

presented to the teacher, who has not previously seen the patient but who in the presence of a senior class takes the history and examines the patient: he then discusses the diagnostic problem presented and might venture on the relative probability of various diagnoses. After this he specifies the investigations which could serve to confirm his provisional diagnosis or clarify the problems of differentiation. He may, for example, examine x-ray films or take note of blood and marrow reports; he will then express his considered views, in the light of his examination and the investigations, on the diagnosis. Those who have seen this kind of class at work describe it as a vivid and memorable experience. As an illustration of method in observation and inference and their importance for clinical studies it can hardly be bettered, and it has on the teacher a sobering influence however well developed may be his *prima donna* instinct.

There is as yet too little experience on which to form a judgment on the place in which training in general practice or in a health centre is for the undergraduate a fruitful addition to our methods of medical teaching.

I have not attempted a systematic or exhaustive thesis on medical pedagogy. I concur wholly in the views expressed by other contributors to this discussion, about the need for the novice in medical teaching to know something of general educational principles and of the psychological factors involved in learning, and to be aware of the scope, uses, and potentialities of the various aids to teaching and of the educational techniques which their use involves; of the value in learning the art of teaching of observing the technique and methods of the most successful teachers, and of discussing his problems with them and seeking their criticism. I have, however, been impressed with the fact that most successful teachers have developed methods of teaching which are suitable to their own personalities and which cannot be fitted into a particular pattern, and that "in the long run systems of education stand or fall by virtue of effort and ideas, not machinery."

The Social Psychotherapy Centre which was recently opened at 7, Fellows Road, Hampstead, has held its first "view day," when groups of interested people—psychiatrists and social workers—were shown round the departments. The activities include art and occupational therapy, therapeutic social clubs, individual treatments, physical treatment in suitable cases, child guidance for those under 7 and those from 7 to 16, and remedial teaching. It is in fact a "day hospital," the patients to the number of a score or more attending at all times from 9 a.m. to 10 p.m. They sleep at home if the home environment is suitable, and if it is not an endeavour is made to find them suitable lodgings. Thus they retain touch with their ordinary environment, and their time at the centre is so fully occupied that they forget their own condition. Patients are also admitted who have been in a mental hospital and are in need of the rehabilitation which is brought about through social clubs, enabling them to return to ordinary life in the most favourable circumstances. Dr. Joshua Bierer, the medical director of the clinic, explained to the visitors the multidimensional treatment employed. He expressed his thanks to the Central Middlesex Group Hospital Management Committee, under whose auspices the centre is working, for making the experiment possible. It was really, he said, a very simple experiment. Its most important feature was co-operation, directed towards the encouragement of self-realization and self-fulfilment of the patients. Various schools of psychiatry were represented on the staff, but staff and outside friends and former patients all worked together in the effort to help the maladjusted and to give each patient the individual attention that he needed. The centre depended largely upon the group idea for its results. The patients at first tended to remain solitary, and then they discovered a group whose feelings they could share and the way was open for normal social life.

THE TRAINING OF CLINICAL TEACHERS*

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This subject is very difficult and ploughs nearly virgin soil. So far as I know, no discussion has taken place directly on this question and little writing has been done. True, for years, and especially in current post-war years, voluminous publications have dealt with the curriculum and the training of medical students and, recently, of practitioners and the need for change. All this impinges closely on our subject but has not tackled the equally important question of the teachers, their capacity, their choice, their training—so fundamental a matter because on it the full success of medical education must be based. I am glad, therefore, to raise the question before a meeting of the best young brains and the future intellectual leaders of our College. I feel quite humbly inadequate, but shall do my best to stimulate more sense and knowledge than mine.

The argument behind the need for improving teaching and the teachers in medicine is simple and was briefly stated in my short letter in the *British Medical Journal* of September 10, 1949 (p. 594). It drew attention to the training, and criticism, that elementary teachers have, not only in the matter to be taught but in the method of presentation and how to teach. In the teaching of medicine, and perhaps especially clinical medicine and its application to practice, training is entirely lacking, and teaching capacity is not considered profoundly when the staffs of teaching hospitals are chosen. I consider that clinical medicine is, for many reasons, the most difficult of subjects to teach, and that some training in it is of paramount importance. Of course, if you accept the old platitude that teachers are born, not made, there is little to be done about it. But I am sure that the educationists would not agree, and I believe that, though bad teachers cannot be made good ones, moderate ability can be improved, and even the born teacher, too. Certainly, the definition of a good teacher would not be agreed upon; but he must, above all, be personally stimulating and questioning. The conference and the academic lecture need other treatment and qualities than those required of the all-important bedside teacher: the manner, the mode, and the material are quite different.

When I reflect that the material to be taught is vast in its details and ever changing, with all our temporary fixities and ultimates becoming penultimate, and that no clear philosophy of medical thought and teaching has been evolved, I am appalled by the complexity of the subject before us. I think, however, that it is possible, and useful, to regard the whole subject from two main aspects.

Diction and Delivery

The first aspect is relatively easy to deal with but is very important. We have all suffered on too many occasions, from our earliest lectures in physics and chemistry to such occasions as this, from inaudible whispering and mumbling, from humming and hawing, from distracting mannerisms, until our attention died and we relapsed into restless boredom or uncomfortable sleep; suffered, too, from mumbling into blackboard drawings, from boring over-explanations of a simple slide, or from bad and complicated diagrams with no explanation. Perhaps worst of all is the opener of a discussion (I must be careful) who wastes time with his prolixity or those following who take fifteen

*An address opening a discussion by Members of the Royal College of Physicians at Bristol.

minutes instead of three. I need not elaborate. Surely we could all be helped and improved in these venial sins by the elocutionists, the educationists, and the friendly criticism of our peers, especially at an early and malleable stage.

Mental Processes of Thought in Medical Teaching and Diagnosis

This second aspect is more deeply important and much more difficult, because it raises the unknown profundities of brain functions and capability, thinking habits and processes, and other abstruse matters.

There is no doubt that, innate ability being equal, the trained mind conscious of the processes and methods of thought will go further and truer than the untrained. This applies to all fields of science, philosophy, and perhaps art. It certainly applies to medicine, but so far as my reading goes I have not been able to find any profound and detailed exposition or analysis of the mental process and principles underlying medical practice and teaching. Many of the best minds in medicine have been aware of the lacuna, and in the last 25 years several authors have written on it—Crookshank, Ffrench, Capon, Lewis, Cohen, Walshe, being particularly stimulating. But nowhere has been enunciated a logical or philosophical approach to the difficult mental processes involved in making a diagnosis, mental methods to which we can systematically turn in dealing with the difficult and ever-widening problems to which the progress of medical science is continuously adding. Hence a well-ordered and wide-viewing mind is more necessary than ever, but its conscious production is entirely omitted in the training of the student and hence those who become teachers.

The mental background of the disciples of medicine has probably deteriorated in the last 50 years, for our fore-runners were widely trained in the classics and the arts, and often in logic and philosophy. There is thus a big cultural gap which must be filled in the training of our students and still more of their teachers: some logic, philosophy, psychology of teaching processes, would help to develop and sharpen the mental acuteness and awareness which we need so badly to increase our capacity and diminish our errors.

I think that medical diagnosis, the application of a vast and expanding body of factual knowledge with no fixed ultimates to the problem of one sick person, is often supremely difficult. What makes our problems still more difficult is that we must usually work and make *rapid decisions* on partial ignorance and imperfect knowledge of disease. Philosophers and religionists can consider their arguments at leisure, and they have no immediate new decisions to make. The lawyer acts on social history and precedents. The man who applies the momentary stabilities of physics and chemistry to material ends has his fundamentals to build on. Patients who work with more inert matter than ours, such as engineers and architects, are often impatient with our ignorance of fundamentals and our incertitude about disease and diagnosis. We can remind them that man did not make the human body nor doctors invent disease—and, if necessary, that disorders even in our man-made motors often defy diagnosis.

The Process of Diagnosis

I propose now to touch on diagnosis and mental processes, more to raise questions than to solve them. The main object of medical education is to train doctors for their life-work in treating—preventing, curing, or alleviating—disease. The first step is the identification of the body disorder we have to deal with—what we call the *diagnosis*

of the *disease*. The importance of diagnosis as the be-all and end-all in medicine has been stressed perhaps *ad nauseam*, and, while the word should really mean a thorough knowledge of the disease process and the body's reaction to it, it is commonly used to mean giving a name to the disorder to fit it into a suitable pigeon-hole in the vast system of nomenclature of disease. No doubt names must be given, but they have the drawback that the name may suggest an unreal entity by no means corresponding to all the facts of the case, and may close the mind to an appreciation of all the facts—the danger of undue nominalism.

The process of diagnosis involves two main steps—(1) the collection of facts, symptoms, and signs, and (2) their collation, interpretation, and meaning—and the teacher who does not separate these aspects can never teach well or practise at the highest mental level of efficiency.

The first of these steps is the easier, and the student is well taught in the collection of data, but in his first clinical year he is pitched too unguided into a new and bewildering world. He has, or should have, a sound glass-case background of the normal functioning and pathological processes of the body, but cannot relate these to the multitude of signs and symptoms and diseases of the patients he meets. It is at this stage, before his memory becomes overpacked with the names and nature of diseases and syndromes, that his mind is most malleable, most ready to feel the need for, and to accept, a co-ordinating system of thought to apply to and put in order the mass of new material. But I believe it is rare that his teachers, however well they instil the techniques of observation and examination, impart a clarifying and unifying system of critical thought, because they have no wide system of their own or are not conscious of it.

The second step—the collation and interpretation of these facts, the making of a diagnosis—is much more difficult and the process hard to analyse and describe, but let me attempt to probe into the mental processes of an expert clinician. By the time a careful history is taken he has already and inevitably formed a primary concept—a first idea of the case—a provisional diagnosis. He must then, by more questions or examinations, search for further evidence which his experience of disease shows is needed to support or refute his first idea. Backwards and forwards he goes from induction to deduction, from general laws, patterns, syndromes of disease he knows, down to the particular problem of the moment and the facts he has found. At any moment his clinical instinct (I prefer to call it intuitive experience) may make a “snap” diagnosis to his own satisfaction and the admiration of students. Such diagnoses are often right, but frequently they are wrong, and if not subjected to further critical analysis have the worst possible effect. The student with limited knowledge cannot see or appreciate such a mental process, which is the exact opposite of the reasoned approach he should be taught.

It seems to me that the detection of disease processes is one of the most difficult of mental exercises: the constant questions of where, what, and why have to be solved positively or negatively, and acted on immediately, as action in treating the patient cannot wait. The detective problems of criminology are relatively simple. Here, in contrast, the question “where and what?” is usually answered by the presence of a corpse and only “why and who?” remains, although I admit the latter question does not bother us in medicine. Fortunately these mental exercises, though hard, are fascinating and natural to the human brain, one of whose innate characteristic needs is to search for an explanation, a logical sequence or pattern of events in

everything. The natural and eternal "why" in human cerebration is seen at all ages, from the simple puzzles of the juvenile to the more complicated problems of the philosopher and doctor—a theory which I have elaborated in a little book (Lawrence, 1947). So if we are mentally alive at all, diagnosis is fun.

Need for a Systematized Method

Now let me stress from another aspect the necessity for acquiring a systematized method of thought in practising and teaching, a defence against the overwhelming difficulties of detailed knowledge, ever expanding. And these details are necessary—detailed knowledge and techniques—for the best treatment of our patients. How is the detailed specialist, in his necessary learning of "more and more about less and less," to retain sufficient knowledge of the "more" and wider aspects to avoid the calamities often arising from narrow specialisms? And how is the hurried practitioner, overwhelmed by superhuman details of all kinds, to be able to retain a balanced sanity by which he can bring to bear on the problem of the moment what wide knowledge he has learned? No doubt the medical curriculum must be changed and be pruned of its impossible burden on pure memory, but it is equally important that the student should acquire a definite basic mental process of thought as a stand-by for ever. This is difficult to evolve on paper, to elucidate in words, to inculcate to many illogical and unreceptive minds, but we must, in order to avoid incompetence, try to retain interest and to continue to progress.

There has been a tendency in certain quarters to suggest a partial division in medical education into two aspects: the first, theoretical or intellectually educative, to be mainly the concern of academic whole-time intellectual highbrows and research workers; the second, the vocational or technical, the concern mainly of part-time clinical practitioners of clinical medicine. Nothing, I think, could be more unreal or disastrous. Both aspects must be welded into a sound fundamental training from which all later activities must constantly stem.

Medicine: Art or Science?

So far I have not touched on the vexed question of the art and/or science of medicine, because to me medicine ought to be a science, and the former word mainly implies a humane and kindly consideration of our patients, an appreciation of their fears, their family ties, their social difficulties. Without the appropriate pat on the shoulder and the well-considered and blessed "white lie" no one can be fully either a good or a successful doctor. Can we teach the art of medicine? Probably only by kindly example. I find it useful, in emphasizing the human side, to ask the student, "If this were your father or mother, your brother or sister, how would you handle the situation and what would you do?" But I think the students, and we teachers in hospitals, too, are apt to neglect the social life and conditions of our patients and could be helped by the house-to-house and day-to-day experience and guidance of a wise and humane practitioner in our midst.

A Diagnostic System

And now may I give you, as an example, the defensive mental mechanism I have produced for my own use to safeguard myself against narrow specialism and to marshal the knowledge I may have vicariously absorbed, but which all too frequently lies latent and intangible—as I have a poor memory? Perhaps it is more an aid to memory than

a scheme of thought. It is an attempt to recall always the where, what, and why of medicine in a simpler way than the "systems of nomenclature." I have put the aetiological "why" first, as it repeats itself constantly in relation to the "where and what."

Causal Agents (Why?)

- I. *Physical and Mechanical*.—External: Trauma, heat, cold, radiations, habitat and environment, etc. Internal: Developmental, stones, obstructions, etc.
- II. *Chemical*.—Poisons and drugs, inorganic and organic.
- III. *Living Agents (Biology)*.—Viruses: exanthemata, etc. Organisms: cocci, bacteria, etc. Multicellular: parasites, etc. ? New growths: benign and malignant.
- IV. *Resulting Degenerations and Regenerations*.—Fibrosis, etc.

System Diseases and Syndromes (Where and What?)

- Cardiovascular and blood and lymph. Respiratory. Alimentary. Urogenital.
- Locomotion.—Bones and muscles. Skin and special senses: position obvious.
- Nutrition.—Metabolism, chemical and vitamin disorders. Endocrines.
- Nervous system.—Autonomic; central nervous system; psychosomatic ("functional").

There is nothing particularly original in this scheme except perhaps the arrangement of aetiological factors in the order of the subjects which we learn in the medical course. No doubt others will evolve different and better schemes to suit their own experience, needs, and individuality. No doubt, too, every specialist must evolve a more detailed sub-branch to cope with his own subject. But I have found the above of great value as an aid to memory to marshal and call to mind facts I really know but might not recall at the moment of need. If all students could acquire and be habituated to use some such scheme they would be equipped with something far more useful than the widest mass of detail that the best memory can hold.

Some Suggestions

You may think I have not said anything directly practical about the training of clinical teachers and that I have so far done little except air a few general principles for further discussion. Some others have written on and discussed the matters I have reiterated, and an address of Professor Capon's (1945) has covered the whole field. There is wide agreement that clinical medicine is supremely hard to teach, that the teachers are not trained, and that consequently their efficiency and their students suffer. I suggest that the following steps should be taken.

A special course on medical teaching must be established by concerted effort. This would be for the registrar grade; also for some junior and perhaps some senior consultants—perhaps even for some students. The teachers present a more difficult problem, but no doubt there would be some interested and capable people available from the medical profession; and it should be easy to find teachers of elocution, lecturers on logic, psychology, perhaps philosophy, and certainly the principles of education (if there are any!). In the first place the course would be short—perhaps a half-day for four weeks would suffice. It would be experimental—extremely so. If, in the first place, it only managed to improve the teachers' elocution and delivery it would have done enough to justify its existence. If it managed to inculcate general principles and an awareness of mental processes it would be doubly justified. In the long run I would hope that these teachers, getting together to form some group, might evolve a philosophy of medical teaching and thought, produce a stimulating book on the subject,

tackle the problem of the medical curriculum, and promote the essential rewriting of textbooks. The whole medical world would be stimulated and benefited. I think that, with the new medical system in Britain based as it is on the soundness of the past, it is possible for this country more than any other to start such an experiment and make it a success.

Conclusion

And who is concerned in originating this worth-while move we are discussing? Obviously the Royal Colleges, the Postgraduate Federation, and the universities. I know, too, that many important bodies such as the Rockefeller and Nuffield Foundations and Unesco are interested. But surely out of all these our own College seems pre-eminently suited, as it should be, to serve so uniquely useful a purpose in modern medicine. But what a pity it is that the conception of an Academy of British Medicine died stillborn.

I will finish by quoting some stimulating words from Walshe's (1948) Harveian Oration: "This College can, and, if it is to survive as something significant in the intellectual life of medicine, must remain a fountainhead of academic medicine, or true learning: the home wherein a philosophy of medicine finds a permanent abiding-place and disciples eager to learn and teach it." I hope this meeting will show we are imbued with this spirit, this faith, and this endeavour.

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CLINICAL EVALUATION OF EFFECTS OF DRUGS ON MEDICAL STUDENTS AS A TEACHING METHOD

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In the past the medical student often first became acquainted with drugs when faced with the laborious task of trying to write and compound prescriptions to the satisfaction of his teachers. He had little first-hand knowledge of the action of drugs, and the clinical evidence of their effects on patients was often confusing and difficult to interpret. The drugs in use to-day are potent and valuable remedies. It is therefore the responsibility of those who train medical students to ensure, as a prerequisite to safe and effective therapy, a sound knowledge of the principles of pharmacological action.

Numerous experimental methods have been devised to demonstrate the action of drugs on isolated tissues and in the intact animal. Such methods provide the fundamental approach, but the criticism has been made that the student often fails to appreciate the connexion between these effects of drugs and their clinical application. The experimental study of the action of drugs on normal man is a logical

step in the process of understanding the effects of drugs in disease. For this reason part of the practical course in pharmacology given to preclinical medical students at University College, London, consists in observing the effects of various drugs administered to members of the class. The experimental methods used and the results obtained in a class of approximately 70 students are described below.

The class was held once a week and lasted approximately five hours. The students worked in pairs, each acting in turn as subject and observer; during the experiment they were housed in cubicles, each cubicle accommodating two pairs of students and one member of staff acting as supervisor. The subjects were all normal healthy male or female medical students. In each experiment the selection of drugs to be studied was at random, and each student drew from a hat a numbered card representing a dose of a particular drug or inert substance the identity of which was not revealed until the experiment was concluded and the observations fully recorded.

Three types of experiment were carried out, in each of which the drugs were administered by a different route, in order to assess the following: (1) the analgesic activity of certain drugs when given subcutaneously; (2) the effects on voluntary sensory-motor co-ordination during inhalation of mixtures of nitrous oxide and oxygen; and (3) the effects of drugs, which were taken by mouth, on the performance of three tasks involving rate of voluntary movement, sensory-motor co-ordination, and sustained attention and muscular control respectively.

1. Assessment of Analgesic Activity

Method

Thirty-five subjects were used for estimating the analgesic potency of the following drugs: morphine, 10 and 15 mg., amidone ("physeptone"), 10 and 15 mg., pethidine, 100 and 150 mg., and physiological saline, 2 ml. Thus each dose of each substance was tested on five students.

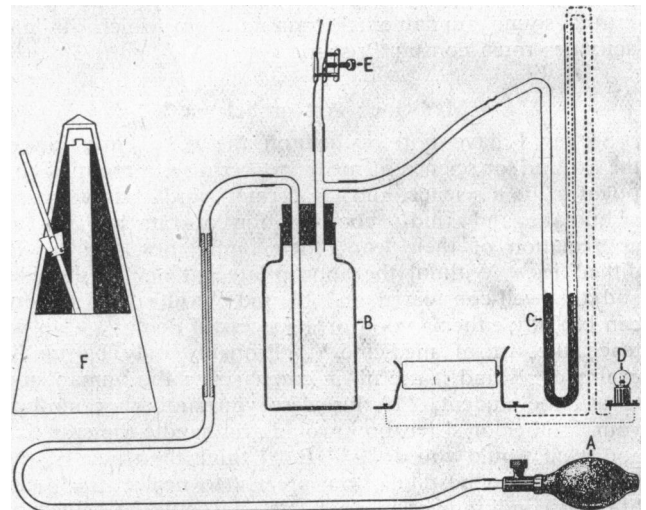


FIG. 1.—Apparatus used for producing muscle ischaemic pain.

The apparatus used to test the effect of these drugs was one that produced the pain of muscle ischaemia of the forearm in a manner resembling that originally described by Lewis, Pickering, and Rothschild (1931) and later modified by Harrison and Bigelow (1943).

The subject lay on a couch and a sphygmomanometer cuff was placed on each upper arm. Muscle ischaemia was produced by inflating the cuff to 160 mm. Hg, and the subject contracted the muscles of the corresponding forearm