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TRENDS IN SPECIALIZATION AND THEIR EFFECT ON THE PRACTICE OF MEDICINE*

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It is not uncommon to hear comment upon the increasingly rapid scientific developments in medicine during the last two decades. This is often accompanied by reference to the increasing extent of specialization within medicine, sometimes with laments about the slow progress in some special fields. But often one hears criticism of the narrowness of specialization which leads to the patient being regarded less as a person than as a vehicle for a disease. Paradoxically, one may find the same individual decrying the disappearance of the general physician or surgeon and criticizing the limited opportunity for the evolution of some particular subject in medicine or surgery. I do not want to enter into a philosophical battle of this kind without first putting forward some facts about the changes which have occurred in England and Wales during the last ten years, because it is only during these last ten years that we have figures that make any pretence of an accuracy upon which we can base our conclusions.

Effect of National Health Service

The first major change in the nature and quality of service brought about by the National Health Service was in the hospitals. Before 1948 there had been a steady movement away from general-practitioner staffing of acute hospitals, outside the teaching centres, toward the appointment of fully trained specialist staffs. When the National Health Service is blamed for ejecting general practitioners from hospitals it is sometimes forgotten that the policy of the British Hospitals Association in the decade before the National Health Service was to introduce paid specialist service in hospitals. Immediately after the war, the E.M.S. framework was used to help this to some extent. The National Health Service gave the first opportunity of planning and financing development on the regional basis which, alone, is likely to give a satisfactory functional result. We have not precise figures about doctors in the N.H.S. in 1948, but it would be a reasonable estimate that in England and Wales there were little more than 4,500 consultants in hospital and about 16,500 general practitioners—that is, just over 1 to 4. By the middle of 1960 the number of consultants had grown to 7,000-odd and of general practitioners to just under 20,000, a ratio of more than 1 to 3 and an increase of about 50% in consultants. Over the whole group of consultants,

therefore, there had been a much greater proportionate increase than in the number of principals in general practice, and this in itself demonstrates the swing toward specialization in the Health Service. When the figures of individual specialties are examined the change is seen to be even more striking. We do not have an accurate breakdown of the numbers of consultants in different specialties in 1948. The first reasonably reliable figures date from the end of 1949. At that time the number of consultants in general medicine was 642. In the next ten years that number rose to 868, an increase of 20%. In general surgery the comparable figures were 792 and 864, an increase of 9%; but the figures for general medicine are obscured by the fact that cardiology and geriatrics are included and may well have accounted for nearly half of the increase. By comparison most of the smaller specialties increased to a much greater extent. If we take medical and surgical neurology together there were 80 consultants in 1949 and 137 ten years later, an increase of more than two-thirds. In plastic surgery the increase was from 27 to 56, and in thoracic surgery from 44 to 91, each more than doubled; but the really large numerical increases in consultants during this ten-year period were in the specialties of anaesthetics, 459 to 795; radiology, 295 to 463; pathology, 454 to 693; and psychiatry, 405 to 648—together over a third of the total increase in consultants. Moreover, the numbers have risen so rapidly in these last three specialties that competition for posts has been slight and too many aspirants are reaching consultant status before the normal period of training has been completed. The 86 consultants aged 34 or less at the end of 1960 included only 24 outside these specialties.

Expressed in terms of percentages of the whole body of consultants, Table A of Appendix 3 in the Platt Working Party Report shows that general medicine and general surgery between them provided 27.6% of the consultants at the end of 1952, but only 25.6% at the end of 1959, whereas psychiatry had increased in that period from 8.2 to 9.2%, anaesthetics from 10.4 to 11.0%, radiology from 6.0 to 6.6%, and pathology from 8.5 to 9.9%. Taking the medical specialties as a whole, excluding these last four, the increase in consultants between 1952 and 1959 was 11.2%, in the surgical specialties it was 5.8%, and in obstetrics and gynaecology 7.6%, whereas the range in the four specialties named was from 21.7 to 27.9%, so that the increase has continued after the period of early expansion and

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through the time when the total establishments have been strictly controlled and an order of priority maintained.

Three of the specialties that show not only a large proportionate increase—which has continued after the initial period of rapid increase in consultant staffs and still cannot be satisfied—are diagnostic or treatment rather than clinical departments with charge of patients, and the remaining instance, psychiatry, presents a special problem of its own. The diagnostic and treatment departments have had to respond to increased pressure for assistance from all the clinical departments and, quite aside from their own technical advances, would therefore naturally reflect the greatest demand.

Distribution of Work

It is worth examining the changes that have taken place in the work done. Although this is not simply a matter of in-patient work, the numbers of admissions to beds in different specialties do perhaps reflect with reasonable accuracy the changes that have occurred.

Between 1949 and 1959 there was an increase in total admissions (for simplicity's sake I shall use the word admissions rather than the more accurate description of discharges and deaths) from 2.85 millions to 4 millions—that is, an overall increase of 40%. The increase in admissions for general medicine in this period was from 401,000 to 532,000 and in general surgery from 664,000 to 842,000—32% and 18% respectively. By comparison neurology and neurosurgery increased from 17,000 to 35,000; plastic surgery from 11,000 to 27,000; thoracic surgery from 10,000 to 26,000; traumatic and orthopaedic surgery from 133,000 to 254,000. The older specialties of ophthalmology and ear-nose-and-throat surgery have shown relatively little growth in consultant staffs, and although ophthalmology admissions increased from 68,000 to 95,000 those in ear, nose, and throat actually fell from 319,000 to 292,000. Some of the other specialties, particularly infectious disease and venereology, have shown a reduction in work done and in staff, while in diseases of the chest it has been the development of work with non-tuberculous lung disease which has led to some continued increase in activity.

These figures confirm two trends which are, of course, common experience—that medical and surgical work both call for more scientific aids to diagnosis and control of treatment and to the separation into a special department of some work which may formerly have been included in general medicine and general surgery. For instance, urology, which was not classified separately in 1949, had by 1959 29,000 admissions to special departments. On the other hand, gynaecology has shown an increase comparable with that in traumatic and orthopaedic surgery, from 178,000 to 295,000, here perhaps reflecting the emergence of a hidden need for treatment which existed before the Health Service provided readily available medical care to the mothers of less well-to-do families.

The experience of out-patient departments is somewhat different. In general medicine the number of new out-patients actually declined from 630,000 to 617,000 and in general surgery from 960,000 to 913,000, while traumatic and orthopaedic surgery increased from 643,000 in 1949 to 1,009,000 in 1959, the largest of all out-patient services.

Development of the specialties has not been uniform, as is well shown by Brinton's account of the growth of

the specialty of neurology. Two-thirds of all neurologists work in the metropolitan regions, where less than a quarter of the population live; only two of the provincial regions have a comparable regional service. Physical medicine has hardly achieved acceptance at all in several hospital regions, and there are also regions with no department of urology. The advance of thoracic surgery has stimulated the development of cardiology in several regional centres, but paediatric surgery is recognized in only a minority of teaching centres. Yet the results of specialization in the management of neonatal surgery are manifest wherever a special centre has been established. Paradoxically, geriatrics has emerged to general recognition as a specialty, and yet it amounts to no more than the application of the methods of general medicine at the slower tempo appropriate to old age and with due regard to social needs. The reports of the Royal College of Physicians on cardiology and neurology emphasize the need for development of sufficient regional units, but there is strong resistance in many places to the surrender of even part of this work to a special department. Rheumatology has not even achieved as many research and special reference centres as are needed, nor sufficient treatment facilities for this much-neglected group of disorders. Paediatrics as a specialty has now emerged in most hospital centres, but not enough has been done to group all children's beds so that the paediatrician can play a part in the care of all children in hospital. Even so clearly advantageous a measure as concentration for their confinements of all women whose babies may have haemolytic disease of the newborn, in units with special facilities for exchange transfusion, is not yet achieved everywhere.

A reasonable balance between the specialties and general medicine and surgery must be maintained, but there is still plenty of room for increases in special departments.

New Specialties and Techniques

There are also some emerging special subjects which will carry subdivision even further. The radiology and pathology of the nervous system have become so specialized that a specially trained man in each specialty is a necessity at any neurosurgical centre. Chemical pathology has evolved so fast that a special training scheme cannot yet produce enough consultants nor will it for some years to come. Some of the new assessment techniques in clinical physiology and the application of new electronic methods to medicine have already led to the emergence of new specialties which are likely to become essential where perfusion techniques in cardiac surgery or dialysis with the artificial kidney are regularly used—and these are not reliable methods in the hands of the occasional user.

The cardiologists were the pioneer users of electrophysiological phenomena in diagnosis, and the interpretation of the average electrocardiogram is part of the daily work of many physicians, but there are advanced methods of electrocardiography and other specialized investigations in cardiology which are almost wholly the province of the special cardiological department. Even some radiodiagnostic techniques are more used by cardiologists than by radiologists. Electroencephalography began to be used generally in neurology, neurosurgery, and psychiatry only after the war, and its future has not yet become firmly established.

Yet there is a clear trend toward concentration of this work in a few hands, and a breed of neuro-electro-physiologist (if that is an admissible term) is emerging in main centres and the need to provide a regional consultative service rather than more machines is now recognized.

The related subject of electromyography has hardly been developed at all, and such odd corners as the use of myo-electric potentials for the control of externally powered prostheses are only in the earliest research stages. Yet the use of the artificial cardiac pace-maker is already common in thoracic surgical centres, and we are certainly not at the end of developments of this kind. The anaesthetists, coming late to the field, are already deeply involved in "medical electronics," and I know of one London teaching hospital where a special department is already being developed. There is likely to be a rapid extension of automatic analysing machines in this kind of work before many years have passed.

Already in North America electronic recording systems are being used much more widely than here. Have you ever reflected on the number of woman-hours being expended daily on recording temperature, pulse, and respiration rates in hospitals? Let us start by admitting that perhaps half these observations need not be made daily at all—they represent only the survival of the one relevant objective set of records science provided for nurses to record fifty years ago. In the cases where they are still necessary, is an hourly, four-hourly, or twelve-hourly record always enough? And is it accurate in the most seriously ill patients, anyway? Should we not take a fresh look at this system, which may be as obsolete as the belief that a patient admitted to hospital must stay meekly in bed? If we really want an accurate continuous record of these physical signs in a patient, desperately ill, are there not electronic recording systems—used for healthy dogs and astronauts in certain circumstances—which might be developed for this purpose? I know someone is going to say that you can't get tender loving care from an electrical device; but you don't get it from a clinical thermometer any more than you get a really accurate reading. There are other ways.

Not all the new specialization flows directly from scientific devices. New surgical techniques develop partly because of the special interest and skill of individual surgeons, but in recent years also because of the application of physiological and biochemical studies and of the control that such new methods make possible. Perhaps the new anaesthetics and the rapid advance in anaesthetic techniques have contributed even more. The actual surgery of the heart is not exceptionally difficult; it is the precise pre-operative diagnosis of the lesion, the physiological control of artificial perfusion and elective cardiac arrest, and the anaesthesia that make this surgery practicable. As one member of a pioneer group put it to me—there is no place for the "great man" in open heart surgery. Even a new tool like the operating microscope suddenly makes possible new surgical remedies and has transformed the lives of hundreds of the deaf through the operation known as mobilization of the stapes.

There are, of course, some opposing trends. Special knowledge or techniques are acquired to some extent by the general physicians and surgeons. Some of the special techniques may be laborious, repetitive, and quite appropriate to be left to the non-medical technician or

to the practised medical assistant. Some of the specialties have an administrative rather than a true medical origin, such as those of tuberculosis, infectious diseases, and venereology. The old-style tuberculosis officer has disappeared and the sanatorium doctor will soon do so; the present-day chest physician is, or should be, a general physician specially experienced in diseases of the lungs. The diagnosis and treatment of infectious disease now requires less than a fifth of the beds which were estimated to be necessary twenty years ago, and the charge of those beds is steadily passing into the hands of the physicians and paediatricians with special experience. Venereology remains a separate specialty more for social than for true medical reasons, just as geriatrics is a specialty which exists largely because the care of the chronic sick is part of a predominantly social problem not requiring special scientific methods. The prescription and fitting of artificial limbs is slowly being brought back into the general field of orthopaedic surgery. The new surgical techniques become safer as they are perfected and, for instance, the thoracic route may be used by the abdominal surgeon. Perhaps the controlling fact is that techniques may be so standardized as to become part of the repertory of the operator, but methods which require a greatly increased knowledge of detail or the regular joint work of a practised team cannot be successfully absorbed by the general surgeon. There must be a limit to the range of the individual, however standardization or classification may assist. Automation will certainly play a larger part in laboratory and other diagnostic work.

Diagnostic Aids

It is impossible to give an accurate measure of the change in total work that has occurred in the diagnostic departments. The statistics have differed in form, and their interpretation cannot be accurate. In 1949 the number of examinations in the radiology departments was 7.87 millions and in 1959 the number of units of service was 21.12 millions; this probably means an overall increase of almost 100%. In pathology the numbers of examinations were 11½ millions in 1949, and of patient requests, which probably mean a good deal more, in 1959 17½ millions. But this is only a small part of the story; the complexity of the examinations undertaken in these departments has increased. This is particularly true of biochemical investigations, a branch of pathology which now forms so large and complex a part of the work that it has been necessary to take steps to train a number of doctors in chemistry so that a new sub-specialty of chemical pathology can emerge. The all-purpose pathologist of 20 years ago has been replaced by the group of consultants each taking charge of a section of the work.

The change in work of the diagnostic departments is not due to hospital practice alone. Many of the tests done may be required only for primary diagnosis, but others are required for the control of treatment. A simple example of this is the introduction of anticoagulant treatment for coronary disease. Accurate diagnosis and prognosis may call for the advice of the cardiologist, and thereafter some patients may be adequately treated at home. If anticoagulants are used, as they increasingly are, then there must be regular estimations of prothrombin levels until a balance has been achieved, and thereafter at lengthening intervals. If the patient is to be treated at home the responsibility is that of the general practitioner, but he cannot exercise

it properly without the help of the pathologist. Nevertheless, most of the tests that the general practitioner will require will be for diagnostic purposes. At Darbshire House Health Centre it was found that the most common investigations were urine tests and haemoglobin estimations. A recent issue of the *Journal of the College of General Practitioners* records a study by a group of doctors in the Reading area well illustrating the economy and value of the direct service.

In the radiology department the commonest investigations are for injuries which might include injury to bone, and chest radiography. Certainly none of these investigations are used as widely as they should be in general practice. It is still recognized that the great majority of the pathological investigations done for practitioners are done for a small proportion of those in the area. There is evidence from Darbshire House of an actual reduction in reference to hospitals following the increased use of diagnostic tests. It is often suggested that the departments themselves cannot face the extra load involved in providing a direct service to general practitioners, but there is really no evidence to show that there is an increased load. If a patient for whom a test is necessary is referred to the out-patient department first, the test will still be done. Other tests may also be used and out-patient time will be wasted if an equally effective result would have been obtained after direct reference by the general practitioner. This question needs more precise statistical investigation than it has yet had. Dr. Eimerl's study in a group of practices suggests that the number of investigations required is not really very large, perhaps of the order of one pathological test and one x-ray examination for every 20 patients per year.

The student sees his teachers carrying out diagnosis and treatment with the assistance of a battery of scientific investigations and the reports of other consultants. When he is a house officer he orders such investigations on behalf of his chief. If he goes on to be a registrar he often reaches at least the primary diagnosis and the initiation of treatment on the basis of the results reported. If this man then goes out into general practice it is absurd to prevent him from having similar aids to diagnosis and the control of treatment. Of course, many practitioners were trained at a time when they had few opportunities to use such aids. If they are prevented from using them now they have little chance to practise medicine with a full understanding of the benefits that their patients could have from such aids. It is true that a large proportion of the conditions treated in general practice are minor and respond to simple drug therapy or to psychological treatment, but there is no reason why the hospital doctor should be the only person who is able to have his diagnosis of lower respiratory conditions confirmed by radiography when the use of modern apparatus, perhaps of the mirror-camera type, could provide accurate evidence much more certainly than any simple clinical examination, or his suspicion of anaemia checked by a haemoglobin estimation done for him in a laboratory.

It has long been part of the Ministry of Health's policy to provide access to radiology and pathology departments for general practitioners, and there is no evidence to support the idea that general practitioners will use complicated and expensive tests wastefully. These services should at least be available. You may remember that in the Collings Report on General Practice much was made of the fact that none of the

practitioners visited used his own microscope. Is this really a criticism of general practitioners? Why should a general practitioner rely upon his own necessarily inexperienced, because relatively unpractised, microscopy if a pathological laboratory with specialist service is at hand? It may be that we will also need to provide electrocardiography services for general practitioners. Some group practices regularly use their own recording machines, and it is a common thing for a physician to be called to a domiciliary consultation which requires the use of the electrocardiograph.

Future Development

My general conclusion is that specialization in hospital work has not yet gone far enough. Consultative services such as cardiology, urology, and neurology will not take over all the care of diseases of the heart, kidneys, and central nervous system, but they should be more widely distributed than they are. Their lack of development in some regions, even their exclusion from particular major hospitals, prevents the development of the attainable level of clinical service. I do not suggest that we are likely to see such elaborate specialization as the emergence of a specialty I have seen identified in New York as "Vestibulotomist"—the man who does fenestration for otosclerosis—but rather that the increases in specialists should be proportionately greater in them than in the main older specialties.

Keeping Medicine Together

If, then, we are facing a progressive increase in specialization, how are we to avoid the division of the care of the patient and the failure of communication of knowledge between the specialists and the rest of medicine? How are we to balance the need to include the stimulus of new specialties in the work of teaching hospitals and at the same time preserve sufficient work on the medical problems of every day to give all-round experience to the student? These are the great dilemmas of medicine as I see them.

With the disappearance of small hospitals and the organization of hospital services upon a basis of area general hospitals, it should be possible to ensure adequate communication between the specialties. There will have to be some surrender of cherished independence. The old pattern of rigid bed-allocations and the extent of consultation, or even transfer of patients, between consultants both need change. The diagnostic departments are valuable links between specialties, but there must be more direct communication. Of course, there remain some relatively straightforward procedures which need the intervention of only one specialty, but there must be very few which involve neither pathologist, radiologist, nor anaesthetist with the clinician. The clinicopathological conference can be overdone, but there can surely be no justification in a modern hospital for the absence of all such activity. There must be readier recognition of the contribution others can make to the care of the patient. I wonder how many hospitals have acted upon the recommendation of the Platt Committee on the Welfare of Children in Hospital that the paediatrician should be concerned with at least general oversight of all children in hospital. Indeed, how many obstetric departments still insist that the obstetrician should supervise the nursery?

The greater difficulty now arises in communication between hospital medical staff and general practitioners.

The evidence obtained for the Platt Working Party on Hospital Medical Staff suggested that many doctors in this country enter general practice after not more than 1½–2 years in hospital work. That situation may be partly artificial, because of National Service—which will shortly end—but two years seems nowadays a very short time in which to acquire the experience in clinical management of patients which must be essential to any form of independent practice, even allowing for the equally necessary period as G.P. assistant. The Working Party made it clear that it considered that a total of at least three years was desirable—and there are many who would think that a longer period would be an advantage. In Sweden it has always been the custom, even after their long undergraduate course, for doctors to spend ten years or more in a variety of hospital posts before going out to practise independently. They have, of course, arranged their junior hospital staffing so that such posts are compatible with a normal family life. Given such arrangements in British hospitals there seems every reason why young doctors should stay longer in hospital work. But there must also be an adjustment of the work they are to do in hospital which will make it better fitted as a prelude to general practice or public health work.

At present, our hospitals are largely staffed as if all who work in them after the pre-registration year are bent upon specialization. That cannot be so; there has been a great increase in junior medical staff in hospitals and, whatever the increase in fully trained specialist staff, it seems very unlikely that there will be any diminution in the number of juniors. Indeed, over the years an increase is more probable. Of course, six-month house-officer posts in medicine, surgery, obstetrics, or paediatrics may give valuable experience, but many of the others are less attractive because they lead nowhere. However long postgraduate experience in hospital continues, there will still be the problem of communication of knowledge between hospital specialists and general practitioners afterwards. There is no reason to expect a reduction of the present tempo in medical progress, and the amount of time that every doctor in hospital or out of hospital must now spend in reading in order to keep himself familiar with new progress increases steadily. Increased specialization, however, makes this process of communication increasingly difficult. Journals cannot be a complete solution to the problem of communicating knowledge, but they help. The *B.M.J.* and the *Lancet* both try to meet this difficulty with their editorials and their series of articles reviewing recent changes. Other journals, like the *Practitioner* and the *Medical World*, are more particularly devoted to this same object; but one wonders whether the conditions of many practices are really conducive to as much reading as is necessary. Moreover, many people need to visualize their subject and cannot make full use of the written word alone.

General Practitioners and Hospital Work

There still remains the problem of elaboration of the written word and a communication of understanding which is not always possible without discussion. At present about one doctor in nine in England and Wales attends a postgraduate refresher course each year. We do not know whether it is always the same one, but it is certain that many doctors either have no such opportunities or do not use them. There are other, less formal opportunities of exchange—for instance, the

regular clinical rounds at week-ends provided at so many provincial hospitals, and special evening sessions provided at some teaching hospitals, such as the London Hospital. There are also domiciliary consultations, though not always accompanied by an actual meeting of consultant and general practitioner; and there are some doctors who find it possible to visit their own patients in hospital. In the Birmingham region, roughly one doctor in four has a sessional appointment at a hospital; and if one doctor in a group practice had such an appointment, he would bring something back to the others. The Platt Working Party urged the wider use of general practitioners in hospital, and emphasized the advantage of longer experience in hospital work for the future general practitioner to fit him for this. But, in sum, this still falls short of the amount of interchange that should occur. Perhaps we will always be pursuing the impossible in this, but it must certainly be a primary concern of the Health Service to see that such opportunities are increased.

I am sure that we have not yet exploited the facilities of our major non-teaching hospitals in providing postgraduate facilities for general practitioners. One would like to see the library facilities that every hospital should possess made freely available to every doctor in the area. Further than this, there should be opportunities of meeting between specialists and general practitioners at the hospital on a much larger scale than now exists. In Exeter, Stoke, and Kingston, and at one London teaching hospital steps are being taken to provide special premises at hospital for this purpose. Local medical societies, and the King Edward Hospital Fund, have been responsible for these experiments. We do not want to make all medical care hospital-centred, but we must make hospitals more active in disseminating scientific medical information than they now are. Equally, we may hope that hospital medical staffs will become more receptive of the other information about patients, which they can obtain fully only through general practitioners.

I do not think that beds for general practitioners in hospital are the solution to this problem. I am sure that general practitioners who are doing midwifery work should be able to attend their own patients having normal confinements in hospital, and that is an opportunity that may bring a majority of doctors into hospital. There may also be other opportunities, such as the Platt Working Party suggested, of giving general practitioners access to medical beds where patients are admitted for social rather than special medical reasons. But already the allocation of beds between specialists is too rigid; it should not become a further complicating factor that another block of beds is set aside for general practitioners.

The general practitioner is the patient's main insurance against the effects of over-specialization. He must accept a greater degree of medical responsibility for the continuing care of his patient and be given the opportunity to exercise it. He obtains the necessary specialist advice, but he is also needed to advise the specialist in some aspects of the care of the patient in any illness. The day when single undivided responsibility for the care of the patient was carried by one medical man has passed. It is through partnership between general practice and the specialists that we can overcome the inevitable disadvantages that limitation of primary interest must impose upon the individual specialist and the patient.