SOME GENERAL CONSIDERATIONS ON HIGHER OR POSTGRADUATE MEDICAL STUDIES

BY

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A far-sighted and comprehensive outlook upon the problems of higher or postgraduate medical studies is not less vital to the future of medicine at this juncture than is a sound and liberal regime of undergraduate medical education.

In a recent article in the *Journal*¹ I ventured to discuss what appeared to me essential defects in the methods and content of our undergraduate teaching, and in some of the schemes proposed for its improvement. The difficulties in respect of higher medical education, if somewhat different and less obvious, are nevertheless real and pressing, and their consideration is complicated by diversity of view as to what we are to include under the title of postgraduate education. Some attempt at definition is clearly necessary, but in the meantime, however we define their scope, higher medical studies present us with a current problem of the first importance. Whatever form the medical services in this country may ultimately take, they will make heavy demands on the services of consultants and specialists, and while the proper Government authority will doubtless enter with zest into the organizing of doctors within the framework of a medical service, the adequate training of those doctors for the diverse functions they will have to undertake within such a service, and the maintenance of professional standards, are responsibilities we dare not delegate if the service is to become in fact what it should be. That this task is recognized as ours finds a welcome confirmation in some remarks of the Prime Minister, recently made at a luncheon of the Royal College of Physicians (see *Times*, March 3), when he expressed the desire that there should be no lowering of consultant standards in the manning of the future medical services. In short, the intellectual traditions of medicine thus far rest in our hands, and their maintenance and enhancement are our responsibility. These, we shall have to remember, will go far beyond the immediate utilities of any national medical service.

We may therefore proceed to consider the aims and methods of higher medical studies, and the nature of the institutions in which they may most fruitfully be pursued.

Role of the Special Hospital and Medical School

While the main academic preoccupation of the great teaching hospitals must remain the training of undergraduates, higher medical studies and research will inevitably continue to be conducted within them, and if the number of whole-time professors and teachers is to be increased it may be hoped that these vital activities will multiply. It is probable, however, that the precise nature of the studies thus followed at any time will depend upon the interests of the then holders of professorial chairs and their teams of workers, and there are special branches of medicine—e.g., neurology, dermatology, paediatrics, etc.—the development of which cannot be left to hazard in this way, but must be pursued methodically in adequately staffed and equipped special hospitals and schools if medicine is to advance on all fronts.

Nevertheless the view has been authoritatively expressed that the day of such hospitals and schools has passed, and that the special branches of medicine may best be developed in the

special departments of large general hospitals. This view is strongly contested here as the product of the organizing mind, concerned only with administrative tidiness and ignorant of the scientific and cultural issues involved. The development of specialization in medicine is inevitable and will be progressive, like it or not as we may, and if every undergraduate teaching hospital is to set up the requisite number and variety of special departments, adequate to conduct high-grade postgraduate teaching and research, the multiplication of hospital and laboratory accommodation and facilities, and of personnel, will be enormous and the multiplication of effort and expenditure wasteful in the extreme—and all this with a quite disastrous loss of efficiency.

In every developed special branch of medicine there must surely be a central hospital and institute that shall form the growing point of knowledge in its special field. Here can be gathered with the greatest economy and efficiency the essential clinical and pathological material and full facilities for its exhaustive study. Moreover, a specially trained group of workers all pursuing knowledge in the same field of medicine within the walls of such an institution will enjoy the stimulus that a team can alone provide and that is so vital to the fruitful activity of the scientific worker.

On the other hand, the one or two men staffing the small special department of the general hospital must perforce work in comparative intellectual isolation, nor can they possibly command the material resources of the central institute.

It is therefore submitted that any attempt to disperse such schools and to divide their activities among a group of general hospitals would be a retrograde step gravely adverse to the future of medicine in this country. Special research and the adequate training of specialists can be competently undertaken only in the special hospital and its attached school.

There is also an essential place for the special postgraduate school not confined in its activities to any special aspect of medicine, but free to cover all fields both in research and in the promotion of higher studies. The British Postgraduate School in London already fills this role, and it may become expedient in time to found comparable institutions in other great centres of medical education throughout the country.

The Aims and Methods of Higher Medical Studies

There appear to be some who view the postgraduate school mainly as an institution for the provision of what are euphemistically called "refresher courses" for general practitioners, or, in the near future, for young medical officers to be demobilized from the armed Forces and contemplating a first entry into civilian practice. The value of such courses as a long-term policy is dubious; but, however we view their potential usefulness, it is surely clear that their provision, as an exclusive function of a postgraduate school, expresses an impoverished conception of what such a school should occupy itself with. This provision by no means exhausts its proper functions, though it may easily exhaust the staff. There is also to be considered the provision of opportunities of all necessary kinds for the research workers of the future, and also of facilities for the training of consultants and specialists—functions that are not wholly identical. It is here submitted that

¹ "Some Principles of Reform in Medical Education," *British Medical Journal*, Feb. 5, 1944.

the primary and essential role of a good postgraduate school consists in the provision of a fair field of facilities, and in the creation of a favourable atmosphere, for advanced and original studies. I should therefore put in the following order of importance the functions of a postgraduate school of medicine: (i) the provision of opportunity for research and the advancement of knowledge; (ii) the training of specialists and consultants; and, questionably, (iii) the provision of "refresher courses." The qualification inserted under the last heading is not to be taken to imply that a postgraduate school has no responsibilities towards the general practitioner, but it expresses the grave doubt as to whether the refresher course itself is the proper way in which this responsibility should be discharged, and as to whether this type of course—if its usefulness be conceded—should be undertaken in a school where really advanced studies are pursued. Indeed, my own view is that these two activities—advanced studies and refresher or examination courses—are incompatible in a single institution; for experience, as will later be indicated, has so far shown that the latter tend to destroy the former.

Research and the Advancement of Knowledge

It is possible that some may be impatient with the notion that these really are the primary functions of a postgraduate school. Issues of more pressing importance, such as the early provision of consultants and specialists, may appear to demand priority. This question involves our entire outlook upon what should be the training of these categories of doctor. Few will dispute that a purely teaching institution wherein no one is engaged in the forging of new knowledge, or in thinking on broad lines about the problems of medicine, but where all are occupied with the handing on of established knowledge and the imparting of techniques, is a dead school. At the best it is merely a polytechnic primarily devoted to grinding out courses for this or that specialist diploma. Research and the advancement of knowledge not only serve the ends indicated by their names, but they also provide—and can alone provide—the keen and critical atmosphere in the absence of which we cannot hope to train specialists of the first rank. It is therefore urged that original thought and work are vital elements in the life of any school for higher medical studies, whatever else we may ask of it. Surely, also, now is the time to approach the new medical world opening before us with the highest possible ideals, for the dangers to idealism and enterprise in any State service that is based on an immediately utilitarian point of view cannot be discounted by the most ardent champions of the reorganization of the medical profession.

In an earlier article in the *Journal*,² entitled "Strategy and Tactics in Research," I ventured to discuss some of the defects in our present outlook upon research problems, and, while I do not propose to weary the reader with recapitulation, some considerations may be restated. The deep searchings as to the very bases of scientific thought that have stirred the world of physics within recent years have had little echo in the world of biology, including physiology and medicine, and we are in some danger of losing sight of first principles of science in our growing preoccupation with experimental techniques. These are now so ingenious and have proved so valuable in the opening up of fresh fields of discourse about medical and physiological problems—as, for example, in the case of the elaborations of electrophysiology—that not rarely we fail to see the wood for the trees. As techniques multiply and grow more specialized, so width of comprehension shrinks. There develops in consequence the tendency to consider research as adequately conducted by the recording of random observations obtained by the use of new techniques, without further consideration of their wider import and relationships. Science thus comes to be viewed as consisting in mere observation and the accumulation of records, without the generalizations and hypotheses and other intellectual instruments that can alone transform information into knowledge and thus lead to advance. The perusal of current physiological and medical journals reveals that a large proportion of their contents consists of these isolated items of information, and the author, especially if he be young, who ventures daringly to attempt some

generalization or synthesis of his findings with those of other workers is in danger of having his contribution declined.

There is, it seems, a pervading intellectual timidity or sloth that shrinks from original thought and, in effect, discourages adventures of ideas. Yet, as Whitehead has remarked, "Panic of error is the death of progress." This situation has been candidly summed up by another philosophical writer of to-day, thus: "There is little hope of the good scientist, who is minding his specialized business, devoting himself to the broken foundations of his science; it would only be bad betting for him as an individual to give up his time and energy to a critical and general speculative investigation, when he has before him the possibility of pushing his specialty a few solid steps ahead."³ Such a state of affairs is plainly as adverse to true advance as the opposite extreme of unbridled speculation, and we should not remain content to ask of a man what "discoveries" he has made; we should also proceed to inquire of him what he has made of his discoveries, or, for that matter, of anyone else's.

It should not be too sanguine to hope that we shall in future see at least some centres of higher medical studies that will set themselves to break with this timorous tradition, and to attempt, as among their ideals, the *ordering* of knowledge and the training of men in the basic principles of scientific thought. At no time in the history of medicine and its daughter sciences has a deeply thoughtful attitude to research been more imperative than it now is, and it is this conviction that must be the excuse for a digression that may have seemed to the reader of undue length and doubtful relevance.

The Training of Specialists and Consultants

The wisdom of undertaking this training in institutions wherein original thought and work are actively pursued has already been discussed. In no other way, save by such contacts, can the student be fired to undertake original work himself. To see knowledge being won is, for those who have it in them, the adequate stimulus to add to knowledge. Yet this need not be taken to imply that every would-be specialist or consultant should be expected as a matter of course to undertake research. A man may have the making of an excellent clinician and an admirable teacher without also having a flair for original investigation. This may seem obvious enough, yet the notion encounters some opposition, largely from those who like to sentimentalize research as something inherently virtuous by participating in which we must all be the better. Yet research is a means and not an end, and there is no doubt that hitherto a young man hoping to make a place for himself in clinical medicine has found himself under the necessity of "going through the movements" of doing research, and the publication of an "original paper" has been widely taken as a test of his capacity. Thus it is that medical literature has been burdened with far too much inferior matter in order that men may obtain due recognition of gifts and attainments in quite another field of medical endeavour. Against this danger it is to be wished that the postgraduate school of the future may be on its guard. Gifts for teaching and for research are not necessarily combined in a single individual, and generations of science and of medical students have suffered from the popular and eminently respectable illusion that a distinguished scientific investigator must necessarily be fitted to teach the elements of knowledge in his own field. Nevertheless, the original thinker and worker is a leaven vital to the fruitful activity of every medical school, even though not all teachers or students need be expected to follow in his footsteps.

The Role of the Special Diploma

The training of the specialist needs to be both theoretical and vocational, covering both a science and an art of medicine. What is implied by this has already been discussed by me in a recent article on the reform of medical education and need not be further elaborated here. The detailed curriculum of studies essential to the full training of the specialist and consultant also need not be minutely discussed. We may, however, make some mention of the specialist diploma examination as a criterion of competence in the field of medicine.

² *British Medical Journal*, April 17, 1943.

³ Scott Buchanan, *The Doctrine of Signatures: a Defence of Theory in Medicine*. Kegan Paul and Co., London, 1938.

Within the past few years the number of these diplomas has increased considerably, and the Royal Colleges in this country now grant no fewer than nine, not to mention those given by universities. As to their influence upon those postgraduate schools that provide systematic courses for them, it can scarcely be denied that it is wholly adverse—that is, if we accept the conception of the postgraduate school herein submitted. Schools making the provision of the necessary courses a primary activity end by doing nothing else, and their research activities dwindle and die. It would be invidious to seek to exemplify this proposition, but the case may be presented in another way. So far, happily, there has been no specialist diploma in neurology, and up to date the primary aims of the postgraduate school attached to the National Hospital for Nervous Diseases at Queen Square have been to conduct original research and to provide a sound all-round training in clinical neurology and neuropathology to its students; the reward of the latter being the work they had done and the experience they had acquired, and not any label or diploma granted to them. It is interesting to note that this school is the only one of its kind in the country to which, right up to the outbreak of the present war, there was a steady flow of serious postgraduate students from the Dominions, America, and Europe—men and women of professorial and other university status desirous of higher training. At a period in the history of medicine in these islands when, owing to the rapid development of medicine in the United States and the Scandinavian countries, the flow of graduates of this type to this country has virtually ceased, this is a remarkable tribute to a school that has been interested in a culture rather than in a curriculum, in a discipline rather than in a diploma. It is not implied that distinguished leaders in medicine and physiology in this country have not continued to attract pupils from abroad, for we know that they have done so, but that no other postgraduate school, as such, has commanded the reputation requisite to bring graduates of the best type and in considerable numbers to these shores.

While, therefore, the special diploma can hardly be regarded as an inspiring stimulus to, or end of, higher medical studies, it possibly has certain useful though restricted purposes. For example, it may assure a working level of efficiency in such special techniques as those of radiology or anaesthetics, and where a large medical service, such as that of mental hospitals or of tropical medical services, requires large numbers of medical officers, the special diploma course ensures that they acquire an adequate familiarity with the branch of medicine in which they intend to practise. But all this is quite another thing than the acceptance of such a diploma course as adequate to the assumption of consulting responsibilities. These require a deeper foundation of experience in general medicine than the special diploma demands or its curriculum provides.

As an element of value in higher medical studies designed for the training of specialists or consultants there are other and more positive defects in the special diploma, as we know it. It tends to focus the candidate's attention upon a curriculum rather than upon the full range of the subject. It promises to fetter higher medical studies, which are best pursued for their own sakes, in the shackles of the examination system—with us a purely vocational system with no theoretical background; and, finally, if the special diploma were ever to be accepted as a criterion of consultant status in a highly organized public medical service, it would lead to arbitrary and unworkable restrictions upon consulting practice. Thus, how fantastic it would be, though by no means impossible, if no one but the holder of a diploma in psychological medicine were to be permitted to deal with, or to issue certificates in respect of, cases of psychoneurosis, or cases in which a prominent psychological element was present! Such cases, as we all know, loom large in the experience of consultants in every field of medicine, coming disguised as somatic disorders involving the nervous system and every possible organ. Further, a concept of psychosomatic medicine is now being developed which proposes psychological factors of causation for a wide range of somatic illnesses. The practice of medicine would become impossible if all consultants were to be restricted by artificial barriers within the field of medicine, and the general level of medical efficiency would inevitably deteriorate.

The truth surely is that the special diploma tends to breed technicians and not physicians; individuals better able to apply techniques than to make those essential clinical assessments that alone render the employment of techniques, be they of psychology or of bacteriology, a rational activity. It is in the field of therapy that their influence is most baneful. Treatment should be thought of as a whole, "as the total contribution of the physician to the complicated action that is taking place within the patient incessantly." It should not be thought of in isolated categories or in terms of specific instruments or aims. "Therapy is one of the routes by which medicine has been specialized, and by which the specialties have become vicious" (Scott Buchanan, *loc. cit.*). A final question arises. The special diploma makes no adequate provision for the postgraduate training in general medicine of any aspirant to consultant status. Hitherto the experience needed by the candidate for the London M.R.C.P. has usefully served to ensure this; but if the easy key of the special diploma opens the door to consultant work, who will trouble to acquire this essential foundation of clinical experience? This examination will fall into desuetude, and our standards will fall with it.

The Value of Refresher Courses

Possibly, an equally controversial issue with that just dealt with is provided by the question of the value of the so-called refresher courses. These attempt the impossible—namely, the imparting in too brief a space of time to tired, or even unsuccessful, men of a range and quality of knowledge that cannot be transmitted in this way. As a mode of instruction in specific techniques of diagnosis or of treatment they may have a limited scope of usefulness, but of general cultural value little or none. At best their influence can be but transient. Surely the remedy for the inevitable difficulty of keeping abreast with advances in knowledge and techniques—as this has obtained hitherto under the common conditions of general practice—is not the makeshift expedient of a brief refresher course, but such a replanning of the conditions of general practice as shall prevent the isolation of the doctor and shall keep him in constant touch with hospital and specialist services throughout his professional life. Some such arrangement should be an integral part of any planned medical service. But if the brief and rarely repeated short cramming course is to be retained, then its provision cannot be a function of such a postgraduate school as has been here discussed. The medical staff of such a school could not possibly stand up to the unremitting repetition of such courses without becoming spiritless hacks, and all their more vital activities would inevitably go to the wall. There would have to be organized special institutions for this work, which cannot be combined with the pursuit of higher studies in medicine. It is to be hoped, however, that nothing of the kind will be found necessary in a better-planned medical world.

Conclusions

We may easily, at this juncture, aim too low in our plans for the future of higher medical studies, but we cannot easily aim too high. No craven fear of what official organizing zeal may do to us while we are seeking to maintain our standards, or even to enhance them, should lead us to fall short of our traditions. We still have freedom to think about the future of medicine, and this should not come to be construed as freedom not to think. If we set to work now in earnest there should be ample time, while an agreed form of medical service is being hammered out and then begins to grow, to produce the right type of specialist and consultant and the numbers we shall need of them. We have in fact, in the Prime Minister's speech earlier cited, been invited to maintain our standards.

In assessing what should be the criterion of an adequate specialist and consultant training we shall do well to rely mainly upon securing full opportunities for higher studies, and for research for such as have the gift for it, and upon judging men by their work and achievements during their period of training rather than by the hazards of a postgraduate diploma mill. After all, the great names in medicine are those of men who trained themselves after graduation and owed nothing to educational planning. It is clear, of course, that such a diploma system would make the task of the official "grader" of consultants delightfully easy, for it would provide him with those

paper categories of doctors which would be as useful to him—if not to the community—as a really adequately trained body of consultants. Yet it is not our business to turn out numbers of mass-produced “utility” consultants and specialists just to make an organizer’s paradise, but to see to it that the community gets a service worthy of us.

So far the examination system has not imprisoned higher medical studies irrevocably in its paralysing grasp, but we shall need all our vigilance to see that it does not. I will go even further. In the past we have not seldom lost for medical science men of outstanding ability because they did not, at the appropriate time, acquire those alphabetical adornments to their names that we have asked of those to whom we have offered opportunities in consulting and academic medicine. This should not be. Surely in a liberal profession based on science there should be a career fully open to talent. Nothing is better calculated to obstruct this than a barrage of diplomas.

THE USE AND ABUSE OF TRICHLOROETHYLENE

BY

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“In estimating the untoward effects of any anaesthetic agent three factors are always involved—(1) the anaesthetic agent, (2) the patient, (3) the anaesthetist—and only too often the last of these factors is ignored.”

Trichlorethylene, a comparatively recent addition to the anaesthetist’s armamentarium, has in the last two years come into fairly wide use in this country, and was at first received with applause and thanks for an agent with many useful and unique qualities. The initial enthusiasm, as is so often the case, was soon replaced by an equally severe swing of opinion to the other extreme, in which all its bad qualities and dangers were repeatedly emphasized. It is this latter swing which occupies the pages of so many contemporary journals, and this article has been written in an effort to control and in part to prevent any undue bias, and at the same time to present material from which a more balanced evaluation of this agent can be made. So much that is good can be hidden by a little that is indifferent, and so many are easily biased by the chance observation of a headline, the remarks of a colleague, or even the smell of a particular anaesthetic.

Langton Hewer (1942) first brought his careful investigation of this agent before the Royal Society of Medicine, and in that report gave particulars of its chemistry, physical properties, and anaesthetic quality. No further mention will be made of these particulars, but attention will be focused instead on the use of this agent, with special reference to its limitations and to the bad effects of ignorance and misuse.

Apparatus

It has become customary to place the trichlorethylene in the chloroform bottle of the Boyle apparatus. This practice is convenient, but at the same time affords scope for a grave misuse of the agent, for only too often the *minimum* which such a bottle will allow proves to be too great for maintenance of the patient, whereas any approach to full delivery, with gases bubbling through the liquid, gives a higher vapour concentration than any patient ever requires. Here then lies a danger, and one into which fall so many who are not conversant with the small amount of trichlorethylene that is needed. It can be stated with confidence that very few patients require more than the minimum vapour flow from such a bottle, and indeed this may often prove an overdose. An extremely small percentage receive the full flow with the plunger elevated to the top, and never has it been found necessary to increase the vapour concentration any further by lowering the plunger towards the surface of the liquid; but on many occasions I have observed administrators labouring under a *full load* of trichlorethylene, with a difficult patient showing a respiratory rate of 60 to 80 a minute. These administrators, too, are the first to complain about the “disadvantage of trilene” in raising the respiratory rate!

Thus the type of apparatus commonly employed is one reason for misuse of this agent, and for a considerable period a drip-feed of the vinesthene pattern was employed instead. This works very well, but the property of trichlorethylene of dissolving fats so *readily* soon makes all the joints leak, and the apparatus becomes dirty and wasteful. Furthermore, vaporization in the stream of cold gases is difficult. However, it is felt that some device constructed along these lines, by which a very small minimum dose could be given, or alternatively a well-designed vaporizing bottle for the Boyle machine, would be a considerable help in avoiding overdose. Marrett’s trichlorethylene-air apparatus has bottles which allow good vaporization of the liquid, and it appears possible with this apparatus to obtain the small minimum dose required.

Induction and Depth of Anaesthesia

Induction with trichlorethylene is difficult, and it is here that trouble may arise, for in attempting to obtain the requisite depth of anaesthesia there is a tendency to use more and more of the agent. This increase of vapour concentration *rarely* brings with it the desired diminution of muscle tone, and this, when it was first used, seemed to be a great drawback and disappointment. However, it was soon appreciated that other agents can be easily employed to carry the patient smoothly and quickly into the third stage and to obtain the desired relaxation; the further course of the anaesthesia can then be conducted smoothly and without incident under trichlorethylene. Once the necessary relaxation has been obtained and the stage of surgical anaesthesia reached, this state can be maintained indefinitely on a minimum of the agent, which suffices to hold a steady plane of anaesthesia showing little tendency to change. First-plane anaesthesia is the usual level, though an occasional patient shows signs of the second plane; and it is fortunate indeed that the lighter plane is sufficient depth for the performance of the overwhelming majority of surgical operations. With trichlorethylene it is as a rule impossible to obtain the deeper levels of third and fourth planes, and the recognized signs associated with those levels are certainly not observed. Any attempt thus to deepen the anaesthesia usually meets with one or other of two conditions—(1) a rising respiratory rate, or (2) sudden respiratory arrest. In other words, trichlorethylene has a very limited working range; but for reasons previously stated this is a most useful range, and, furthermore, physiological disturbances occur with considerably less frequency in such lighter planes.

For convenience, and where a barbiturate is not contraindicated, pentothal, or some similar rapidly acting intravenous anaesthetic, is employed for induction, and is followed by nitrous oxide and trichlorethylene on the Boyle machine. The necessary relaxation is provided by the barbiturate, and if sufficient has been given to tide over the time required for the introduction of the trichlorethylene, then such relaxation is maintained for the duration of anaesthesia, and a quiet smooth anaesthesia results. In cases in which a barbiturate is not desirable, or is contraindicated, the induction is made with nitrous oxide, followed by a little oxygen and then trichlorethylene. Cyanosis is avoided, as this tends to persist under trichlorethylene even with an ample sufficiency of oxygen. With adequate well-timed premedication it is possible to produce the necessary relaxation under nitrous oxide and trichlorethylene alone, but in 50% of cases muscular relaxation under this agent is still not adequate—i.e., arms and legs are usually stiff, and vague wandering movements are to be seen in fingers and wrists and feet—and small quantities of ether have to be added to produce it. The very small amount of ether required at this stage is impressive, and relaxation can often be produced with but two or three minutes of ether on the Boyle machine. Once relaxation has been obtained a return is usually made to the trichlorethylene, and no further ether is required for the duration of anaesthesia. It thus appears that trichlorethylene is an excellent “maintenance agent,” and its best effects are to be observed when it is used as such.

From the preceding paragraphs it becomes obvious that trichlorethylene is given no part in producing relaxation, and this is even truer when considering the minority of cases which need additional degrees of muscular relaxation. These cases