenters, electricians, plumbers and professional men from scholars entering high school. It has been said 'there is very little in common in the responsibilities of an administrator of health policy, a psychiatrist, a consultant physician, an orthopaedic surgeon, a lecturer in anatomy, a Ph.D. candidate in physiology, a junior hospital resident or an immunologist directing a research institute. But they are all doctors.'

In my view the selection procedure, seeing selection is forced upon us, must be simple, fair, readily understood and appreciated particularly by those who are not

selected, and, most important of all, in our case reduce the number from 6 to 1.

The Doctor-patient Relationship

The post-World War II phase has seen a world-wide change in the approach to the practice of medicine. The increasing awareness of the value of medical services has made the doctor a sought-after person, but prohibitive costs have made him less accessible, and thus many schemes have been evolved to make the services of medical practitioners more readily available to all members of the community. The concept of medical practitioners freely competing with each other on a monetary basis is losing favour in many parts. It is said that it is professional skill alone that should direct a patient to a doctor and not his reputation as may be made or broken over 11 o'clock tea. This type of thinking excludes the human element, that indefinable essential of an effective medical service—the doctor-patient relationship. Any factor adversely affecting this relationship is detrimental to effective practice. In spite of the tendency today to swing away from the 'Robin Hood' type of remuneration, that is, the rich paying for the poor, to the prepaid medical scheme, that is, the well paying for the sick, our Medical Association stands for free choice of doctor and a fee per service remuneration. Home visiting is falling into disfavour, blocks of consulting rooms with office-like efficiency have sprung up, the role of the general practitioner is in doubt. Phrases such as 'doctor of first contact' are evident. The College of General Practitioners has come into being to defend and improve the image of the general practitioner or family doctor. The age of specialization is fully developed and developed, in my opinion, by public demand. For some reason the status symbol of a specialist in attendance is greater than that achieved by the patient under the care of a general practitioner.

As John Ellis so aptly pointed out in Durban last year—'Doctors are no longer inert alleviators of suffering as, with the exception of surgeons, they were for so long. They are now capable of harm by acts of omission and commission. I would reckon that on the whole the surgeon is now the safest person in medicine because whatever he does he must do with his own hands, performing skills which in most countries he has taken a long time to learn, in the open view of expert witnesses at a pre-arranged time. The physician and the general practitioner, without themselves doing anything more, physically, than applying pen to paper, can wield agencies of immense harm in the still, dark silence of their own rooms.'

However, knowledge is not everything; in spite of our preoccupation with the slaughter on the roads and with coronary disease, malaria still remains the major killing disease in the world and we have known a lot about malaria for a long time. The World Health Organization estimates that some 2½ million people die of malaria every year and perhaps a hundred times that number are afflicted.⁵

Medical Ethics

The then President of the British Medical Association in his presidential address in 1963 said: 'The ethos of medicine is of no less significance than the science. While

the science is progressing rapidly it is a real danger, as perhaps never before, that the ethos of medicine will be lost. If it is lost the most precious part of our professional heritage will be squandered, perhaps irretrievably."

There is a real fear that the new medicine may bring in its train a decline in ethical standards. Following World War II there was a revival in the approach to medical ethics brought about, one presumes, by the tragic episodes which took place during that war. The word ethics is derived from the Greek 'ethos' meaning usage, custom or habit. The first attempt at codification of medical ethics was of course the Hippocratic Oath. In the new medicine there is no place for such a long, rambling exposition. Our graduates at Cape Town publicly affirm the declaration required by the University before the qualifying degree can be conferred, and voluntarily, at their own request, they subscribe to the Declaration of Geneva which was adopted by the World Medical Association in 1948. The search for knowledge has brought a new emphasis on the ethics of human experimentation, and there has emerged the Declaration of Helsinki adopted at the meeting of the World Medical Association in June 1964. The subject of experiments on human beings is highly complex and wide open to misinterpretation. If Jenner had not given the boy James Phipps cow-pox and then subsequently attempted to give him smallpox, the science of immunology would not have reached its present position today. And if William Withering had not tried out the effects of foxglove infusion on his dropsical patients, countless thousands of sufferers from heart disease would not have had the benefit of digitalis. These were experiments on human beings. In a leader on the subject the *British Medical Journal* points out that it has become necessary to spell out the simple guide Claude Bernard set himself: 'So amongst the experiments that may be tried on man those that can only harm are forbidden, those that are innocent are permissible and those that may do good are obligatory'.

The Geneva Declaration states: 'The health of my patient will be my first consideration'. You will rarely find anyone who answers 'yes' to the question: 'Has a doctor the ethical right to strike?'. It is taken to imply that the doctor will not go to the aid of the sick. The *Daily Telegraph*, London, writing on the strike of Belgian doctors last year, said: 'In point of fact, 12,000 Belgian doctors and dentists have been spending thousands of pounds daily and some of them wearing themselves out on a highly efficient emergency service from which practically all serious cases get quicker and often better treatment than before'. The newspaper goes on to relate the story of a Belgian mechanic who had a bit of a stomach ache and had to stay at home for a day. He said: 'So I needed a certificate of absence from the works. The doctors made me go to hospital and kept me in bed for twenty-four hours before giving it to me.' This leads one to think. Multiple certification is a problem of the new medicine, the validity of a medical certificate is basic to our social structure. It speaks volumes for modern ethical standards that commerce, industry and the State rely so utterly on medical certification for the disbursement of millions of rands annually.

The sanctity of information gained by doctors in the course of practice is traditional. The Hippocratic Oath in-

cludes 'and whatever I shall see or hear in the course of my profession . . . I will never divulge, holding such things to be holy secrets'. The Declaration of Geneva is less stringent: 'I will respect the secrets which are confided in me', and yet today medical practitioners are constantly required to divulge the nature of the illness to secure sick benefit, health insurance, etc. for the patient under his care. Refusal to do so may not be in the patient's interest. Our own Medical Council has ruled that a routine over-all authority to disclose information given by the patient, say on accepting an appointment, is not binding and the medical practitioner should have the specific permission of the patient to divulge the nature of his illness irrespective of the patient's signature on a routine form, if the practitioner is of opinion that such information may be prejudicial to the patient's interests.

The Basic Sciences

Let me now turn to some of the more interesting trends in the new medicine. In our day we were taught that pathology was the basis of medicine. Now knowledge in pathology has advanced, but physiology and biochemistry have assumed a profound influence on modern medical thinking. We will not have time even to mention physiology, but let us see what an eminent medical biochemist says on his subject:⁴

'It has been said that the explosion of biochemical knowledge in this century represents man's greatest achievement. Every part of medicine is beholden to biochemistry in some shape or form.' He goes on to say: 'The biochemist measures accurately—if he says that the excretion of hydroxy indoleacetic acid in the urine is 50 mg., the patient has a carcinoid tumour. There is no argument about it, it is a fact. There is no question of personal experience or prejudice with which the clinician is liable to muddle up and confuse the issue.'

I, in passing, casually questioned the standard of chemical pathology in a recent postgraduate examination. The examiner said: 'Not bad, but not as high as the undergraduate'. On my querying this statement his reply is illustrative of the new medicine: 'If we were to ask the postgraduates the same questions as we ask the undergraduates they would not know what we are talking about'. So that it is comforting to read: 'We are trying to teach fundamental biochemistry to students but are not trying to turn them into biochemists. We have to inculcate the scientific attitude of mind into the student and he must understand what makes a biochemist tick and what makes the subject fascinating and enjoyable for us' (i.e. the biochemist).

Genetics

Leaving biochemistry, let me mention another subject which is having an increasing influence on our concept of disease—genetics. One of the most amusing remarks made at a recent conference was: 'Successful medical men have frequently made it clear that their success was based on remnants of anatomy, ancient physiology, not enough biochemistry to pronounce the words correctly, a dislike and distrust of statistics, a horror of psychology, a little home-made sociology and a growing suspicion that there are other genes than those their daughters wear'.⁵

The gene is at the basis of life (here gene is spelt g-e-n-e). Rapid expansion in medical genetics has been brought about by factors such as the increasing control of infection and other intrinsic causes of disease, the rapid expansion of molecular biochemistry and the increasing public concern on the genetic effects of ionizing radiation. Medical genetics is assuming such importance that the day cannot be too far off when we will be registering specialists in medical genetics. There are many ways in which genetics can be applied to clinical practice, for instance the prediction of recurrence rates for certain specific diseases; the so-called 'genetic counselling'. Many instances are now known of genetically determined susceptibility to particular drugs, consequences of which are of the greatest practical importance. It is of particular topical interest to note in a World Health Organization Report⁵ of an expert committee on human genetics a reference to a hereditary porphyria due to a dominant gene found in South Africa. Those afflicted react severely to certain drugs, particularly a barbiturate anaesthetic. I say of particular topical interest because a great deal of the work here reported was carried out in Port Elizabeth, and the Provincial Hospital at Port Elizabeth was one of the first hospitals in South Africa to introduce routine tests for porphyria before an anaesthetic is administered.

The subject of immunogenetics is fascinating. The discovery of blood groups with its immediate application to the techniques of blood transfusion was one of the first and most important examples of the implications that inherited difference may have for practical medicine. Another outstanding example was the discovery that haemolytic disease of the newborn is caused by maternal iso-immunization owing to a special mother-child combination of normal inherited traits. As a result of this the lives of many newborn infants have been saved by the process of exchange transfusion.

Experiments in animals have firmly established that the rejection of transplanted tissues between individuals of different genotypes is due to immunogenetic incompatibility. The animal is able to recognize 'self' as distinct from 'foreign' or 'not self' and rejects anything that is 'not self'. Homografts may be successful when the recipient is either naturally or artificially made immunologically unresponsive, that is, accepts the foreign matter as 'self'. In man this is achieved by skin grafting from one part of the same body to another, or transplants between identical twins; this has been demonstrated by the permanent take of transplanted kidneys between identical twins. In mice, by the administration of donor cells in foetal mice, it has been possible to make them unresponsive to skin grafts in the postnatal stage. This induced state is known as 'acquired immunological tolerance'.⁶

It is quite clear that the present practical limits to homografting are not surgical but immunogenic. The practical surgical techniques of grafting, e.g. a kidney from one body to another, are not very difficult. The difficulty is to make the recipient retain the graft. The situation, once immunological tolerance can be accurately predicted or acquired, is almost horrifying to contemplate. I vividly recall a pathetic letter from a distraught mother who said: 'My son is crippled but his brain is excellent. Could he not have his head grafted to a new body?'

Cybernetics

Some 2 or 3 years ago I arrived at a meeting of our University's Committee of Deans. The Dean of the Faculty of Science at that time was the local secretary of the Royal Society, and he handed me a copy of a notice inviting attention to the Second World Conference on Cybernetic Medicine and asked me: 'What is cybernetic medicine?' I hadn't the faintest idea. The Dean of Arts who happened to be the professor of classics, said: 'It sounds as if cybernetics comes from the Greek *kubernêtes* meaning "steersman".' 'Oh, yes', said the Dean of the Faculty of Social Science, 'I remember, cybernetics is the study of electrically operated machines such as a calculating machine or a computer'. Just then the professor of law came in and said: 'Oh, cybernetics, of course, that is to do with computers'. So rather acidly I said: 'Well, if you are so clever, what is cybernetic medicine?' And, he had a slight stammer, he said: 'Brom, don't you know? Cybernetic medicine is the psychiatric study of sick electronic brains'. A joke two years ago. You can imagine how my interest flared when I read a review of a book *Cybernetics* by Wiener in which the book was said to be as epoch-making as Darwin's *Origin of Species*. Incidentally, the *Concise Oxford Dictionary* (1959) in an appendix defines 'cybernetics' as follows: the study of system of control and communication in animals and electrically operated machines, such as a calculating machine, and it does come from the Greek *kubernêtes* meaning 'steersman'. I obtained a copy of the book *Cybernetics* through the library and was alarmed to read in the introduction by the author the following: 'When I first wrote *Cybernetics* the chief obstacles which I found in making my point were that the notions of statistical information and control theory were novel, perhaps even shocking to the established attitudes of the time. At present they have become so familiar as a tool of the communication engineer and the designers of automatic controls that the chief danger against which I must guard is that the book may seem trite and commonplace. The role of feeding back both in engineering design and in biology has come to be well established.'

Sir McFarlane Burnet—whom I shall mention again later—in an address entitled 'Fifty Years On' says: 'The brightest academics in medicine will soon be more interested in mathematics and cybernetics than in today's fashionable molecular biology or the microbiology that was the excitement of my day'.⁷

I realize I shall never understand cybernetics. I rather sympathize with the lady clerk who, when I mentioned cybernetic medicine, said: 'That sounds nasty, I wouldn't take it'. I was not dismayed when I found I could not understand a word of an article headed 'Further experience with an automated Minnesota Multiphasic Personality Inventory'. It has been said that the human brain cannot be expected to assimilate and hold information as does an electric computer, but as far as computers go it must be realized that no other computer can be as easily and cheaply mass-produced as the human brain.

Teaching Aids

To most medical teachers 'teaching aids' mean the use of an occasional slide, a few wall diagrams, or perhaps no

more than a piece of chalk and a blackboard. In the current trend in medical education it is important to encourage the student to take a more active share in his own education. I have mentioned machines that learn, such as the computers or so-called electronic brains. There are being developed machines that teach. Programmed instruction on individual teaching machines is attracting interest. It has a recognized place in ordinary class-room instruction, in briefing detail men or commercial representatives. It is now being looked at with relation to medical teaching. A piece of apparatus about the size of a table model radio set is being developed in Newcastle, England,⁸ where a programme is filmed onto 35 mm. film and is presented on a screen by means of a back-projection system. A series of 11 buttons situated below the screen enables the student to move from one frame on to any of 10 new frames. By changing the frames he literally turns the pages, and he is thus able to read or study the subject programmed into the machine. In this particular experiment the subject chosen was electrocardiography. At the end of a chapter he is set questions on what he has learned, and the programmer in the multiple choice form of examination may use as many as 10 alternative questions; 9 of these, i.e. wrong answers, would take the student to remedial material consisting of either a single frame or a more extended sequence of explanation as to why he went wrong and where he had misunderstood what he had previously read. The correct answer would produce the next frame of instruction.

The report of this experiment suggests that for academically weaker students, presentations of electrocardiography by means of a teaching machine is more effective than the most carefully prepared lecture course. Gifted students no doubt will do well under most circumstances, for they can readily accept a considerable measure of responsibility for their own education. Where a subject requires understanding as opposed to memory, the teaching machine may have something to offer.⁹

Overseas television is playing a large part in postgraduate medical education, not only in closed circuits but also over the normal channels after normal viewing has ceased. This is a recent introduction, but I think it has been running sufficiently long for the public to have lost their obvious initial interest. They will probably now stick to the more dramatic 'Emergency Ward 10'. One looks forward to further publications on the findings.

The Future

What of the future? Earlier I referred to Sir McFarlane Burnet, one of the world's greatest medical theorists. It was he who used the phrase 'doctor of first contact'; he says, 'I prefer to use the phrase doctor of first contact rather than general practitioner, because I feel eventually the doctor of first contact may have a very different range of skills and activities from those of the classical general practitioner. His most important function, however, will be, as now, to decide whether the condition presented by the patient calls for hospitalization or its equivalent and to steer the patient to where his needs can best be met.

'One pictures him as essentially a wise counsellor with a special quality of understanding the whole predicament of his patient, and a wide range of social, psychological

and medical expertise to help bring back the patient to full effectiveness in the community.' Sir McFarlane, in referring to the use of computers, goes on to say: 'The process has already begun in medicine, as in every other high-level human activity, from making decisions between war and peace to weather forecasting and booking airline seats.'²

The Director of the National Institute for Medical Research, London, Dr. Peter Medawar, Nobel Prize winner and noted for his important studies on the immunological aspects of tissue transplantation, said at the Symposium held to mark the centenary of the Mayo Clinic last year:¹⁰ 'There is a view that medicine is abolishing—has indeed already abolished—the main causes of ill health; that the goal of medicine is to put its own practitioners out of business; the other view', he says, 'is that medicine by its very success is preserving the weak and defective, and the medically dependant are imposing a huge and growing burden on society and in particular on the medical services of society'. He points out that both these views are exaggerated, but that there is enough truth in the first to create a sense of satisfaction which is instantly dispelled by reflecting that there is also a good deal of truth in the second. He goes on to say: 'At any rate the point I want to make is that we must not at this time arrogate to ourselves the task of trying to provide solutions for all the problems that may afflict mankind in the future. I think the time will certainly come when our present-day medicine seems to future generations as inept as Galen's seemed to us and we are not yet qualified to prescribe for the medical welfare of our great-grandchildren. In a slogan I should say that present skills are sufficient for present ills.' That was Dr. Peter Medawar.

Now, I hesitate to offer my own opinion of the future following close on the considered opinion of two of the greatest medical thinkers in the English-speaking world today, but I am sure it is expected of me. My own view is that the future of the medical services depends largely on the systems to render those services that are evolved. As a medical administrator myself I am conscious of the increasing importance of the administrator in the formation of these systems. There are several interesting and divergent systems in vogue today, e.g. the National Health Service of the United Kingdom, in which all members of the public are entitled to full medical services on a prepaid government scheme; the free enterprise of the United States, where costs are recovered by insurances, the responsibility of the individual; and the systems being developed in New Zealand and Australia. In this country our own trend is toward the prepaid medical scheme, with the State interesting itself in the control of such schemes. As you may have gathered my personal view, and it is my personal view with no current medico-political bias, is that the greatest single factor in medical service is the doctor-patient relationship. It is the bounden duty of all administrators to ensure that no system evolved interferes in any way with this vital relationship. Free choice of doctor by the patient and the right of the doctor to choose his patient, in my opinion, is the keystone of efficient medical service. As a non-practising doctor but a keen observer, I am convinced that the medical profession genuinely desires to serve the public, and I am equally convinced that it is the responsibility of medical teachers and other leaders in

the academic field to ensure that the future generations of medical practitioners are imbued with the spirit of service; and it is the responsibility of the administrators, medical and lay, to ensure that the systems evolved enable medical practitioners to carry out the service they are anxious and willing to render. Like Peter Medawar I do not think one can in all honesty prescribe for the future. Historically it was only in the middle of the last century that a physical examination of the patient was accepted as an aid to diagnosis. Before that only the symptoms as given by the patient and the opinion of the patient himself were taken into consideration. Over the first half of this century the physical examination has been given great prominence, it is expected by the patient. No private or hospital patient would consider himself fairly treated unless he was examined by the doctor. The first half of this century, too, has seen developed the laboratory examination as part of the diagnostic procedures, and now the clinician is calling more and more for assistance from the scientist and is himself undertaking more biochemical and physiological procedures. The chemist, the physicist, and the mathematician, including the statistician, are today in the forefront of medical research and advanced medical thinking.

Now, as we enter the second half of the century, will the machine take over teaching? Will the computer make one process of investigation, diagnosis and treatment? It is idle to speculate; let us rather have the slogan: 'Today's skills for today's ills'. Nevertheless, provision still has to

be made for the trivialities which are so important to the individual. The pain that starts in the pit of the stomach, goes between the shoulders and up to the top of the head until 'it is pressing like a ton weight doctor!' is very real and important to the patient. In the vast organizational aspects of modern medical services the patient, the reason for such organization, is apt to be overlooked instead of being the central feature and chief beneficiary of all the manifold skills and wonders of the new medicine. The touch of human kindness, reassurance and comfort are the tried and true remedies of the old medicine, it is for us to ensure they have a large place in the new medicine.

Let me end with the words of John Ellis, spoken in the Hasting Lecture last September: 'The new medicine must bring comfort and relief and give support when nothing more can be done and still stand guard over the more trivial complaints'.

REFERENCES

1. Pickering, G. W. (1963): *Brit. Med. J.*, **1**, 133.
2. McFarlane, B. (1964): *Ibid.*, **2**, 1091.
3. Ellis, J. R. in Reid, J. V. O. and Wilmot, A. J. eds. (1965): *Medical Education in South Africa*, p. 88. Pietermaritzburg: Natal University Press.
4. Kench, J. E. in Reid, J. V. O. and Wilmot, A. J. eds. (1965): *Ibid.*, p. 44.
5. WHO Expert Committee on Genetics (1962): *Wld. Hlth. Org. Techn. Rep. Ser.*, no. 238, 1.
6. Kipps, A. (1964): *J. S. Afr. Vet. Med. Assoc.*, **4**, 35.
7. Wiener, N. (1961): *Cybernetics*, 2nd ed. Cambridge, Mass.: MIT.
8. Owen, S. G., Hall, R. and Waller, I. B. (1964): *Postgrad. Med. J.*, **40**, 59.
9. Annotation (1965): *Lancet*, **1**, 1055.
10. Medawar, P. (1965): *Proc. Mayo Clin.*, **40**, 23.