3rd College of Surgeons Lecture — Bringing up Surgeons

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Abstract

The talk traces briefly the development and changes of surgical training in the English-speaking world in the early days and the trials and tribulations of surgical training in Singapore a few decades ago. The factors that brought about the surge of American surgery from late 19th century to the first half of the 20th century are discussed. Structured surgical training leading to the exit point was introduced by William Halsted of Johns Hopkins Hospital around 1892, a system that was later adopted by all other medical disciplines and by all other hospitals in the US. It is considered to be the prime mover of the rapid progress of American medicine. Training surgeons to only the entry point while leaving the competence of trainees to chance, used to be common in the British surgical world. The trend now favours surgical training to the exit point. It is also the system being adopted in Singapore. Increasing demands of high standard of patient care and public accountability no longer allow us to be casual and permissive mentors of future generations of surgeons. Proper surgical upbringing requires a good structured programme that itself needs to be accredited and periodically reviewed. It also requires that discipline be observed on the part of trainees. Knowledge and skills are within the capability of our mentors to impart, but inculcation of good attitude and ethics in trainees is a harder goal to achieve.

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I am greatly honoured to be given the privilege of delivering the 3rd College of Surgeons Lecture, especially when I have retired from surgery for 3 years. I am not in a position to contribute anything significant to your knowledge. There is an old Chinese saying that learning is like sailing upstream; if you do not advance, you go backward. I am now miles and miles downstream.

Old people like to talk about things in the past. With your indulgence, I would like to reminisce how I came to work as a surgeon in Singapore. In 1949, coming from a Chinese-medium school, I was rejected as an applicant for admission to the medical faculty of the university in Singapore, formerly called the University of Malaya, because of my poor English. Having gone through medical school and been trained in surgery in the US, I returned to my native land Malaya in 1962 after having gone by a roundabout way to get myself registered with the Malayan Medical Council as American degrees were not recognised then. I was, nevertheless, unable to get a surgical position with the Malayan Ministry of Health because of my American surgical qualifications. The University medical faculty in Kuala Lumpur had not been established, and also there was no possibility of private surgical practice. Seeking employment, I came to Singapore and approached the Ministry of Health and was amazed to be told by the DMS that Singapore already had more surgeons than it would ever need. I had no choice but to plan to return to the US for good. As a last resort, I contacted the Dean of the Medical Faculty of the University. It so happened that the Professorial Surgical Unit at the Singapore General Hospital was soon to be badly depleted in staff strength because of resignations, and I was offered a one-year temporary lectureship. That was how I gained a shaky footing in the surgical world of Singapore. I had no delusion that I was accepted on my merits but rather as a means to tide over a situation in the University Department of Surgery. With the strong prejudice against American qualifications prevalent at the time, I fully expected to be sent packing after a year. Almost half a century later, I am still here. What has surprised me is that in the last several decades, more and more doctors have gone to the US for higher training. It is to our credit that a broad outlook has prevailed over the previous insular mentality in the Singapore medical profession.

Having worked in 3 different countries and had contact with different systems of surgical training, I would like to share some of my personal views and experience with you.

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Of course, situations are completely different now, but what is past can still serve to guide us away from pitfalls.

The system of surgical training is constantly evolving with increasing complexity of our field, and there is no consensus as to how best to bring up surgeons. Every country has its own surgical training system, varying from a prescribed programme for the trainee to go through, to the casual way that places the onus on the trainee to muddle along on his own to reach the lighted end of the tunnel. Some years ago, I was told that in an advanced country in Asia, the surgical trainee would obediently follow the professor around for years. There was no formal training programme and there was no examination to take. Then one fine morning, the professor got up from the right side of the bed and pronounced the trainee a surgeon. The system also seemed to have worked well as the country was known for its high standard of surgery. I believe that surgical training in that country has been undergoing changes in recent years.

Regardless of what system we adopt, we cannot escape the fact that training surgeons carries with it a clear and definite social responsibility. Increasing demands placed on us to provide good patient care and show transparent accountability to the public no longer allow us to be casual and permissive mentors of future generations of surgeons. Furthermore, I have often observed that once a surgeon has acquired inappropriate ways in his training, in spite of his intelligence the deficiencies seem to stay with him for the rest of his career.

British Surgical Training: Rise and Inertia

Formal surgical training in the English-speaking world probably began in Edinburgh. In 1505, James IV granted a royal charter to the Incorporation of Barber Surgeons of Scotland. Two hundred seventy-three years would elapse before the Royal College of Surgeons of Edinburgh, the oldest of the royal colleges, was formed in 1778 when the surgeons separated themselves from the barbers. The surgeons agreed not to do any barbering, and the barbers promised to confine their practice to hair and teeth. The college was given sole right to examine candidates who wished to practise surgery.

The Royal College of Surgeons of England was formed very much along the same line and it began with a charter from Henry VIII to the Company of Barbers in 1540. It took two and a half centuries for the surgeons to break off to form the Royal College of Surgeons of London in 1800, which later became the Royal College of Surgeons of England. The title 'mister' which British-trained surgeons are addressed or prefer to be addressed as is probably a legacy of the barbers and bears no relevance to surgical competence.

The Royal Colleges of Surgeons of Britain would catalyse the development and progress of surgery in Britain and its colonies well into the first half of the 20th century. One of their roles was to set up requirements of surgical training and to conduct examinations, leading to the award of FRCS. Unfortunately, the system had remained essentially unchanged for too long, and it began to fall behind in meeting the challenges of surging surgical advances in subsequent decades. The main emphasis of the colleges was on conducting didactic courses and holding examinations, and systematic practical training was relegated to the back seat. There was no pre-selection of candidates. Anyone who could muster enough postings and pass the examinations could obtain the higher degree. Furthermore, the strong bias in favour of anatomy over physiology in the early days tended to lead young surgeons to view surgery as essentially a craft rather than a mix of craft and science.

Trials and Tribulations of Surgery in Old Malaya and Singapore

Before the Second World War, in Malaya which then included Singapore, the surgeons were mostly from Britain with a few from other parts of the Commonwealth. They were usually young doctors who had just obtained their FRCS and had limited practical experience. Nevertheless, we should be thankful that they brought to our medically primitive land knowledge and skill of Western treatment. The local doctors were appointed as assistant medical officers in hospitals on a lower scale and were not allowed the opportunity of going abroad for specialist training and higher qualifications. Those were the days of the big white chiefs when there was not a single native specialist in the country. Then came the Japanese occupation. The colonial doctors had either escaped or were interned by the Japanese. The local doctors had to do their best in the hospitals without proper guidance and under adverse conditions. The rule restricting our further training was relaxed after the War and local doctors began to go to Britain for higher surgical qualifications. However, the early pioneers went to Britain to attend lecture courses and demonstrations, to pass the primary examinations and to accumulate enough clinical postings in a haphazard way to qualify for the final examinations. They did not in a real sense undergo systematic training. Unfortunately, by necessity the entry qualification of FRCS was taken to be exit qualification. On their return to Malaya the fledgling surgeons could be appointed consultants and state surgeons and had to learn surgery the hard way, as there was no one to fall back on. Like their expatriate predecessors they acquired their experience from the abundant clinical material at their disposal. Medical litigation was rare and public accountability hardly existed in those days. The bright ones

learned their lessons fast, often from their mistakes, and became good surgeons, but some never rose above substandard surgery. It would be unkind to quote a line from an old Chinese poem that a general attains his success over ten thousand skeletons, but there was some similarity in certain instances.

Anglophilia died hard in former British colonies. In the early sixties, we appointed a young English surgeon to be our professor. A 37-year-old surgeon with limited operative experience, who had just attained the consultant status in England, arrived here to head the University department of surgery. He was known to have proudly told an English physician that he was here to teach the natives some surgery. Lives were cheap then. His disregard for patients' safety was legendary. On the way to acquire his badly needed operative experience, he stirred up considerable havoc in our surgical world and had to be forced out eventually.

The Surge of American Medicine

Around 1892, a new development occurred in the surgical world in America, which was considered a medical backwater by Britain in those days. William Stewart Halsted was appointed professor of surgery in the newly founded Johns Hopkins Hospital. A graduate of Columbia University College of Physicians and Surgeons, he had spent some time in Vienna studying under famous surgeons such as Billroth, Chiari, Mickulicz and others. Halsted wrote 180 papers in his lifetime and introduced many surgical innovations, the most famous of which was the Halsted radical mastectomy for breast cancer, which stood the test of time for more than half a century. For his contributions in haemostasis, wound healing, technique of wound closure and sterility in the theatre, he was called the father of safe surgery. While in Austria and Germany, he was exposed to the German surgical apprenticeship system and appreciated its merits. This led to the most significant and influential contribution he had made to American surgery. At Johns Hopkins, he modified the German surgical training system and introduced his structured residency training programme that gave trainees graded responsibility and supervised hands-on experience and placed strong emphasis on the basic scientific principles of surgery. Halsted trained many academic surgeons including the famed Harvey Cushing. The residency system was copied by all other disciplines in medicine and by all other hospitals in the US and it was responsible more than anything else for the surge of American medicine to a leading position in the 20th century.

In the first half of the 20th century, many renowned American surgeons emerged from the structured residency system initiated by Halsted to distinguish themselves. To mention an outstanding one, Francis Moore, a Harvard graduate who completed his surgical residency at the Massachusetts General Hospital, was later appointed chief of surgery at the Peter Bent Brigham Hospital. He was credited with many medical advances brought about by his promotion of collaboration between surgeons and physicians. His best-known achievement by far was the progress he inspired in perioperative care that culminated in the writing of his book *The Metabolic Care of the Surgical Patient.* Like a modern John Hunter, he redefined surgery as not merely a handicraft but an interwoven field of craft and science.

The Exit Point

For most of the first three quarters of the 20th century, conservative Britain had remained complacent and had not considered the American residency system worth emulating, having continued to emphasise the traditional examination system over structured training. However, in recent decades, both Britain and Australia have come to appreciate the importance of structured training leading to exit qualifications and not to leave their surgical protégés to chance. In the early 70s, we began to award our own higher degree, the MMed, patterned after the FRCS system. As a former colony of Britain, we copied the time-honoured system with some of its inherent deficiencies. Nonetheless, it is heartening to note that we have moved forward. I understand that since 1992, in addition to the MMed basic degree, we have implemented advanced specialty training programmes whereby the candidates are assessed at the exit point. This has been a step in the right direction, and we can proudly claim to have kept up with time.

Accreditation of Training Programmes

However, we should be cautious that we are not repeating history and placing again our emphasis on examinations and not on the structure of training. Ideally, certification should not apply only to candidates but also to the quality of training as well. The training programmes need to be accredited and subjected to periodic review. The length of training is not as relevant as the intensity, the degree of supervision and the contents of training. The Accreditation Council of Graduate Medical Education in the US, a non-government body, is charged not only with certifying and recertifying specialists but also with defining the requirements of training programmes needed for accreditation. When a residency programme is found to be deficient, it is put on probation and given a prescribed time period to make good or face loss of accreditation.

Thus, there are certain fundamental differences in surgical training between the American and the traditional British systems. For more than a hundred years since its inception, the American residency system has been designed to lead to exit qualifications. In the US, the surgical trainee or resident works full-time in the hospital from day one and

follows a structured programme. The Accreditation Council of Graduate Medical Education defines the aims of general surgery residency programme in the following terms:

"The education of surgeons in the practice of general surgery encompasses both didactic instructions in the basic and clinical sciences of surgical diseases and conditions, as well as education in procedural skills and operative techniques. The education process must lead to the acquisition of an appropriate fund of knowledge and technical skills, the ability to integrate the acquired knowledge into the clinical situation, and the development of surgical judgment."

To achieve these aims, detailed conditions are stipulated, which the institution offering a residency programme must fulfill before the programme can be accredited. For instance, there must be sufficient volume and variety of clinical material for the number of trainees taken in. There must be adequate faculty staff to train and supervise the residents. The minimum number of operations the resident is required to assist in and perform as the main surgeon is spelled out. The resident is exposed to all the essential areas of general surgery, including transplantation and thoracic surgery. In each institution that offers a residency programme, a programme director of suitable qualifications is appointed to oversee and ensure that both sides, the institution and the residents, fulfill their respective obligations. Residents on completion of their residency training are certified by their department as having acquired sufficient hands-on experience, and they then apply to specialty boards to take the qualifying and certifying examinations. The prestige of a hospital as a training centre depends to a large extent on the merits of its residency programmes and the subsequent achievements of its residents.

Surgical Training: A Win-win Situation

A characteristic of the American residency is that considerable demand of self-improvement is placed on the residents. Formal classroom lectures do not occupy a prominent part of the training. The residents are expected to further their theoretical knowledge by reading books and journals on their own and by attending and participating in clinical conferences and even by engaging in research projects. They acquire their operative skill and experience by both assisting and performing operations on their own with the assistance of a consultant when indicated. A residency training system should provide mutual benefits to trainees and consultant staff, a win-win situation with patients as the ultimate beneficiary. It places demands and obligations on both sides. The residents learn from their superiors and are expected to follow instructions and carry out their duties religiously. The consultants assume the role of mentors, impart their expertise and in return benefit from the trained assistance of the residents. In the American system, when a resident is assigned to assist a consultant in an operation, he is expected to be thoroughly familiar with the patient's condition and the surgical indications and come prepared with knowledge of the steps of operation and to assume subsequently the prime responsibility of postoperative care. Assisting a consultant in an operation provides the trainee a good learning opportunity. The benefit the trainee obtains from the experience is more than that derived by the consultant from the trainee's assistance. Some trainees do not understand this and tend to consider assisting at operations as useless chores. I still cannot forget the experience in my time when a trainee assigned to assist in an operation would sometimes show up late. He would stick his head into the operating room and ask whether he was needed. Or he would come to assist and, like a bystander, ask what the case was all about, expecting the consultant to present the case to him. Such impertinence would not have been tolerated in an American hospital and, I am sure, no longer occurs in our training hospitals nowadays.

In 1969, while working in the University of Malaya in Petaling Jaya, I spent a 6-month sabbatical leave in the US. I was then concerned with cardiac surgery and went there to learn heart valve replacement. On the way back I spent a couple of weeks in London visiting some leading cardiac surgical centers and had the opportunity to observe several open-heart operations in various hospitals. What struck me then was the difference at the level of surgical assistants between the American and the British hospitals. At Houston, Texas, I watched the famous Denton Cooley performing 8 open-heart operations on one single day. Teams of well-trained assistants prepared the operations like clockwork while Dr Cooley moved from one theatre to another with precise coordination. In London, I often saw cardiac surgeons struggling, at times rather desperately, with surgical assistants who were obviously not fully familiar with the procedures and were unable to support the surgeons to perform the operations smoothly. I believe the difference was consequent to the lack of a structured training programme in Britain at that time.

On the other hand, a glaring fault in the American surgical residency a few decades ago was the harsh conditions imposed on the residents in terms of their duty hours. One may say that the residents were exploited for their cheap labour. It was not uncommon for them to have duty hours well exceeding a hundred a week. It has been found that excessive deprivation of sleep would adversely affect working efficiency and clinical judgment, thereby compromising the safety of patients. The recommendation now is to limit duty hours to 80 a week.

Subspecialisation

A remarkable phenomenon in recent years in surgery in Singapore is the rapid development of subspecialisation. This is a double-edged sword. The upside is that patients can benefit from a high degree of expertise in care. The downside is that in a patient with multiple organ disease, fragmentation and compartmentalisation of treatment may result in confusion and less than desirable outcome. There may be a lack of coordination among the various subspecialists as they each concentrate on their respective narrow fields and overlook the overall well being of the patient. Subspecialisation is here to stay, but the importance of training in general surgery is not diminished as a result. On the contrary, in order to minimise the undesirable effects of subspecialisation, it is important to inculcate in young surgeons sound surgical principles and provide them with wide exposure through systematic training. General surgery, which encompasses all the surgical principles, the basic skills, the perioperative care and the total approach to the patient, has continued to be the indispensable foundation of all subspecialties. In the American system, practically all surgical subspecialties require the trainee to undergo fully or partially a residency in general surgery. For instance, to enter a thoracic surgery training programme, the trainee or resident is usually required to have completed a full general surgical residency, which is now 5 years beyond housemanship. Similarly, for transplantation surgery, the trainees are board eligible or certified in general surgery. Plastic surgery training programme now includes 3 full years of general surgery beyond housemanship. In both colorectal and breast subspecialties, the requirement is 5 years of general surgery prior to 1 year in the core subspecialty training.

Discipline and Attitude

There are 4 aspects in the training of surgeons: knowledge, skill, attitude and ethics. It is within our capability to ensure that our trainees will acquire adequate knowledge and technical competence. We are less able to influence their attitude and ethical behaviour.

A poor work attitude of a doctor directly compromises patient care and adversely affects the performance of his colleagues. In order to instill a good work attitude in our trainees, one has no recourse but to require that a certain degree of discipline be observed. In a unit, the trainees should be encouraged to raise questions, offer opinions and argue with their superiors on clinical matters but are expected to conform to a code of behaviour that is conducive to good patient care. It is worthwhile to mention a feature of the American residency system. Discipline in most hospitals is almost draconian, and there is zero tolerance of neglect of duties. We lacked the culture of discipline and accountability in the early days. When I was working in the General Hospital in the 60s and the 70s, instances tantamount to negligence and gross breach of discipline abound but they rarely surfaced and were well tolerated. In this respect, I would like to pay tribute to the late Mr Yahya Cohen whose insistence on diligent patient care by the staff set himself apart from some easy-going consultants and unit heads at the time. When I was with the University, most of the young doctors I had worked with in my department were conscientious, responsible and hard working, and any supervisor would have been proud of them. But there was a black sheep every now and then. There were quite a few occasions when I had to deal with cases of misconduct, neglect of duties and gross breach of discipline. To mention a few, there was a houseman who would lift the phone off the hook in the call room on his night duty so that he could sleep undisturbed. He remained unrepentant after he was warned. Once I had a trainee from another discipline posted to us for his required surgical rotation. He was assigned a ward to supervise the houseman. I discovered that he had not shown up in the ward for 3 days leaving the poor houseman on his own. When I called him to my office and asked him to explain, he became angry and defiant and walked out in a huff. He would have been sacked instantly in an American hospital. In another instance, a university trainee of ours known for his habit of shirking his duty, walked in the office the day before Good Friday and left a medical chit with the secretary. He claimed to be unwell and was going on sick leave. As one might guess, he was on the roster for duty the following day which was a holiday. We were desperately short-handed in those days. I moved up the next medical officer on the roster to take over the duty. When the trainee came back, I had to put him on duty on that day as there was no available substitute. He went into a rage and claimed that by the original roster, he was not supposed to be on duty. Apparently, he had some backing which he thought he could rely on. He yelled at me, slammed his fist on my desk and said that I had no right to tell him what to do. He tried to drag me physically to see the hospital medical superintendent. I was more amused than angry. Obviously, there was no way I could continue to be his supervisor and be responsible for his actions. My shock came when the University rejected my request to have him removed. I finally had to make it very clear to the University that one of us had to go. These were situations which would not occur in discipline-conscious American residency programmes. In retrospect, if I disregarded my conscience, I would have been happier and more popular in my time by assuming an indifferent attitude to whatever improper acts and conduct that occurred. After all, patients rarely complained of poor care in those days. We did not have a healthy progressive outlook, and it was quite futile to try to change the prevailing work culture. Attempts to improve the standard of patient care that would call for additional

work for the supporting units were generally regarded as trouble making even though there were plenty of flaws in our hospital services to be improved on. A unit head was considered good if he did not rock the apple cart. I am sure the situation is vastly different now.

Cultivation of Good Attitude

To understand why a good attitude can often be difficult to cultivate, we need to go back to the beginning. When we admit medical students, we really have no idea why they want to take up medicine. They may have just followed parental advice. Perhaps they have a strong interest in medical sciences. Maybe they genuinely wish to help their fellow human beings like Dr Albert Schweitzer and Mother Teresa. Or they have heard that doctors usually make a lot of money. Their underlying motives are really beyond our concern. In the preclinical years, medical students generally study hard. Whether they do so out of a sincere quest for knowledge or mainly for fear of failing examinations, is again not for us to judge. In the clinical years, some natural sifting begins to take place. Some students wisely catch on to our predominant emphasis of textbook examinations over daily ward work and elude what they consider time-wasting work in their ward postings. In my time, I found that some students were frequently absent from wards and they would go as far as copying housemen's notes to fulfill their assignments. What they did not understand was that clinical competence with good insight could only come from close and ample exposure to clinical material known as patients.

I believe that when we take in a new class of medical students, we are dealing with people whose attitude and character have already been molded to a considerable extent, but there is still latitude for change. In our upbringing in childhood and youth, we usually undergo two phases or are exposed to two environments. Home upbringing depends mainly on parents, and school teaching rounds up the basic formation of the individual character. Basic intelligence is probably inborn, but attitude and character are likely to be due to the combined influence of nature and nurture. The debate can go on perpetually as to which is the dominant factor. Without understanding genetics, the ancient Chinese believed that a child was born like a blank sheet and it was up to the parents and teachers what to write on. Until about 100 years ago, Chinese children began their education with the study and memorization of the classic *Three-worded Jing*, known in Chinese as 三字经, long before they would have been able to comprehend the meaning of the lessons. Many older Chinese are still familiar with the opening verses of the classic, which can be loosely translated as "men are born good and similar in nature; they become different by influence of nurture". With this oversimplified concept, when a young man went wayward in old China, the blame would be placed squarely on parents and teachers. We now know that the actual situation is much more complicated with genetic make-up significantly dictating our behaviour. But the ancient Chinese were not entirely wrong. Nurture can exert a powerful influence in our upbringing. The importance of discipline in undergraduate and postgraduate training cannot be underestimated.

Selection of Trainees

As medical students graduate into housemen, their work comes under closer scrutiny, and it becomes easier to identify the conscientious and caring young doctors. There is no strict correlation between one's performance as a young doctor and one's undergraduate academic record. I remember 1 year when we were selecting surgical trainees for the University department, one of the candidates had performed excellently as a houseman, and I intended to take him as a trainee. I went to attend the meeting of the selection committee at the University, naively believing that I had a say as head of the department. The chairman, who was the University Vice-Chancellor, the head of the postgraduate school, and others did not approve the particular candidate I recommended because his undergraduate scholastic record was only average. I pointed out that it was understandable because the candidate had to work part-time as a student because of family circumstances and that he had more than redeemed himself as a very good houseman. Still, I could not put my point across. The candidate was later selected as a surgical trainee by the Ministry of Health. He went on to become one of the most outstanding surgeons in our country.

In my experience, the housemanship year is the time when one can sort out to some extent the wheat from the chaff. And so we take in surgical trainees who we think will do our profession proud. They have come through the baptism of fire and most of them have no difficulty acquiring the necessary competence. Soon, they become full-fledged surgeons and some, will in time outshine those who have trained them and become leaders in our field. This is what should happen, and that is how progress is made.

End of Trainers' Responsibility

Students complete their clinical postings and enter housemanship and some of them will proceed to specialty traineeship. In this entire period, they are still amenable to rules we establish to guide their behaviour even though a radical change in the depth of their character make-up may be unlikely. The moral responsibility of the supervisors and mentors up to this point is to ensure that the work attitude and behaviour of young doctors are consistent with optimal patient care. That responsibility ends when trainees become full-fledged surgeons and are independent in their work because, like all of us, they now come under another set of

rules that constrains or modifies our professional behaviour. These are rules of reality of life in society. These are rules of self-preservation. A person's attitude outwardly changes in order to enhance or safeguard his self-interest. I have often been amazed by the 180-degree turn in attitude of some doctors towards patients when they leave institutions for private practice. No longer do they consider patients as necessary evils that one has to put up with. No longer are they displeased by situations requiring them to work at inconvenient hours. Once, I was thanked profusely by a colleague in private practice whom I had woken up at 3 am; while, formerly in the institution, I would have expected a very unpleasant response from him.

Ethics

The problem of ethics is much more difficult to deal with, especially when it involves the fee-for-service system. In Singapore, medicine is fast evolving into a pure business. In our society, a person's worth is realistically measured by his financial success. It is said that few great men can get past the temptation of beautiful women. We lesser mortals have difficulty resisting the temptation of making money. What is to prevent doctors from fleecing patients unethically? What is to prevent doctors from carrying out intentionally procedures which are not in the best interest of patients? Peer review probably does not work well in our tight little medical community. For the Medical Council to exert its long arm, we need whistle-blowers which few of us are willing to be. These are problems for us to think about.

REFERENCES

1. Hurwitz A, Degenshein G. William Halsted – Biographical sketch. Milestones in Modern Surgery. Hoeber-Harper Book, 1958:247-8.
2. Brieger G. The Development of Surgery. David-Christopher Textbook of Surgery. WB Saunders Co, 1977:1-26.
3. ACGME Announcement: Program Requirements for Graduate Medical Education. Announcement of ACGME, June 12, 2007
4. Möller M, et al. Mentoring the modern surgeons. Bull Am Coll Surg 2008;93:19-25.
5. Santry H, et al. General surgery training and the demise of the general surgeon. Bull Am Coll Surg 2008;93:32-8.
6. Shamugaratnam K. Evolution of postgraduate medical education in Singapore. Ann Acad Med Singapore 2005;34:xxx-xx.