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THE TEACHING OF ANAESTHESIA

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THIS lecture is named for Arthur Guedel. No more fitting name could have been chosen to commemorate a newly instituted Lecture in Anaesthesiology, and particularly for one to be delivered in this enlightened and progressive university city in which Guedel lived and worked for so long.

Guedel was not only a pioneer in anaesthesia, but a great pioneer, because his contributions had a very different quality from those of his contemporaries. In his day, far from there being few individuals interested in anaesthesia, and therefore the fruits of invention and observation more easily gathered, there were as many pretenders to fame as there are now. In his day every doctor, physician, or surgeon, and indeed many others outside the medical orbit, felt qualified not only to administer anaesthetics, but to invent apparatus, try new combinations of the then known drugs, and to write with authority on the subject. Then as now, much of this furore was repetitive. In general, beliefs were founded on poor observation and still poorer deduction. Many hypotheses were put forward but little or no experimental work was carried out to support them.

The methods of anaesthesia used by Guedel's generation were comparatively simple, and the impression was general, both within the medical profession and without, that little skill or knowledge was required for the administration of anaesthesia. On the continent of Europe as distinct from Great Britain, it was the custom right up to the outbreak of the second World War, even in university hospitals, for the most junior assistants of the surgical team to take turns at being anaesthetist. In less exalted hospitals, the operating room porter or, at best, the nurse would be given the job. In the United

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States, Guedel was one of a handful of men who devoted themselves to anaesthesia, in strong contrast to the then almost universal delegation of this branch of medicine to nurses. He followed truly in the tradition of John Snow and Joseph Clover, those great British anaesthetists of the nineteenth century. His eye was acutely perceptive and his mind sharp and logical. He lived in and responded to a period which saw a striking change in the methodology of medical science. The new interest and reliance lay in objective phenomena rather than on what, even to the present day, is still called clinical impression or "hunch." It was Guedel's need during the first World War to establish certain easily understood objective guides to the safe administration of anaesthesia by non-medical orderlies that started him on a career in which he became one of the most famous and honoured teachers of anaesthesia in the world.

While Guedel was laying the foundations of scientific anaesthesia, the subject was regarded as so unimportant a part of the armamentarium of a doctor, that few medical schools had more than rudimentary arrangements for instruction in this subject. Many ignored it altogether. Even as recently as 1940, Ralph Waters, a contemporary and lifelong friend of Guedel, in urging medical schools in the United States to include anaesthesia in their undergraduate curricula, gave some of the reasons which were apparently then being put forward to justify the neglect of this subject. These reasons are also applicable to the still widespread apathy where anaesthesia is concerned. Here they are, with answers which fit today's situation.

Firstly, that an insufficient number of physicians would be interested. There is at this moment a grave, almost desperate, shortage of anaesthesiologists, a fact which is continually being emphasized by responsible bodies of anaesthesiologists in this and other countries. As a result an increasing, and to some, a disproportionate, number of doctors are taking up the subject.

Secondly, that excellent instruction was given in the basic sciences in the pre-clinical period, and that further clinical instruction was therefore unnecessary. If this is true of anaesthesia it is equally true of all clinical medicine. Such an attitude is patently absurd. Its adoption would increase what is already a serious danger in this field, the production of men who know almost everything about anaesthesiology except how to administer an anaesthetic.

Thirdly, that serious and impractical economic adjustments in the administration of hospitals would have to be made if physicians anaesthetists were to take over anaesthesia on a large scale. This problem is still with you. It has already been partly overcome, and, I am sure, will eventually be entirely overcome. It is unthinkable that in this immense, prosperous, and generous country, a financial difficulty will stand in the way of providing medical care of the very highest standard for the public.

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Fourthly, that the administration of anaesthesia is not a science but an art, and as such could be done by anybody, with scientific training. This reason has surely lost its significance. The practice of anaesthesiology is now clearly seen to be the application of a vast accumulation of physiological and pharmacological knowledge transferred from the animal laboratory to a sick human being.

Two other apologetic reasons were also given in Guedel's day for the neglect of anaesthesia. It was said that a little knowledge was a dangerous thing, and only a little knowledge could possibly be given to the undergraduate. It was also said that anyway the curriculum was overcrowded. These two points have some substance and are worth examining a little closer. Anaesthesia is as much a part of the corpus of medicine as any other specialty. As such, every well-educated doctor must be aware of its applications, its triumphs, and its limitations. How far the undergraduate should be led to consider himself competent to perform the complex and dangerous methods of modern anaesthesia is another matter. In my own country the older view that the medical curriculum was designed to produce a general practitioner, is rapidly giving way to a newer and more acceptable concept.

The medical curriculum is probably more sensibly regarded as providing little more than a basis on which postgraduate medical knowledge can be built. The undergraduate can expect little more than to learn a variety of terminologies, to get to know his fellow man as a biological entity, and to train himself to observe accurately the changes of diseases and to form a balanced judgment on what he has observed. And lastly, though not least, as one thinker has put it. to be in contact with the philosophy of the great. On completion of his medical training, the young doctor is equipped to begin the serious study of one or other of the various branches of medicine of which general practice is one, and anaesthesiology is another. The undergraduate should, therefore, certainly receive instruction, both theoretical and practical, in anaesthesia. The emphasis, however, might well be placed on the detection and treatment of physiological disturbances such as respiratory obstruction and depression, circulatory failure, and coma in general, which every doctor is bound to meet in the course of his general medical work.

This view is put very neatly by the General Medical Council in Britain in their new Recommendations to Medical Schools. They advise, that "the value of utilising a specialty in a limited field, to demonstrate general principles of medicine should be borne in mind." The purpose is not to teach the undergraduate to *practise* anaesthesia, but to teach him *about* anaesthesia. To practise anaesthesia, he must surely receive further training of some sort as a postgraduate. I realise only too well that many regard this view as yet but an ideal. Wherever it has been insisted on by enlightened communities, the

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alarmingly high rate of death and near-death owing to anaesthesia falls dramatically.

I now come to postgraduate instruction and the training of the specialist. Anaesthesia has advanced rapidly, perhaps more so in the post war years than any other branch of medicine. Every single aspect of this specialty has changed for the better for both the patient and surgeon, offering better health and less risk to the one, and facilitation of surgery to the other. This statement, however, must be most emphatically conditioned by the need for the highest level of training, knowledge, experience, and skill on the part of the anaesthesiologist who uses present day methods. Used at the wrong time, for the wrong patient, in the wrong manner, modern advances in anaesthesia lead to morbidity and even death. Powerful drugs are used haphazardly by those unaware of their pharmacological effects and clinical complications. Techniques already condemned in the literature or at meetings are used by those who do not read the literature and do not go to meetings. If we are to ensure that the advances in anaesthesia remain real ones and do not become false, we must as a community insist on proper training for those who are to administer anaesthetics. The pitifully small time set aside for this purpose in the undergraduate curriculum cannot provide any satisfactory basis for the safe administration of anaesthetics after qualification. Postgraduate study must be obligatory in a branch of medicine which carries with it, as we know, a high mortality, to say nothing of morbidity, at the hands of the inexpert. The pitfall in postgraduate training, if it is to be short, as it may have to be when providing a level of skill sufficient for routine needs but falling short of that expected of the wholetime specialist, is to emphasise the technical level at the expense and even to the exclusion of what is called theory. The important basis of anaesthetic training at any level is physiological and pharmacological. Wherever the technician flourishes, be he medical or lay, there will anaesthesia stagnate and its advances be only apparent to the eye which sees but the glitter of the equipment.

There is a widespread feeling, and I must confess I believe it has a great deal of justification, that in the arrangements for training the specialist too much attention is devoted to maintaining a hospital service and too little to providing the proper atmosphere of learning and the proper knowledge and enthusiasm on the part of his teachers. Too many future specialists in anaesthesiology are learning their work as best they can while expending their energies in providing a hospital service. The inevitable result of this arrangement is the growth of a generation of technicians, for they are little more. These men and women are well able to provide the routine procedures demanded of them, but they all too often fall short, to the dismay and concern of their medical colleagues, of the true aims of specialist training.

In preparing this lecture I consulted some 41 papers of which 15

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were written within the last five years, on the subject of the teaching of anaesthesia. While a great deal of advice is offered on how to organise courses of instruction or of seminars, what sort of cases ought to be reserved for postgraduates, how much time ought to be spent on various sorts of work, or the number of dogs that ought to be provided for experiment, none of them enters in any discussion of the aim of all this training. None suggests what sort of individual it is hoped will emerge from the training programme, to whom the description of specialist could properly be applied. If there could be agreement on what qualities anaesthesiologists ought to possess, the best kind of training for that end might become clear.

A specialist of any sort must have a wide and sound knowledge of the medical field as a whole with a breadth of vision essential to a balanced and critical outlook. He must be a well-educated individual in both the humanities and the basic sciences, without which general trends, forces, and interrelationships between branches of knowledge within the field of medicine as a whole, cannot be properly appreciated and understood. In addition, he must possess a mature personality, be aware of the life of the community around him, and be able to sense almost subconsciously the needs of the community and of medicine in terms of his own specialty, and so to develop an acute if subconscious sense of time and place for advance and development.

In considering the specialist anaesthetist we can add certain more specific aims:

First and foremost comes technical proficiency in all the various manoeuvres which form the external expression of the anaesthetist's work in the operating room and wards. I may be taken to task for putting technical efficiency at the top of my list, but I have been struck with the uselessness and futility of the specialist who knows a great deal about anaesthesiology but little about anaesthetics. All his training is of little avail if the specialist cannot induce anaesthesia smoothly, cannot pass an endotracheal tube with facility, cannot perform a spinal puncture with certainty and cannot block a required nerve with expedition. It has become a little fashionable to deride technical skill. Indeed, in a recently published paper the four essential qualities of an anaesthetist were given as sympathy, honesty, strength, and skill in that order. I cannot entirely agree with this. However much one may deprecate lack of sympathy, dishonesty or weakness, lack of skill is the one wholly unforgivable thing in a specialist. Unfortunately, however, the acquisition of technical skill alone has until recently been almost the sole hallmark of the anaesthesiologist. We must lift our sights a little higher if we are to keep in proper line with the development of anaesthesia as largely a science of applied pharmacology and physiology in a limited field.

He must have a wide knowledge and understanding of the physiological and pharmacological processes involved in the administration

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of anaesthetics. The disturbances in the general bodily economy produced by anaesthesia are very widespread while the influence of disturbed health on the effects of anaesthetics is equally so. Unless the specialist can equate anaesthesia and deviation from the norm in both directions, and be able either to restore normality, or to minimise any disturbances, he is not performing his full function.

He must be temperamentally as well as educationally fitted for this particular type of work. The place of the anaesthetist in the surgical team is now becoming crystallised, and unless the anaesthetist is prepared to occupy that place with satisfaction and equanimity, anaesthesia ought not to be for him. The pugnacious, quarrelsome type who is unable to form part of a team of which he can rarely be the head should be dissuaded from continuing with, or better still, from entering upon an anaesthetic training. The critical selection of suitable entrants to this specialty is a vitally necessary ideal if the other aims are to be fully realised.

He must be a mature doctor in every sense of the word, with a proper sympathetic approach to patients especially to those in pain and fear. He must find satisfaction in being in contact with human beings, and not regard his work in the operating room as something in the nature of a scientific exercise, which has little to do with people as individuals.

He must be able to transfer his specialised knowledge gained in dealing with unconscious patients and in the administration of a variety of depressant, analgesic, and other drugs to problems in other medical fields. Examples come readily to mind; the care of patients with spino-bulbar poliomyelitis, tetanus, poisoning with barbiturates and similar drugs, the administration of oxygen and other gases, and the treatment of pain especially by means of nerve blocks. All these require, not only technical skill, but also a good knowledge of the diseases concerned, and above all good judgment as to what therapeutic measure is likely to have the best results and when to apply it.

He must have an inquiring lively mind with the word "why" constantly bubbling to his lips. With this must go a healthy, though informed critical appraisal of pronouncements, especially from those for the moment in authority, so that dogmatic statements from them, based on little more than individual preferences, never get a chance to become established as the truth.

The last of my aims and by no means the least, is to produce an individual well able to advise administrative authorities on problems connected with his work, and to take his part in the complex machinery of modern hospital life.

From this list, I have deliberately omitted the ability to teach and conduct research, because I feel that these activities however desirable are not fundamental requirements of the specialist anaesthetist whose real and primary function is to serve the daily needs of the community for anaesthesia as an adjuvant of surgical treatment.

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Now to consider some of these aims a little further. Technical efficiency, which I placed so high in my list, can only be acquired by constant practice and correction in the operating room and at the bedside. Any training scheme for a specialist anaesthetist which does not include a very great deal of practical anaesthetics, first under supervision and then alone, is to my mind worthless.

The teaching of practical anaesthetics, however, presents certain special problems, since it is next to impossible for the pupil to acquire the necessary skill, confidence, and judgment, unless he is allowed to take over the administration almost completely in his own hands, with the teacher at the most standing near, supervising his actions. Things often go wrong in the early stages of learning anaesthetics. The surgeons concerned, therefore, must realise the need for a kindly temperament, and sympathetic understanding, without which training in anaesthetics cannot be carried on. To complicate the matter further, the degree of skill required in any particular instance must be possessed in some modicum by the pupil and no possible hazard must be offered to the patient. Learning practical anaesthetics is like learning any manual art. Watching is but a small part of the acquisition of such skill and can never take the place of practical experience.

One American author, in fact living in this city, describes the progress of the beginner very nicely in the following terms. He says that the beginner goes through three stages of learning. In the first stage, he finds anaesthesia is interesting and believes that it is a subject which can be conquered by hard work and the application of the principles he is being taught. This stage continues so long as he has individual supervision and meets little trouble. The next stage occurs as the individual instruction is diminished and difficulties arise. He blames all his troubles on his equipment or other extraneous factors and fails to recognise his own inadequacies. When he realises the cause of his difficulties he enters the last stage which is that of true learning through self-evaluation. He realises, as this author puts it, that in the anaesthetic management of cases, he is called upon to make emergency diagnoses from minute to minute, and then handle the emergency as a practicing physiologist and pharmacologist.

During his protracted period of heavy clinical experience, the future specialist gradually acquires a proper feeling for being a member of the surgical team. He knows the correct moment to express an opinon, when to defer to others, and when to make an issue of any differences. He learns how to invite confidence and in general, how to conduct himself with dignity.

His second aim is the acquisition of an adequate knowledge of physiology, pharmacology, medicine, surgery, electronics, engineering, and those multitudinous branches of knowledge which overlap into the field of anaesthesia. No one person can be expected to have a profound knowledge of all these sciences. The specialist anaesthetist

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needs to know sufficient to enable him to have a deeper understanding of his own work, to follow current research work intelligently, and to realise his limitations when he wishes to undertake research. This sort of knowledge so vital for the true specialist can best, if not only, be acquired in a university atmosphere, and is one important reason for putting forward the plea that I shall elaborate again, that an important period of any specialist training should be spent within the atmosphere of a university hospital.

It is not every specialist who is a good teacher. Teaching is an art and needs an inborn temperament and emotional makeup to be wholly successful. Many years of training and practice, in addition, are necessary before any teacher becomes a good one. The average specialist should, therefore, not ordinarily be expected to teach, as he is at the moment if residents are employed at his hospital. The training of anaesthetists is by and large placed haphazardly up and down our countries in the hands of specialists who, while excellent anaesthetists, vary widely in their teaching abilities. Very few indeed have had experience of teaching others. Many have never been taught themselves. In university establishments, however, the staff, has, one hopes, already been selected among other things for their demonstrated ability and interest in teaching others.

The ability to conduct research is also not necessarily a requirement of the specialist, although the ability to understand, to be critical of, and to evaluate other people's research is. The trainee, of course must be taught clearly what is meant by research and this is best done in places where worthwhile research is in progress. He learns, for example, that the contribution of new knowledge does not necessarily require the use of complex instruments, for the proper use of which special training is generally necessary, but that it invariably requires an inquiring mind and an ability to observe acutely.

A discussion of aims of training necessarily leads on to a consideration of some of the ways in which the aims might be realised. Two American authors in 1951 speaking about the training of future specialists in anaesthesiology in this country expressed thoughts which apply equally well to my own with some force. The first one said, "No longer is it possible for high quality medicine to be taught by the simple mechanism of throwing the swimmer into the stream and assuming that he will gradually on his own learn how to swim." The other said, "Should residents in anaesthesiology be exploited? In too many instances residencies are established only for service and teaching is secondary." The more I observe the way in which young anaesthetists work in hospitals in my own country and in this, the more I am impressed with the way that we are trying to teach them to swim by throwing them into the stream and that so many resident posts have been established to cater to the needs of the hospital service rather than to produce well trained specialists at the end of a number of years.

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Few staff anaesthetists have either the time, the inclination, or let it be admitted, the ability, to teach junior anaesthetists to become specialists in the fullest sense of the word. The operating room is the workshop of the anaesthetist and it is there, no doubt, that the young specialist must learn his technique to a high degree of perfection. Discussions on the whys and wherefores of procedures, and of their possible complications, are an essential accompaniment to technical training. These discussions must be conducted in an atmosphere of calm and quiet outside the operating room. Few hospitals have facilities of this sort and very few of their staff have the time.

The proper base on which the superstructure of training should be built, is the university anaesthetic department. In this place the beginning and ending of training truly takes place. In the middle period, one of acquiring practical experience and confidence, the peripheral hospital can play its part and both help itself and the young specialist. In the university hospital there is the greatest chance that the aspirant, in company with others of his own standing, will find that enthusiasm, devotion, and fervour for anaesthesia, both practical and theoretical, which alone can give him that distinction which marks the specialist from the technician. The small hospital, which in any case so badly needs fully trained men rather than juniors for its anaesthetic work, is less likely to supply this atmosphere. A good deal of equipment is needed for teaching, quite apart from a wide variety of surgical and anaesthetic problems. A meeting room, various visual aids, a museum, a library, literature and abstract files, and of course expert co-operative colleagues in other branches of knowledge ready to lend a helping hand. These are the basic needs for training and they are rarely to be found in a small hospital. Britain and the United States have the finest anaesthetists in the world by present-day standards. We shall not be able to say that by to-morrow's standards unless we realise that anaesthesia is long past being a simple technical art, and that its practitioners of the highest grade, the specialists, not only need the very best artistic training but need a rigorous scientific one as well.

Arthur Guedel whose memory we honour to-day, combined in good measure all the desirable qualities of a specialist upon which I have dilated. Without formal training in anaesthesiology, he perceived the need and value of a wide medical knowledge, of careful observation, and of the very best endeavour and desire to transmit his experiences to others. There is not an anaesthesiologist alive to-day, who does not benefit from the patient careful labour of Guedel, from his lucid literary contributions on the subject, from his ability to teach and lecture, and from the new standards he set in that hitherto neglected branch of medicine. Lastly, in company, I am sure, with those others who had the privilege of knowing him as a personal friend, I pay tribute to the generous, warmhearted humanity of Arthur Guedel, a great physician and anaesthesiologist.

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