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## THE PURPOSE OF MEDICAL EDUCATION\*

BY

G. W. PICKERING, M.D., F.R.C.P.

*Professor of Medicine, University of London; Director, Medical Unit, St. Mary's Hospital, London, W.2*

It has been remarked by an intelligent observer from across the seas that no country has produced so many excellent analyses of the present defects of medical education as has Britain, and no country has done less to implement them. It seems to me that this arises partly from our national conservatism, but chiefly because we have devoted too little thought to the true purpose of medical education, and thus omitted to select a yardstick against which to measure the virtues and defects of our system. My object here is to outline what I conceive to be the purpose of medical education and to discuss in general terms why this purpose has not been achieved. I can best introduce my subject by quoting from the Report of the Royal Commission on the University of London (1913) which, under the chairmanship of Lord Haldane, produced one of the most penetrating documents in the history of medical education.

"We must, in the case of the Faculty of Medicine, as in the case of other Faculties, consider what steps it is necessary to take in order to place the best teaching upon a real university basis. . . . We cannot, however, deal with the Faculty of Medicine on exactly the same lines we have followed in the case of other Faculties, such as those of Arts and Science. In those Faculties, the provision for teaching of the highest university standard may be deficient, but the standard itself is not questioned. In the case of the Faculty of Medicine, we have no test to apply. Except as regards pathology and hygiene the University has not attempted to determine which of the teachers of the subjects classed as Advanced Medical Studies are entitled to the status of Professors or Readers. . . . What is more significant, it is denied that they ought to do so. . . . The question is therefore forced upon us, whether the standard we have accepted and required for the teachers in other Faculties ought to be abandoned in the case of the teachers of the most important professional subjects in this Faculty. . . ."

That was 43 years ago. The University of London has changed much since then, and, in fact, led the country in the development of clinical studies along true university lines. Nevertheless, as I hope to show, the chief issue facing us to-day is whether the objects of medical education are the same or different from those of other faculties of the university. Should medicine, in fact, be taught within the university or in a technical college?

### Proper Training

The proposition that the purpose of medical education is to turn out properly trained doctors would probably receive general assent. There is, however, dissent about what constitutes a proper training and yet more about

what kind of doctor should be trained. Are we trying to train physicians, surgeons, psychiatrists, and medical scientists in all their special branches as well as general practitioners? Clearly, to do all these things in the scope of one single curriculum is impossible. A man would either spend the major part of his lifetime as a student, and render service to the community only in his dotage, or else be improperly trained. The recognition that this is so is one of the major achievements in the post-war period. It is now agreed that the training of a doctor does not stop at his final professional examination, that postgraduate experience is necessary for all doctors who are to be licensed to practise medicine; and that experience and training should differ according to the career ultimately to be followed. The organization of postgraduate education, and particularly the institution of a compulsory year of hospital practice under supervision, has in fact liberated the undergraduate curriculum to serve its proper purpose. It remains to agree what that proper purpose is.

Postgraduate education is perhaps in its infancy. Since, however, it is chiefly concerned with the acquisition of detailed factual knowledge and of special techniques, it provides a fairly well defined problem about which there is fairly general agreement. While acknowledging the great importance of postgraduate education, I would like to say no more about it and devote the rest of my remarks to the medical curriculum proper, the course leading to the degree of Bachelor of Medicine.

While few would now maintain that the function of the undergraduate curriculum is to train specialists, there are many teachers and administrators who hold that its purpose is to train general practitioners. This, however, seems an inadequate definition. Thus there is an increasing body of opinion which believes that at least part of the special training necessary for a general practitioner should be postgraduate. Again, much of what is included in the present curriculum is quite unnecessary for general practice, and it would be very difficult to justify the vast public expenditure on preclinical departments merely to train general practitioners. In fact, if this were the sole function of medical education, some might doubt whether it was desirable to include medicine within the faculties of universities. It would be cheaper and more efficient to carry out the small amount of preclinical training necessary at technical colleges and to revert to the system of apprenticeships. The fallacy of so defining the purpose of medical education would be

\*An address which had to be postponed.

clearly demonstrated were we to fashion our educational system on such a definition. Not only would those who intend to specialize have an inadequate background, but the advance of medical science would come to a standstill.

#### Basic and Special Requirements

The conflict between the needs of future general practitioners on the one hand, and of specialists and research workers on the other, led Lewis to suggest that there should be two medical curricula, a shorter and a longer designed for the two groups. This suggestion has never found much favour and probably never will. As all experienced teachers and examiners know, much may happen to a man during the five years or so of the medical curriculum. A boy may enter loaded with examination honours, and at the end be in the bottom part of the class, qualifying with the greatest difficulty. I also know of one man who had difficulty in matriculating but whose scientific work was so distinguished that he became a Fellow of the Royal Society at 35. It would thus be a thankless task to try to select men at the outset for those two types of education, and I for one would not care to do so. However, an even greater objection would be the creation of two separate grades of doctor with detrimental effects on the unity and the morale of the profession. And here let me venture an aside and remark that in these days of the Welfare State matters affecting morale are of much greater importance than is generally realized. There is an increasing tendency for men to be concerned more with what they can get out of life than what they put into it.

The idea that the medical curriculum should be primarily designed for any particular kind of doctor proves thus unacceptable. It would seem rather that it should be regarded as a basic foundation on which may be built the special requirements of the various specialties. We might say that the function of the medical curriculum is to train the basic doctor, provided that we recognize that the concept of the basic doctor is a mere abstraction.

It would seem, then, that the problem of defining the purpose of medical education resolves itself into two questions: What are the basic requirements that all doctors need, and what are the special requirements severally needed by general practitioners, scientists, and specialists?

#### Function of University Education

Medical education has grown up within the framework of the universities. No one would dispute that this is the proper place for medicine. "The study of man in both health and disease is part of biological science. Scientific knowledge is indivisible, and advance on one front makes possible advances on others. Were medicine to leave the universities, both medicine and science would be immeasurably the poorer. It may be accepted as axiomatic that medical education is part of university education. We may therefore approach our subject by inquiring what is the purpose of university education and whether this purpose needs modification or amplification in the case of medicine.

I would suggest that the function of university education is to train the student's mind so that he can gather data accurately and so that he can learn to form a balanced judgment on those data. Some disciplines use for the training of judgment data that bear little relevance to those with which the student will later deal. Such, for example, are the classics, and there is no doubt that in our ancient universities the quality of teaching and refinement of methods over the ages has made this discipline an excellent introduction to handling the affairs of men both in the civil

services and outside them. In fact, it was once the fashion at the ancient universities to regard all other disciplines as inferior. To my mind this attitude has been of great disservice to our country, for such is specialization at school and in the universities that these future leaders completed their formal education with no more than a smattering of scientific knowledge. In our age, when scientific knowledge and its applications seem likely to determine the future of mankind, it seems at least odd that such ignorance should be tolerated, much less encouraged, amongst our leaders. Nevertheless, whatever its shortcomings, it is to be acknowledged that the discipline of the classical studies fulfils much of the purpose of university education, and that, at best, it is highly successful in sharpening the wits so that the student emerges with a mind that is a much finer instrument than when he started. Most of the other major disciplines of the university—mathematics, law, theology, natural science, and medicine—have a more vocational aspect—that is to say, they use for educational purposes data of the same kind as those with which the student will deal in later life. There is much to be said for this. To quote the report of the Cambridge University Committee on University Education and Business (1945):

"The view that a university course should not be closely related to a man's ultimate career, but should be a general education in non-vocational subjects, is open to various interpretations. If it is meant that a university course should not consist merely of specific instruction designed for earning one's living then no objection can be taken to it. If, on the other hand, the statement is interpreted to mean that a man is best prepared for life by reading subjects wholly unconnected with his career, then a good many objections can be taken to it. Such an interpretation depends ultimately on the assumption that habits of thought are transferable from one subject to another, but there is nothing in experimental psychology to suggest that such transfer will take place automatically. Any subject can be used as a means of training and developing the intelligence, and when intelligence has been developed by exercise, it will be a better instrument for studying other subjects. This, however, is not the same as saying that the clarity in thought attained in one subject is directly transferable to another. In order to secure clarity the ideas involved must be easily manipulated, and an early acquaintance with these ideas is a great aid to proficiency. Further, if the subject is one for which the student has special interest, he will more readily advance by using his innate ability unchecked by lack of interest in the subject-matter."

I would suggest, then, that the primary purpose of the undergraduate medical course within the university is to train the student's mind so that he can collect and verify facts concerning health and disease in man, and so that he can form a balanced judgment on issues that affect both individuals and groups. If this has been achieved in the undergraduate curriculum, then the special requirements of scientific and vocational medicine can be erected, in the postgraduate period, on a firm foundation. Moreover, the student is equipped to learn, so that in his future professional life he will have little difficulty in keeping abreast of advances in thought or knowledge. It is not the function of the undergraduate curriculum to turn out fully fledged general practitioners or specialists, nor to turn out men who have detailed knowledge of aspects of the basic sciences. These are the proper responsibility of the postgraduate period.

#### Does the Undergraduate Medical Course Fulfil its Purpose?

If this be the purpose of the undergraduate course, it is now proper to inquire whether this purpose is fulfilled. We may look at the content and methods of teaching of the course, the examination system, and the effect on the student, and we may compare these with the discipline of classical studies at our older universities.

The conduct of the two courses could not provide a greater contrast. The student reading classics attends a few lectures in the course of the day; the rest of his time is spent in reading and performing individual exercises which he presents for comment or correction to his tutor. The medical student spends nearly all his time in the lecture theatre and laboratories; in the medical curriculum proper

in the four schools with which I have been associated as student or teacher the student is not, except in rare instances, encouraged to read original papers or to prepare material for his teachers to correct. In every medical school library which I have visited (and I have visited them all in this country), with one single exception, nearly every student is either reading textbooks or his lecture notes.

We find a similar contrast in the examinations. In classics, the examination papers are designed to test the capacity of the student to discriminate; he is given a wide choice of questions so that he can show his mental capacity, using data with which he has become familiar. How different in medicine! The examination papers allow no choice of question, and they seem designed not to test a student's capacity to discriminate but his capacity to reproduce material learned from the pages of textbooks or the notes of lectures. The kind of question which is still current in the final examinations for university degrees in medicine is a question such as, "Describe the symptoms, signs, complications, and treatment of ulcerative colitis." What a comment on six years of university education! And the earlier examinations are no better. When we set examination papers like this it is not surprising that arts teachers regard us as uneducated.

These facts can leave us in no doubt that, as at present conducted, medical education in the universities is not directed to training the student's mind as a discriminating instrument but merely as a temporary storehouse for miscellaneous information collected from textbooks and lecture notes and retained for long enough to be reproduced at the moment of the examination. Nor is there much doubt (though the assessment is, of course, highly subjective and in the nature of a clinical impression) that the effects of the medical curriculum on the student's mind bear this out. Thus the Planning Committee of the Royal College of Physicians made the following comment:

"We are agreed that, quite apart from lack of character and ability that may be avoided by improved recruitment and selection, the average medical graduate has defects which are to be attributed chiefly to the manner of his training. He tends to lack curiosity and initiative; his powers of observation are relatively undeveloped; his ability to arrange and interpret facts is poor; he lacks precision in the use of words. In short, his training, however satisfactory it may have been in the technical sense, has been unsatisfactory as an education. This is a matter of very great importance. The average student leaves his medical school at about the age of 25; during the subsequent thirty or so years of professional life, his ability to learn from his own experience and that of others, and to keep abreast of the stream of advancing medical knowledge, depends entirely on those qualities in which his training has left him defective."

It would seem to me that all the numerous criticisms of the medical curriculum are embraced in the general criticism that it does not fulfil what should be its central purpose of training the student's mind. And I suspect that so little has been done to remedy the worst defects because there has been no yardstick, no clear concept of purpose, by which questions of detail could be subordinated to questions of principle.

#### Can this Purpose be Achieved?

If the primary purpose of the medical curriculum is to train the student's powers of observation and of critical judgment in the field relevant to medicine, then the achievement of this purpose will require a drastic reorganization of the medical course and a revolution in the attitude of most teachers to it. So far as content is concerned, the three great obstacles to education are its enormous content of so-called "facts,"\* its rigidity, and its disorder. Nearly all committees that have considered the curriculum have recognized these three defects, but it is an interesting fact that most of the proposals for reform would actually have accentuated some, at least, of these defects. It is well recognized

\*I put "facts" in inverted commas deliberately. As the Dean of Harvard (Dr. Sydney Burwell) put it at a Harvard dinner which I was privileged to attend, "My students are dismayed when I say to them, 'Half of what you are taught as medical students will in 10 years have been shown to be wrong.' And the trouble is, none of your teachers knows which half."

that the growth of scientific knowledge has been accompanied by a corresponding growth in the content of the curriculum: much has been added, little taken away. As a one-time teacher of elementary biology to medical students, I maintain, with some right to an opinion, that compulsory botany for medical students is quite unjustified, though of course a knowledge of it may give, as it has given to me, untold pleasure for a lifetime. Again, there is no justification for the amount of anatomy that is taught in some schools. These are old issues, but there are new dangers.

I have heard extremely intelligent scientists maintain that all doctors need a knowledge of nuclear physics and of electronics. I, personally, can think of few things more useless to the average practitioner, though of course they are essential to certain lines of scientific research. I need hardly remark that neither of the eminent gentlemen who presented these views had a medical degree. These examples illustrate the kind of difficulty that an attempt to reduce the content of the curriculum is likely to meet—the obstinate conservatism of old subjects, the predatory enthusiasm of the new. Each represents powerful vested interests; for the amount of time allocated to a subject in the curriculum is, in a sense, a measure of its prestige; and the more time the larger the staff required and the greater the power and security of the departmental head. I have no doubt that these are very strong motivating forces, though, of course, most teachers are unconscious of them. Hitherto, the student has been sacrificed to these vested interests because there has been no good weapon with which to defend him. A good weapon would be provided by agreement on the purpose of medical education. It would seem to me that the main problem of medical education is this: Will the medical course be arranged primarily in the interests of educating the student, or primarily in the interests of the prestige of the teachers? I say this as a teacher and with a full appreciation of the meaning of the words I use.

#### Collaboration in Teaching

The chief difficulty in integrating the course so that the field of biological science relating to health and disease in man is presented and treated as a whole, and not in discrete and apparently unrelated parts, has been the insularity of so many teachers and departments. Schemes of research requiring the collaboration of different departments are probably the most important means by which men of different disciplines learn what is new elsewhere and how to talk a common language. Notable attempts at collaboration in teaching have also been made, for example, in pre-clinical science at Birmingham. Clinico-pathological discussions and combined ward rounds are other important methods.

Finally, I would like to make a plea for elasticity. Any attempt at defining a medical undergraduate course is necessarily a compromise, and a purely arbitrary one. There are many ways to Rome. We shall never find out the best way so long as all pilgrims are forced to take the same path.

The measures which we have considered affecting the content of the curriculum are all concerned with reducing the time which is now required for memorization, so that enough time can be found for the student to develop his own mind. This time will not be properly used unless there is a revolutionary change of attitude on the part of his teachers. There must be more seminars and tutorials (in the old sense of tutorial and not in the sense of a cram-class) and fewer lectures; more reading of original papers and less of textbooks; more kindling of the flame of curiosity, and a greater readiness by teachers and taught to admit and remedy ignorance. This will not be easy, since most teachers mould themselves on those who taught them. Nevertheless, I can think of one or two universities where the professors are so enlightened that a change of the kind I have contemplated would not be difficult. There is a generation of young men who have experienced such teaching in the final honour school at Oxford, in Part II of the Tripos at Cambridge, and in B.Sc. classes at other univer-

sities and in other ways. They are aware of what such teaching did for them, and I have no doubt that with a little encouragement they could open a new era in medical education in this country. They have a right to expect, and I hope would receive, support from other faculties in achieving this, the common purpose of university education.

### Conclusion

The development of postgraduate education, and, in particular, the institution of the compulsory year of hospital practice under supervision before licence is granted to practise independently, have at last freed the undergraduate course to serve its essential purpose, that of training the student's mind to collect and assess data and to form a judgment on them. The fulfilment of this purpose requires, first and foremost, a change in the attitude of teachers, and, second, a reduction in content and an attempt to integrate the subject matter on which the teaching is based. To quote Karl Pearson: "The true aim of the teacher should be to impart an appreciation of method rather than a knowledge of facts," for method is remembered when facts have been forgotten.

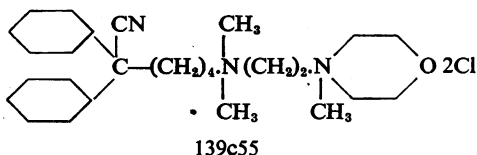
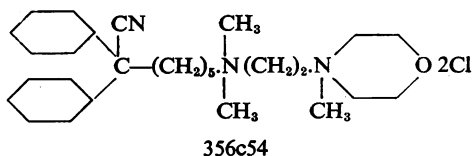
## TWO NEW GANGLION-BLOCKING AGENTS IN TREATMENT OF HYPERTENSION

BY

S. LOCKET, M.B., B.S., M.R.C.P.

Senior Physician, Oldchurch Hospital, Romford, Essex

This clinical communication is based on results obtained in using, since January, 1955, the drug 356c54 and since October, 1955, the drug 139c55, two active members of a recently described group of ganglion-blocking agents (Adamson, Billingham, Green, and Locket, 1956). Chemically, 356c54 is  $N^1:N^1:N^2$ -trimethyl- $N^1$ -(6-cyano-6:6-diphenylhexyl) ethylene-1-ammonium-2-morpholinium dichloride, and 139c55 is the 5-cyano-5:5-diphenylpentyl homologue (also called "presidal").



One very important property possessed by this new group of compounds, seen particularly when they were used in man, was the apparent dissociation between their activity as hypotensive agents and their ability to produce ocular changes and gastro-intestinal disturbances (dry mouth and delay in gastric emptying), a dissociation shown well by 139c55.

For both intravenous and subcutaneous injection we used a solution containing 20 mg. of the dichloride of either drug per ml. After discharge from hospital injections were continued by the patients at home.

### Pattern of Activity in Patients after Intravenous or Subcutaneous Injections

In our hypertensive patients, using as our criterion of effectiveness a fall to or below 100 mm. Hg diastolic (measured in the sitting position), the minimal effective single intravenous dose of 356c54 was 2 mg. and the maximum dose necessary (used by us) was 12 mg., whereas the minimal effective single *therapeutic* dose given subcutaneously was 10 mg. and the maximum dose found necessary was 40 mg. With 139c55 the comparable doses were approximately half these, and the maximal subcutaneous dose used in treatment has been 27.5 mg. (Comparative blood-pressure readings were also always taken in the reclining and erect positions.)

The first detectable pharmacological response occurred after a delay of from 5 to 25 minutes. No immediate response occurred after an intravenous injection, irrespective of the dose given. Usually after an interval of about six minutes blurring of vision occurred. At this stage clinical examination revealed this subjective effect to be accompanied by objective changes in the eyes. Also it was often accompanied or immediately followed by a variable degree of bradycardia. A definite fall in blood pressure occurred within another 10 minutes, but the maximum fall occurred 45 to 60 minutes later. The bradycardia began about 10 to 20 minutes before the onset of any hypotensive effect. When the action of the drug was wearing off, the hypotensive effect gradually disappeared some time before the bradycardia subsided.

When the drugs were given by subcutaneous injection there was a somewhat longer delay, ranging from 10 to 60 minutes but on an average 12 to 15 minutes, before the first signs of pharmacological activity appeared. The pattern of activity was identical with that already described for the intravenous injection, but the duration of the desirable hypotensive action was much longer. With identical hypotension-producing doses the duration of hypotension given by 139c55 was longer than with 356c54—in many cases at least 50% longer and in a few even twice as long. With suitably chosen dosage—that is, that dosage which produces the longest period of hypotension *below* any desired maximum pressure, with the minimum of side-effects—using 139c55, this hypotension often exceeded 12 hours and on occasion 24 hours, and rarely was less than nine hours, and with 356c54 it was rarely less than seven hours and might even exceed 24 hours, though this latter duration occurred much less often with this drug than with 139c55. The maximum fall in blood pressure was reached some 60 to 120 minutes after the onset, and this level of hypotension persisted for some time before it slowly returned to its pre-treatment height.

### Activity After Oral Administration

When an effective dose was given by mouth there could be a considerable delay before a fall in blood pressure began. A dose which was about 12 to 15 times the therapeutically effective subcutaneous dose was the usual effective oral dose, but it has, in an occasional patient, been as low as five times the effective subcutaneous dose and as high as 20 times this dose. The predictability of hypotension after oral administration, though certainly as good as was found in this group of patients using the other commercially available ganglion-blocking agents which could be given orally, in our opinion was not good enough, except in a very occasional case, to justify their use by mouth alone in the treatment of the severest cases. When the single oral dose