

The Inaugural Centennial Lecture: Celebrating Milestones Achieved and Pondering the Road Ahead

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I am deeply conscious of the conspicuous honour of being invited to deliver the inaugural Centennial Lecture. This lecture has been specially established to commemorate the 100th anniversary of the founding of our Faculty of Medicine and of the National University of Singapore (NUS); it is the opening event of the main scientific programme of the special 39th Singapore-Malaysia Congress of Medicine. I thank the Academy of Medicine and the Faculty of Medicine for bestowing on me this rare honour and the opportunity to make a personal contribution to the centennial celebrations.

One hundred years ago, our medical school was founded and it marked the very first step leading to the development of a full-fledged university, which we now call NUS. Compared to the very old universities of Europe, some of which boast a history of almost a millennium (e.g., University of Bologna), one century of existence seems hardly significant. But considered in the context of the history of the society in which a university has been established, our centenary takes on a significance which justifies the jubilation and pride that characterise our centennial celebrations.

Medical education was established and with it the beginning of our University in 1905, 86 years after the founding of Singapore itself. Our medical school and University have since attained the standing befitting a developed country, and have done so in tandem with Singapore's rapid transformation from a third- to a first-world country. The focus of my talk today will be on the Faculty of Medicine, since this is the only component of the University that can lay claim to having attained the venerable age of 100.

I shall first share with you my personal evaluation of the major milestones achieved so far by our Faculty. This will be followed by an attempt to assess what the future holds for the Faculty, the important issues and questions that will challenge the Faculty and how the Faculty could respond to

them, drawing on the valuable lessons and experience gained from our rich history of 100 years.

Birth of the Medical School

One striking fact that stood out on looking back was how the Faculty came to be established in the first place. The poor and deteriorating condition of healthcare then in Singapore drove a group of local community leaders, headed by a prominent businessman, Mr Tan Jiak Kim, to make the bold move of calling on their colonial Governor to set up a medical school to train and produce the sorely needed doctors. The response to the petition was cool at best and the community leaders were in turn challenged by the Governor to raise \$71,000 for the project, perhaps as a way to discourage and curb enthusiasm. \$71,000 was an enormous sum to raise then, when a bowl of noodles cost only 2 cents and the population and economy of Singapore were a mere fraction of what they are today.

But such was the petitioners' commitment to the cause that within 3 months, a sum of \$87,000 was collected and presented to the Governor, who had no choice but to yield to the extreme moral pressure. He hesitantly agreed to embark on what he called "an experiment" and a medical school with a small intake of 23 students was born. The experiment turned out to be an unqualified success. Graduates of the medical school were awarded the LMS (Licentiate in Medicine & Surgery), which qualified them to practise in the Straits Settlements and Federated Malay States (present-day Singapore and West Malaysia). Their training was in the hands of dedicated British expatriate doctors, who strictly adhered to the tried and tested method of bedside teaching and clinical apprenticeship.

By the time the sixth batch of students graduated in 1916, the high quality of these doctors was strongly endorsed by the General Medical Council (GMC) of UK, which accorded holders of LMS full professional registration on a par with graduates of the established medical schools in the UK.

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This early accolade to both teachers and students set the tone for the subsequent development of the school into the Faculty of Medicine as we know it today.

University Status

Recognition as an academic institution came when the Carr-Saunders Commission in 1948 recommended that a university be established, comprising the Medical School and its sister college of Arts and Science, the Raffles College, after assessing the standards attained by the 2 tertiary institutions.

The Commission had initially explored the possibility of elevation of the 2 institutions to university college status, but after interviewing the various stakeholders, not least the students themselves, it was convinced that the quality of tertiary education in Singapore had more than met university standards. The University of Malaya, the forerunner of NUS, was thus set up in 1949, and the Medical School was elevated to Faculty of Medicine within the University. Among the student leaders who strongly advocated elevation to university status and made a very strong impression on the Commission was Emeritus Professor K Shanmugaratnam, who was then President of the Medical College Students' Union. The following quotation is taken from the letter addressed to him from Sir Alexander Carr-Saunders himself,

“It was after meeting you and your friends that I had little doubt in my own mind that we should recommend immediate formation of a university.”

Our students had played a key role in winning academic recognition for our institution.

Postgraduate Education

With the subsequent growth in size and reputation of the Faculty and to meet the growing need for postgraduate medical education, which was pioneered by our alumni in the Alumni Association, the School of Postgraduate Medical Studies was established in 1969, in partnership with the Academy of Medicine representing the medical specialists of the profession. Guided by the experience of established specialty colleges in the UK and Australia, the School began to organise formal postgraduate courses and offered examinations leading to the award of Master of Medicine (M Med) degrees in the major specialties.

The first M Med examinations were conducted in 1970 in the specialties of Internal Medicine, Surgery and Paediatrics. External examiners were invited for the M Med examinations to ensure that standards were comparable to those of the established sister colleges in the UK and Australia. With the eventual inclusion of all major specialties, the bulk of Singapore's specialist manpower

needs was met by the holders of the M Med.

Our M Med examinations have also attracted doctors from the region and since 1986, some of the established colleges from the UK and Australia have been holding joint examinations with M Med in Singapore, e.g., M Med-MRCP (UK) examination, in which the same examination qualifies for the award of 2 diplomas, a testimony to the standard of M Med.

With the development of subspecialties, the Faculty and the School of Postgraduate Medical Studies have also been active partners with the Academy of Medicine and Ministry of Health in the training and accreditation for the whole range of subspecialties. In fact, the development of several major subspecialties, such as nephrology, cardiology, oncology, endocrinology, cardiovascular surgery and hand surgery, was spearheaded by the clinical departments of the Faculty, and contributed to the standing of Singapore as a regional medical hub.

Research

Research achievements were to be found in a number of areas across the disciplines. Among the more prominent were the breakthroughs in assisted reproductive technology. Our staff, led by the late Prof SS Ratnam, were the first worldwide to pioneer and successfully apply the technique of micro insemination sperm transfer in 1989 and the “co-culture” protocol in 1991, which boosted pregnancy rates to over 40% in IVF. In 1994, Prof Ariffin Bongso, from the same group, established the first human embryonic stem cell lines in the world, a major step forward for research on regenerative medicine.

The move of the entire Faculty, including the clinical departments, to Kent Ridge in 1985 opened up enormous potential for multidisciplinary research, the focus of our research ethos. Proximity to the whole range of disciplines of the University, all on the same campus, facilitated research collaboration across disciplines, enhancing research productivity and quality through pooling of expertise, ideas, resources and facilities, often creating invaluable synergies.

The Office of Life Sciences was specially set up in 2001 to facilitate and step up joint research with the Faculty of Engineering, School of Computing, Faculty of Science and Faculty of Dentistry, and to take advantage of the resources and facilities made available by the nation's biomedical thrust, and collaborate with several state-of-the-art biomedical research institutes situated in nearby Biopolis. Several major programmatic research initiatives focusing on important common medical problems had been launched and a significant number of internationally renowned scientists were attracted and recruited to enhance our research capabilities.

Curriculum, Teaching and Learning

Parallel with developments in research was the continual review of its curriculum and teaching by the Faculty to ensure that its medical graduates were able to serve society with robust professionalism and enjoy the trust and confidence of their patients. Our graduates were widely respected professionally, not least by their peers overseas; and external examiners were regularly impressed by the quality and performance of our students.

Many resources had been invested to provide high-quality learning resources and environment, including state-of-the-art library and IT services.

The development of the Faculty has closely mirrored the overall growth of the University, which in turn reflected the rise in prosperity and stature of Singapore itself. Just 3 months ago, thanks to the special effort and exceptional persuasive power of the Dean, Prof John Wong, the Yong Loo Lin Trust generously donated \$100 million to the Faculty. This was the largest single donation ever received in the history of the Faculty and the University.

Matched dollar for dollar by the Government, the total sum of \$200 million has meant a very significant injection of resources, which would enable the Faculty to substantially upgrade its infrastructure, expand research programmes and enhance pedagogic activities. This extraordinary donation, together with several other major donations, was a reflection of the high regard of the community for the Faculty. This was corroborated by our international peers.

In March this year, based on a survey of 1300 academics in 88 countries across 5 continents, the Times of London Higher Education Supplement's World University Ranking in Biomedicine placed NUS at the 25th position. There is clearly much about the history of our Faculty that we can be proud of, from the way it was born, to the high standing it now enjoys locally and internationally. Admittedly, the availability of resources, which ultimately depended on the degree of society's support, largely determined the extent of growth and development possible for the Faculty.

The other crucial factor, no less important, was Faculty leadership; one that, while deeply committed to traditional academic values, was able to grasp prevailing societal needs and expectations and respond to them appropriately, and thus generate further support from the community and to do even better, creating a virtuous circle. This is particularly true of a professional faculty like the Faculty of Medicine. It must continue to be the ethos that guides the Faculty into the future.

Continuing in its strong tradition of regular curricular and pedagogic reviews, the Faculty faces many formidable challenges in preparing its graduates for the future. The pace of change in society as a whole and in medical science

in particular is likely to accelerate, and this demands ever-greater nimbleness and agility in the Faculty's response to those changes relevant to our graduates. Preparing our graduates for the onslaught of increasingly rapid growth in medical science and knowledge will be a major challenge. This calls for the inculcation of a strong culture of continuing professional education where an enquiring, analytical and critical mind capable of and committed to life-long independent learning is a *sine qua non*.

Much has already been done in the Faculty to this end. Projects and programmes promoting self-driven exploratory learning have been an important feature of the curriculum. Horizontal and vertical integration of the curriculum are in various stages of implementation. Theme-based learning, centred on leading causes of mortality and morbidity, and taught by multidisciplinary teams comprising doctors, scientists and other healthcare professionals would emphasise the application of scientific knowledge to clinical practice, teamwork and the holistic approach in the care of patients.

In implementing such an integrative approach, there would be considerable organisational and logistic issues to sort out, requiring understanding and cooperation of all parties concerned, not least a patient, creative and persuasive leadership. Arising from this pedagogic shift, one has to be careful to ensure that a firm grounding in the basic sciences is not diluted in the process.

A strong grasp of scientific principles and scientific methods is essential if the graduates are to be able to keep up with and understand the gathering avalanche of scientific advances that could impact clinical practice. This is critical to active independent learning, enabling the graduates to separate the wheat from the chaff in the process and make the most of the pearls of scientific advances. At the level of clinical practice itself, the graduate will be confronted with the massive volume of clinical reports and papers, often conflicting, when he looks to the literature for guidance in making clinical decisions. It is critical that he is able to search for and critically appraise the best evidence in relation to the clinical problem at hand. Clearly, the culture of evidence-based medicine must be deeply entrenched in our students to help them make optimal clinical decisions for their patients.

Art and Science of Medicine

Medical science and technology, as we know, are essential but insufficient for quality patient care. They have to be combined with the art of medicine also known as medical humanities to produce the maximum clinical impact. The relevant scientific knowledge has to be applied hand-in-hand with compassion, empathy and human understanding, which in turn build rapport, trust and confidence. The

ability to communicate appropriately and effectively with patients is a critical skill in this regard and should be nurtured early. Steps already taken in the Faculty to strengthen the humanity aspect of medical education will no doubt be further enhanced to maximise synergy with the growing contributions of medical science in clinical work.

Actually, there is the distinct danger that over-enthusiasm for the use of technology could cause the graduates to lose sight of the immense value of bedside skills for clinical assessment and judgment – taking a detailed history, conducting a thorough physical examination and unhurried, sympathetic discussions and meetings with the patients and their relatives. Clearly, clinical immersion in the wards and clinics, the clinical apprenticeship, should remain sufficiently long for the students to learn clinical skills, pick up the art of medicine, and imbibe professional values. It should never be diminished even as the contribution of science increases.

Indeed sound clinical judgment, as we know, requires a lot more than just a good grasp of medical scientific knowledge. It calls for a certain intuitive sense that is born of the accumulated body of experience gained from clinical work itself. Evidence-based medicine, alluded to earlier, is valuable insofar as it helps to assign the level of confidence to a given piece of available evidence for clinical guidance, with the highest level being accorded to data derived from meta-analysis of randomised controlled trials. Since the bulk of the myriad uniquely complex clinical questions that we face are unlikely to be put through randomised controlled trials, at least in the foreseeable future, intuitive insight derived from clinical experience and reflection remains indispensable for sound clinical judgment. And even as IT is increasingly used in clinical work for decision analysis and support and predicting clinical outcome, it is still very far from replacing the experience and sound reasoning skills of a good physician. Bedside clinical apprenticeship and learning from patients should continue to be the cornerstone of the training of medical students.

One of the reasons for the increasingly litigious environment encountered in medical practice has been the diminishing rapport and weakening sense of special doctor-patient relationship attributable to heavy reliance on technology in patient care that is not accompanied by sufficient personal interaction, human warmth and empathy. The fact that patients, with easy direct access to much medical information, could be incompletely informed or misinformed, may have contributed to the problem. Patients are also more conscious of their individual right to seek legal recourse. Increasingly therefore, doctors have to hone their communication skill and scrupulously maintain the highest professional ethical standards, and this has to be strongly reflected in the undergraduate curriculum. The

Faculty has already initiated a comprehensive review of this aspect of the curriculum and will no doubt keep it in focus as part of the continuing effort to develop the professionalism expected of our graduates.

Translational Research

Singapore has invested heavily in promoting biomedical research as part of its strategy for economic growth. This clearly has a deep and far-reaching impact for the Faculty. A*Star, the agency implementing this strategy, has provided state-of-the-art facilities, attracted and developed talents and generously supported deserving research projects. Substantial progress has been made in many critical areas of basic biomedical research and this has earned wide international recognition and acclaim. The quality and range of research output achieved speak for themselves. However, the ideal outcome of our biomedical ambition has yet to be realised, the goal of developing for the economy a vibrant cutting-edge biomedical sector where the output of strong basic research feeds freely into clinical medicine and brings about advances in medical care. The precious fruits of much of our basic research, however, remain to be translated into valuable outcomes at the clinical level. Bridging this gap in the value chain is actually a universal challenge, chiefly because there exists a cultural hiatus between the clinician and the basic scientist; the former is focused on solving individuals' medical problems while the latter is primarily concerned with the discovery of broadly applicable principles, knowledge, and methods. Much of the latter may find application in the clinics, and such applications would be eagerly embraced by the clinician. But research focusing on the application of new scientific knowledge and technology to clinical problems has to be undertaken if any potential benefit is to be realised, research to enhance understanding of the causes and mechanisms of diseases and to improve their diagnosis and treatment.

Such research has been appropriately called translational research. The people able to conduct such research are usually clinicians who have been trained in research and are therefore able to relate to and collaborate productively with the basic scientists. Such people, the clinician-scientists, are generally in short supply because of a number of reasons. Medical schools traditionally do not include research training in the undergraduate curriculum, being more concerned with teaching established applications of science in patient care. To build a cadre of clinician-scientists to drive translational research, it is necessary to start at the undergraduate level, as has already been initiated in the Faculty.

Offers of scholarships for the MBBS PhD programme in the Faculty funded by A*Star have been implemented and

should gather momentum as students' interest in research is further nurtured. The parallel scheme of supporting selected clinicians for training in translational research should also be enhanced. The ability to attract people to commit themselves to translational research depends to a great extent on the condition of work and the career prospect offered, bearing in mind the established, stable and relatively well remunerated albeit hectic career of the clinician.

The hospitals are rightly primarily concerned with providing healthcare. But to accommodate and promote the development of translational research, such research activities should be strictly shielded from the inexorable pressure of clinical work and accorded equal recognition and importance as clinical duties by the teaching hospitals. The important move has been made to clearly establish the percentage of working time to be devoted strictly to research for the clinician-scientist. The special clinician-scientist awards by A*Star, which reimburse hospitals for clinicians' time away from clinical duties and thus ensure protected time for research, are laudable and should be stepped up in the future.

In order to attract talented doctors to pursue a clinician-scientist career, a clearly defined attractive career structure must be mapped out and, not least, their remuneration should not be any less generous than that of clinicians of equivalent seniority and experience. The recently introduced clinician-scientist career track for staff in the clinical departments of the Faculty is therefore most timely. With substantial time clearly marked out and protected for research activities and their career progression based mainly on research performance, academic clinicians who are talented and interested in research now have the opportunity to realise their full potential as researchers and contribute to the much-needed pool of clinician scientists in Singapore. Productive collaborations between scientists and clinicians would set the benchmark for university-wide multi-disciplinary research showing the way for moving discoveries and technologies from the laboratory to the real world, and making a difference to society at large.

For obvious reasons, there is urgency to strengthen translational research in the highly competitive environment. If the constraint on the growth of clinical-scientists is the shortage of medical manpower in Singapore, it may be necessary to recruit from overseas, either directly to the clinician-scientist scheme or to take up the slack in clinical manpower resulting from conversion of full-time clinicians to clinician-scientists. In leading research universities with medical schools, the ratio of clinician scientists to clinicians in a teaching hospital should be in the region of 1 in 7.

Funding for research projects both for programmatic and investigator-initiated research should clearly be stepped up

in proportion to the increase in available research manpower. While top-down programmatic research can readily find strong advocates, small investigator-initiated research projects should also be widely supported provided they have been rigorously reviewed. This will give breadth as well as depth to the growth in research activities and further strengthen the research culture among doctors. Given the unpredictable nature of shifting research trends, some of the investigator-initiated research projects may well turn out to be the forerunners of new major research thrusts of the future.

Donors and Alumni

From the very beginning right up to its centennial year, the Faculty has received much generous support from many donors. The birth of the Faculty in 1905 was actually precipitated by the bold generosity of a group of local community leaders. Obviously, the Faculty has since established itself as a worthy cause in the eyes of subsequent donors. The Faculty should capitalise on its standing and reputation and its appeal to the public and step up its fundraising efforts. The availability of funds ultimately determines the extent possible of improving, developing and growing the Faculty in the future. This takes on added significance with the granting of greater autonomy to the University. The Faculty now has to take greater responsibility for its financial needs and would have to maximise funding support from all quarters.

Looking at the list of our past donors, a fair number of them are actually from the ranks of the Faculty's alumni themselves. Worthy of special mention is the recent donation for a Chair in Medical Ethics, from the Chen Su Lan Trust. The late Dr Chen Su Lan, who set up the Trust himself, was a member of the very first intake of students of our medical school in 1905 and graduated top of the class in 1910. Donated this year by the Trust to help focus attention on ethical issues in professionalism, the gift takes on a special significance that is deeply appreciated in our centennial celebrations.

Our alumni have the potential and the opportunity to do more for their Faculty, to increase the enabling resources for their Faculty to scale new heights. The centenary of the Faculty is an appropriate occasion for the alumni to rally behind the Faculty to re-affirm and express their strong ties to their Faculty by pledging their wholehearted and generous support, and helping to enhance the Faculty's reputation as an internationally competitive medical school that the alumni themselves can truly be proud of and deeply cherish.

Maximise Resources to be Competitive

As a small country, Singapore has only limited clinical materials to support its academic and research activities.

While it is healthy to have some local competition, the Faculty's main focus should be competition in the international arena as a national institution. To be competitive worldwide, pooling of resources is clearly critical. The Faculty has done much to maximise the teaching resources in all the major hospitals through a network of associate deans, and is continually seeking to improve the system of collaboration in education. By comparison, such collaboration is not nearly as strong in research. There is indeed much room for creating synergy and achieving greater research productivity by working together across institutions and hospitals. This is how we should move forward if we aim to increase our impact in research and enhance our research competitiveness internationally.

The Future

The Faculty has clearly laid the foundation for achieving further milestones in the next century. It has ambitious goals to produce graduates that will best fit the needs of society even as these needs shift with time, graduates who are able to pick and apply the best that advances in medical science have to offer, while remaining firmly anchored in

the art of medicine, maintaining the highest standards of bedside skills and upholding the values and ethos which underpin professionalism in the practice of medicine. It is geared up to enhance its international impact in research, including translational research that will tap on the rich vein of output from our basic scientists, thus helping to realise our country's goal of becoming a significant biomedical hub in the world and an international centre of medical excellence.

It is working harder and smarter to mobilise the alumni and the public for their support to beef up its resource base, which will in turn make possible the implementation of the best ideas and strategies for the Faculty. With a wise visionary leadership at the helm, setting right priorities, maximising available resources from all quarters, in and outside the Faculty, instilling in the staff a strong sense of common purpose and motivating them to give of their best, the Faculty can certainly look forward to further vibrant growth and many more sterling accomplishments in the years ahead. We congratulate the Faculty for having come so far in 100 years. It is now poised to achieve much more in the next lap. We wish the Faculty every success as it continues on its confident resolute march into the future.