SOME ASPECTS OF POSTGRADUATE SURGICAL EDUCATION IN THE UNITED STATES OF AMERICA AND SOUTH AFRICA*

ANTHONY J. LEONSINS, F.R.C.S. (EDIN.), *Senior Tutorial Surgeon, University of the Witwatersrand Medical School, Johannesburg*

Having recently returned to Johannesburg after 1 year in the United States, where I had excellent opportunities to note the trends of postgraduate and undergraduate education, I feel that there are aspects of their training programmes that could be utilized with profit by South African schools. After 14 years of personal experience in full-time academic surgery I feel reasonably qualified to offer comments in this field. Professor Churchill, a doyen in the world of surgery and medical education, states: 'The days are past when a great consultant and a great professor are synonymous. Today they are two different careers and not competing with one another. A great consultant is usually not a great teacher and *vice versa*. The ancilliary advances in surgery, standard techniques, antibiotics and post-operative care have made it safe for the patient to be operated on by young trainee surgeons under supervision. There is no question that the senior surgeons of an older school are good and able men but they cannot encompass the modern scene as clearly as younger surgeons trained in a different era.'

The following lengthy quotation is from a report to the American Surgical Association by the special committee on Graduate Surgical Education, April 1953, of which Prof. Oliver Cope, of Harvard University, was the chairman:

'Criticisms of present-day graduate teaching are numerous. The most obvious is that too few surgeons are really interested in anything but the technical training . . . . Such narrowness of interest in the teaching stems, of course, directly from the narrowness of the concept of patient care. The interest of too many surgeons flags the moment the incision is closed. It is a rare surgeon whose understanding of fluid balance, nutrition, aetiology and preventive medicine of the diseases of his own interest carries the same stamp of authority as his technical competence. So, too, for the social aspects of patient care. Too many surgeons pride themselves on the narrowness of their knowledge and technical capacity. It is as if they thought ignorance outside their sphere indicates greater knowledge within. Such pride is absurd when it is realized how broad and intricate medicine is. What is worse, it smacks of irresponsibility.

'It is also a fair criticism that too few surgical teachers appreciate curiosity. Research is something effete and for the physician . . . .

'Careers in teaching at the graduate level should be fostered as much as in the undergraduate education of the medical student. Universities must share responsibility with hospitals. Older men must be generous in affording opportunities to the younger . . . . . The older surgeon must stop deprecating research in fundamental medicine . . . .

'Whether prolonged graduated residency (registrarship) or apprentice system is practised, what counts is the atmosphere. Education is best carried out in an atmosphere which is intellectually demanding . . . . The surgeon must be emotionally secure enough to match his wits with his colleagues. Instead of ridiculing and criticizing their shortcomings, he must support vigorous departments of medicine, psychiatry and the laboratory services. A free exchange of thought is to be encouraged by combined clinics and frequent consultations . . . .

'A common criticism of many graduate programmes is that the hospital and the staff make use of the intern and resident rather than contribute to their education. Where the practical day-to-day care of patients involves several medical men at levels from students to senior surgeon, it is often difficult to strike a reasonable balance between usefulness and learning. Both are often involved at the same moment. The balance struck depends upon the true interest of the staff in teaching.'

The Committee concluded its deliberations by acknowledging that the influence of the American Boards and the College of Surgeons has been of the greatest benefit because organization of good graduate training programmes followed the stipulations laid down by these authorities. The broad scientific nature of the examinations given by the American Board of Surgery had injected an educational aspect into the programmes. However,

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they deprecated narrow and extreme specialization. They learned much from examining the procedures of the Royal College of Physicians and Surgeons of Canada. 'A 5-year curriculum of graduate education and training leads to the examinations for Fellowship in Surgery or in a speciality. A broad education is demanded before qualifying. The examinations are rigorous and include examinations in the medical sciences'.

No doubt the new College of Physicians, Surgeons and Gynaecologists of South Africa has learnt much from the Canadian system in contrast with the English or Scottish systems. These latter UK examining bodies do not demand a preliminary approved 4- or 5-year graduated registrarship and it is conceivable that many examinees for these higher diplomata may have never performed even a small variety of major operations!

Naturally, the necessity for a 4- or 5-year training programme is not merely for the acquirement of surgical technique but also to cater for the individual who has research ideas. Prof. Owen Wangensteen, of the University of Minnesota, states: 'The most fundamental requisite of a research project is an idea. A disciplined imagination is at the bottom of every great discovery. The person professing to want to do some research must be looking for something . . . . Persons with ideas may lack intimate knowledge of methods, tools, or techniques by which to undertake the solution of a problem. And frequently, too, persons who have an intimate acquaintance or mastery of techniques are devoid of ideas. Obviously, therefore, for the successful prosecution of research, a combination of talents is necessary, in which a fusion of effort with others gives an accelerated momentum to the project. No one was ever great by imitation. The touchstone of the scientific method is the universal validity of its results. It establishes a finality of proof and agreement which puts aside all speculative rationalization. Such is the superiority of the experimental method over logic.'

A great deal of the progress in the medical and surgical world is due to preliminary research in the laboratory and its application in the clinical wards. This obviously requires a closer liaison between the clinical man and the laboratory man. This link is provided by the registrars, who should have easy access to both. In the Witwatersrand medical school we are slowly understanding the need to integrate our teaching and practice by increasing our cooperation with the basic science departments. Instead of relying wholly on small unit staff meetings we hope that all of us will realize that it is necessary for the whole surgical division to meet more frequently in order to discuss unit records, mortality, morbidity, interesting cases, research results and trends, and organize grand surgical rounds for the benefit of all graduates and students.

HISTORICAL

A brief historical survey of the state of affairs in the United States may be of interest. In 1870, although there were about 20 university medical schools in Germany, there were no medical schools of university rank in America. In 1878, Dr. William Stewart Halsted, a graduate of Yale and Columbia Universities, then aged 26, went to Europe for 2 years of study. The greater part of his time was spent in Vienna, Leipzig, Würzburg and Halle, and he was most influenced by the teachings of Volkmann, Billroth, Thiersch, Bergmann and Mickulicz. As Professor Blalock expressed it, 'These were the golden days in medicine. Bacteriology was dawning, embryology and histology were developing, pathological anatomy was being studied with great vigour and the teachings of Lister were being accepted in Europe. These 2 years had a profound influence on the future of Halsted who was aware of the many deficiencies in the medical schools and hospitals of America. Among other benefits this period of freedom from clinical duties allowed time for study and thought'.

In 1889, the Johns Hopkins University and Hospital were completed. The dean and professor of pathology was Dr. William H. Welch; Osler was head of the department of medicine and Kelly of gynaecology. The professorship in surgery was offered to Sir William Macewen, of Glasgow, but it was refused and Halsted was appointed for 1 year on an 'acting' basis as surgeon to the hospital. When 2 years later he was appointed professor at the age of 39, Welch said that 'no greater good fortune could have befallen the Johns Hopkins Hospital than to have Halsted as Surgeon-in-Chief. He was also instrumental in developing the full-time residency training programme which later proved to be a superb system of postgraduate medical education. He created the first genuine school of surgery in America'. The two principal features of this residency system were (1) a close blending of the work of the basic sciences and the clinic, and (2) a prolonged postgraduate training in which the best candidates were retained for a term of several years. The Halsted modification of the German system consisted in the main in the concentration of responsibility and authority in the resident (or registrar) rather than in the Geheimrat (or chief). In 13 years Halsted had trained such men as Cushing, Bloodgood, Mitchell and others. Among his group of 238 resident surgeons there have been 37 professors, 14 clinical professors, 18 associate professors, 14 clinical associate professors, 17 assistant professors, 16 clinical assistant professors and 23 instructors; the remaining 99 were private surgeons.

MASSACHUSETTS GENERAL HOSPITAL

In 1938 the American Board of Surgery established a 5-6 year period of graduate training as a standard for all surgeons. At the Harvard School and the Massachusetts General Hospital, where I had most experience, there are 140 general ward surgical beds, 100 for the surgical specialities (orthopaedics, urology, neuro-surgery) and 300 private surgical beds. Annually there are 7,000 general surgical and gynaecological admissions. In 1939, this hospital departed from the Halsted pyramidal programme and established the *horizontal or rectangular system* because this latter eliminated or reduced the excessive and prolonged competition which was found to be soul-destroying for so many aspirant trainee surgeons. The rectangular programme depended upon two assumptions: (*a*) That men can be selected with sufficient accuracy during their final student year or during internship to assure first-rate service in a long training period, and (*b*) that it is better to offer the educational facilities of a large teaching hospital to a group of 8 or 10 highly selected individuals than to concentrate these facilities for the benefit of only 1 or 2 a year.

The present residency training programme at the Massachusetts General Hospital was outlined in the Warren Report of 1950. It provided for the *selection of* 8 *surgical house officers a year* (note there are only 2 services at the Massachusetts General Hospital whilst there are 5 such services in the General Hospital, Johannesburg), each man, so long as his performance was satisfactory, to finish *a programme of increasing responsibility lasting* 5 *years*. Included in this 5-year period may be an 'elective' year which the individual may spend at another approved institution familiarizing himself with problems of investigation or acquiring theoretical and technical skills in the basic sciences. This additional experience would naturally be for the ultimate benefit of patients and for the increasing efficiency of the hospital services. The opportunity, as here outlined, of pursuing a 5-year course of surgical training and education is of course conditional upon satisfactory performance. But no one year of that training (which includes the compulsory internship year) is considered probationary to the next in the sense that only a certain proportion of house officers will be kept on. Conversely, no appointee is under obligation to pursue the course to its finish if it becomes apparent that his abilities lie elsewhere. A small proportion alter their course for one reason or another and thus provide a certain degree of flexibility to what otherwise might become an excessively rigid and top-heavy system. In this way an occasional appointment to one of the upper rungs of the resident ladder may fall vacant.

Method of Selection

An interesting feature of the selection of surgical interns at the Massachusetts General Hospital is the selection each year of 8 men on the basis of medical-school credentials and a stiff competitive examination given by a committee of staff surgeons. All men started their training on 1 July. Applications for these intern posts came in from nearly every prominent medical school in the US and the examination and selection committees, comprised of 20 surgeons of the surgical division, were kept very busy for 2 or 3 days in making their final selection of the 8 interns who would continue as residents for a further 4 years.

I was privileged to sit in with one screening subcommittee of 4 surgeons during the intern interviews and examinations and was most impressed by the high standard. There were 72 final-year medical-student applicants from all over the country for 7 surgical appointments. A 1-hour written examination and a 20-30 minute oral examination by the subcommittee of 4 surgeons were the chief features. The final committee, under the chairman-

ship of Prof. E. D. Churchill and consisting of 6-7 senior surgeons further considered the 3-4 most promising men from each of the 3 screening subcommittees. Potential interns were interviewed a second time before a final choice was made.

Training Programme

Table I shows a representative training programme. Each general surgical service has 70 beds, and is divided into a female

TABLE I. MASSACHUSETTS GENERAL HOSPITAL REPRESENTATIVE TRAINING PROGRAMME

First Year: Surgical Intern	
General surgical ward	3 months.
General surgical emergency ward and out-patients	3 months.
Gynaecological ward	1½ months.
Fracture service	1½ months.
Neuro-surgical ward	1½ months.
Urological wards	1½ months.
Second Year: Third Assistant Resident	
General surgical ward	2 months.
Anaesthesia	2 months.
Anaesthesia emergency ward and out-patients	4 months.
Private pavilions	4 months.
Third Year: Second Assistant Resident	
Gynaecological ward	4 months.
Neuro-surgical ward	2 months.
Urological ward	4 months.
Private pavilions—gen. surgical	2 months.
Fourth or Elective Year: Second Assistant Resident	
One year in a basic-science or surgical research Laboratory or outside affiliated hospital	6 months.
Orthopaedics	4 months.
Private pavilion—gen. surgical	2 months.
Fifth Year: First Assistant Resident	
Gynaecological	4 months.
The responsible surgeon-resident for male ward	4 months.
The responsible surgeon-resident for female ward	4 months.
Sixth Year: Chief Senior Resident	

and male section. Each service has 1 senior or chief resident, 2 assistant and 2 junior assistant residents, and 4 interns. As the system of rotation is employed there are 32 assistant residents.

On the average there are about 100-125 operations performed per month in each of the two services and excluding private cases performed in the private pavilions. There are many visiting surgeons on the staff, of whom groups of 4 also have a turn at duty with each service, changing every 4 months. These visiting surgeons act in a supervisory capacity and once a week they conduct a clinical round and preside over the staff meetings. This service meeting analyses the interesting pathology encountered during the week, and discusses mortality, morbidity and problem cases. A complete typewritten statistical record is maintained and after this has been perused it is submitted to Professor Churchill for permanent filing. A list of the operations and the surgeons who performed them is also included. In addition, once a week a 1-hour grand surgical round or clinic is held in the large teaching amphitheatre, where the most interesting cases from both services are presented to a large audience of staff, visitors, students and nurses. The residents conduct these entirely and questions, opinions and criticisms are invited from the senior staff and visitors. Mistakes are freely admitted and constructive suggestions for diagnosis or treatment are put forward.

These practices could be employed with profit in all South African medical schools and teaching hospitals. In Johannesburg we only conduct private unit rounds and somehow or other the whole surgical division never seems to meet to discuss or present problem patients or a series of interesting and instructive cases. Our schools, with their different units, are too individualistic in their teachings, and that is the reason why in some of the affiliated teaching hospitals there is great diversity of opinion in the handling of many of our common problems. The department of surgery of the Witwatersrand medical school does not present to its student or postgraduate body a particular school of thought. We are still groping about trying to establish an integrated scheme of things. Fortunately we are aware of our shortcomings and, as Prof. Edward Churchill stated, 'there are scores of medical schools in the United States that are also confronted with similar problems in their constant endeavour to improve their methods of student selection, teaching and resident training'.

To revert to the Massachusetts General Hospital: The resident or registrar staff perform 98% of the surgery, and so excellent is the system of graduated training that the senior residents are competent to perform any of the major operations. The chief senior resident has the choice of the most complicated procedures and on the average performs 4 operations a week besides assisting his more junior colleagues in many others. If a very unusual operation is necessary then, on rare occasions, a senior surgeon may be invited to demonstrate it or assist an inexperienced resident. It must be realized that this 4- or 5-year training produces competent surgeons and, that with the numerous advantages at our disposal today such as better anaesthesia, antibiotics, more efficient diagnosis, and a clearer appreciation of fluid and electrolyte problems, major surgery is made safe for the patient and we no longer only depend on scintillating manual dexterity to maintain low mortality and morbidity rates. In 'small' communities this is rather irksome to senior colleagues, who will never quite appreciate that young surgeons with less experience can also produce excellent surgical results!

Example of some of the types of operations successfully performed by chief or senior residents at the end of 4 or 5 years are as follows (approximate figures only): Hernia (30-40), radical mastectomy (10), radical neck dissection (6), colectomy, right or left (6), abdomino-perineal (6), artery graft (6), aortic aneurysm (2), diaphragmatic hiatus hernia (4), total cystectomy and ureterosigmoidostomy (2), partial pancreatectomy (2), oesophagectomy (2), pneumonectomy (4), mitral valvulotomy (6), gastrectomy (20), parotidectomy (2), porto-caval shunt (3), nephrectomy (6), prostatectomy (10), hysterectomy (10), thyroidectomy (8.)

Many other operations are performed and as the residents are usually first assistants to senior surgeons with their private patients their experience in this full-time service is very extensive. It is no exaggeration to say that well over 600 major operations have been performed by a 5th year resident.

It is worth while noting that 8-12 months of a 5-year programme are spent on the private services and, because the resident is assigned to a small team of staff surgeons, he acquires some insight into the practical problems of surgeon-patient relationships in private practice, as well as adding to his technical knowledge.

At the end of a 5-year training period in an approved hospital a young surgeon qualifies to sit the American Surgical Board examinations. The 5th or 6th senior resident year is compulsory for eligibility. The American Board maintains that the most important single factor in surgical development is the opportunity under senior guidance and supervision to grow by progressive stages to the stature of complete responsibility for the surgical care of patients. Extensive major operative experience and senior responsibility is an essential part of surgical education and training. It is most desirable that the new South African College shall maintain similar ideals and not merely pattern itself on the inadequate British system of F.R.C.S. and M.Ch. diplomas or degrees, in which the emphasis is more on profound theory than the assured competent practice of surgery.

Records. During their training periods careful personnel records are maintained and at the end of each period spent in a particular service a chief's report is added as well as a record of the operations performed. During a symposium on postgraduate education at the Massachusetts General Hospital Dr. William Sweet remarked: 'There are a number of good ways in dealing with different problems and it is good for students and residents to have a broad range of thinkers about them . . . . Stifling of young creative minds by orthodox moulds of mediocrity is to be deprecated. Orthodoxy should be a guide, not a strangler, of future developments.'

Other American Hospitals

I have dealt at length with one famous teaching hospital but there are many others with similar training programmes. Professor deBakey's Department at Baylor University, Houston, includes a 6th year of training, and assignment to the thoracic service and more responsible administrative and teaching duties. The Buffalo medical school, New York, also incorporates thoracic and paediatric surgery as separate allocations to their residents. At the University Hospital of Minnesota, Prof. Owen Wangensteen conducts a weekly 3-hour conference, where the residents demonstrate interesting pathology slides or specimens, X-rays and patients; all problems are freely aired and the meeting concludes with an address by a visiting surgeon or an interesting film.

Incidentally, there are 83 medical schools in the US but probably twice as many large teaching hospitals. Some of the private clinics, particularly the Cleveland Clinic and the Ochsner Clinic, provide first-class training facilities even though they are not

undergraduate teaching hospitals. The Mayo Clinic from a postgraduate point of view is not exceptional in its provision for adequate training sufficient to satisfy the American Board of Surgery.

SUMMARY AND CONCLUSION

In summary the chief points of value in the system as I saw it were:

1. A closer liaison between the individual members of the staff of the one hospital and with the staffs of groups of affiliated hospitals.
2. A close link between the clinical services on the one hand and the pathological, radiological, chemical pathological, physiological and anatomical departments on the other.
3. A preference for clinical demonstration of various types in lieu of routine systematic course of lectures.
4. The institution of well organized, staffed and equipped research laboratories within the hospitals.
5. The gradual development of registrars so that by the end of 5 years they were very efficient general surgeons, not only in theory but also in practice.
6. The provision for first-class medical records. Dictaphones or similar types of machines were installed in various key positions such as the operating theatres and out-patient departments. Every large ward had a permanent secretary. Reports and letters were typed out without unnecessary delay.
7. A well organized photographic department for recording clinical and pathological material was readily available; likewise a surgical artist.
8. Finally, a staff of 5 full-time registrars and 4 interns to take care of 70 patients was not considered excessive. Experienced authorities pointed out with pride that, in this manner, patients were well cared for and greater progress was made in the general management of the hospital. Intelligent patients were realizing more than ever that it is specialized group medical effort or team work rather than individual physicians or surgeons who were responsible for the extraordinary advances of modern medical science. Naturally, hospital costs increased simultaneously but the all-round benefits to society and economic welfare also improved.

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