

Singapore's Proposed Graduate Medical School – An Expensive Medical Tutorial College or An Opportunity for Transforming Singapore Medicine?

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Abstract

The proposed Graduate Medical School at the Outram Campus will open in 2007. The main value of this medical school is the transformation of the medical institutions in the campus and SingHealth into Academic Medical Centres. Such centres will train and host quality physicians and physician-scientists. It will help push the development of translational research, complementing the country's investment in Biopolis. It will also underpin Singapore's push into regional medical tourism and its development as an educational hub in the biomedical sciences.

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Introduction

The government recently announced its intention to set up a second medical school at the Outram Campus. Duke University has been invited to help in the planning and organisation of this new Faculty of Medicine. It was chosen because it is one of the top biomedical universities in the United States of America, has an excellent track record in research, and has, together with the University of North Carolina and North Carolina State University, provided the intellectual environment that created the research triangle in that state. This research triangle has transformed the economy of that state, from one based on agriculture (tobacco at that) to one based on knowledge. The curriculum of the faculty of medicine of Duke University is innovative and unique. In its 4-year programme, the whole of the third year is devoted to research. A result of this is that many of its graduates continue to engage in medical research or are leaders in academic medicine. It is hoped that the cooperation with Duke University will help the new biomedical university to transform Singapore medicine.

The Faculty of Medicine, National University of Singapore (NUS) has served the country well. It has produced high-quality graduates who are able to compete worldwide. The graduates are the backbone of the health service of the country. As the country continues to develop and the population ages, there are increasing demands from the community, demands that will necessitate the training of more doctors. At another level, with the country's push

into research and development (R & D) in the biomedical sciences, there is a need for more doctors who are trained in clinical research. An International Advisory Panel (IAP), headed by Lord Oxburgh, was invited by the Ministry of Education to review medical education in Singapore in 2000. It made several insightful comments including: "Clearly staffing levels (in public hospitals) are very low by international standards and clinical loads are correspondingly very high;"¹ "it is clear that at present Singaporean bio-industry is severely hampered by a lack of doctors trained in research. Without such people, Singapore stands no chance of becoming the bio-medical hub for the region"; "the time-scale for establishing a research base to support bio-industry in Singapore is much tighter and urgent action is required if Singapore is to grasp the commercial opportunities of biomedicine and derive full advantage from Biopolis."²

Perhaps the most important insight was that "a number of valuable initiatives are placed to support the bio-industry in Singapore but these will not succeed without a profound cultural change in Singapore medicine, especially the recognition of the role of physician-scientist."²

The panel made cogent arguments for an increase in the number of doctors produced annually. The choices available are either to increase the medical school intake in the current Faculty of Medicine from 230 to 300 a year, continue to have students trained overseas or to build a second medical school. The problem with depending on

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foreign-trained doctors is that it “*makes medicine in Singapore very vulnerable to the vagaries of external markets over which there is no control.*”³ Also, a significant number of Singaporeans who study medicine in foreign universities remain overseas, contributing to the brain drain the country can ill afford. Increasing the intake in the current Faculty of Medicine carries with it a whole set of problems, not the least of which is the inability of the current staff to cope and the inevitable degradation of research because the faculty has too large a teaching burden. In another article in this issue, Professor Peter Hwang argues forcefully that Singapore should have a second medical school.⁴

Singapore Medicine

Singapore medicine, both in the public and private sector, is undoubtedly of high quality. With only 3% of its gross domestic product (GDP) spent on healthcare, Singapore is able to deliver service standards comparable to that of developed western countries, like the United States and the United Kingdom. These countries, however, spend about 8% to 14% of their GDP on healthcare. The disparity must mean that “*while Singapore is getting excellent value for money in public expenditure on health care, this is achieved at the expense of case loads for the public sector staff that are exceptionally heavy by international standards.*” (Personal communication—Epstein R, 2001) This situation will not be tenable in the long term. The repeated cycles of resignations of high-quality medical staff from the public sector primarily for private practice is symptomatic of heavy case loads borne by these physicians. Singapore has a small manpower pool. While it is necessary to have a mix of public and private sector medicine, we should not be too sanguine about doctors leaving the public sector. This is especially because in the present system, private sector specialists hardly provide any service to the subsidised population, nor do they teach to a very significant extent the medical students or junior staff. Thus the effect of each resignation from the teaching medical institutions is amplified considerably. Furthermore, the shift to the private sector has to be seen in the context of the public health system, which serves 80% of the population, with a greater proportion of elderly patients, who suffer from more complex medical problems. It is thus perverse to have established specialists in the private sector handling a small proportion of complex problems while the majority of complex medical problems are left to be handled by less well established specialists and a dwindling pool of senior doctors who have chosen to remain in the public system. Furthermore, these doctors are invariably co-opted to perform additional duties in administration and educational activities.

Resignations have a destabilising effect on the

departments and the teaching institutions. Private medical institutions provide our doctors with the opportunity to set up practices in direct competition for patients. The real loss is even higher because specialists leave when they are about to achieve their maximum potential and the years of useful service they could have contributed to the nation's intellectual quotient are now channeled elsewhere. Also, when specialists leave, they go out in teams or with their cohorts, creating a cascade effect. This attrition makes teaching medical institutions unattractive and most specialists do not see a long-term career with these institutions. It is most disconcerting seeing trainees and registrars already planning their move to private practice. Many have maintained that they do not see any prospects with the lack of diversity of careers.

While the country desperately needs staff to stay in teaching medical institutions to push the frontiers in research and education, it is unfortunate that only the NUH is host to academic departments of the medical faculty. The lack of academic careers for medical staff in the other teaching hospitals effectively means that the large majority of specialist staff in Singapore do not have opportunities for an academic career or resources from the University. There cannot be any reputable school of medicine where academic careers or resources are only confined to one teaching hospital with 800 beds. Harvard Medical School has at least 4 associated academic medical centres, Melbourne University has 5, and London University has at least 13. The reason for transforming our teaching hospitals to academic medical centres is not that the staff of the teaching hospitals are infatuated with academic titles. Rather, it is to allow the culture of scholarship to be embedded in all our teaching hospitals. The protected time and academic resources available from the university, will allow staff to move up the value chain in research, education and clinical service. Important values can then be transmitted to the students and junior staff. It also allows the university to tap a wider talent pool than that which is confined to a single medium-sized teaching hospital. In Singapore, major specialties in medicine viz psychiatry, paediatrics, obstetrics and gynaecology, cardiovascular disease, the neurosciences, ophthalmology, cancer and dermatology are housed in National Centres. All these, and the major teaching hospitals other than NUH, do not have any formal links with the university. These resources and institutions are especially useful for training and hosting physician-scientists.

The monopoly situation that exists in the NUS-National University Hospital (NUH) relationship has resulted in their dominance of the biomedical academic scene in Singapore. This local dominance, however, is not reflected by their performance in the international scene. “*A reasonable hypothesis is that the monopoly relationship has inadvertently weakened NUS, NUH and other teaching*

hospitals and national medical centres' local and international competitiveness." (Personal communication, Epstein R, 2001)

There are thus compelling reasons and great urgency to "universitise" all our biomedical institutions and to reduce distortion. The university will have staff and facilities many times its current size. Serious commitment can be made to academic careers and infrastructure development in all these institutions. Singapore will be much better equipped to attract and retain good personnel who consider it important and prestigious to be a part of a university. There will also be better accounting for the time and cost of medical education and research. Internal competition between the various clinical schools will result in better teaching and clinical services. The widened mission of public hospitals and national centres will make it more attractive for quality staff to join and to remain. Perhaps fewer will be attracted by private practice. Our institutional resilience will be greatly enhanced.

Singapore Life Sciences Initiatives

Singapore is attempting to build a strong knowledge-based economy. It has many attractive features, including its geography, its connectivity, a well-educated population with fluency in English, a legal system that protects intellectual property and the numerous government incentives to help locate industries and research and development in the country. Its economic paradigm is changing, with countries like China, India and Malaysia competing for manufacturing, information technology and outsourced industries at lower costs. At the top of the value chain, developed countries continue to push the frontiers of research and intellectual development. In the biomedical field, it occurs primarily in the universities and academic medical centres. These are strong sumps attracting talent worldwide. In a globalised knowledge-based economy, the only competition is for human talent. Many have questioned whether we can compete with the best for this human capital. Perhaps the more important question is, can we afford not to compete with the best? With the relentless pressure on us because of rising costs, there is little choice but to attempt to move up the value chain of the knowledge-based economy. The life sciences, which have a high barrier of entry, have been identified as a new engine of economic growth for the country.

The breathtaking development of Biopolis and the investments in biomedical sciences have attracted the attention of the world of science. It is to be applauded. There is now a buzz about the biomedical sciences permeating the schools, junior colleges, polytechnics and universities. Pharmaceutical industries have made significant investments in the country. Where do we go from here? In a recent report in *The Straits Times*,⁵ several

international experts suggested that the country now has to consider significant investments in developing translational research and building up a bigger pool of doctors who are actively involved in clinical research. The call for investments in physician scientists and the development of academic centres is not new. The IAP on Medical Education suggested that 4 years ago. In fairness, the dire shortage of physician-scientists is a problem worldwide. Countries like the US and the UK encounter the same problem. Many have suggested that the model of success in biomedical research is in jeopardy. "*Tragically, one of the nation's most remarkable accomplishment is in jeopardy. The US has the world's finest fabric of medical research, education and health care.*"⁶ "*Yet paradoxically at the very height of success, the model is threatened. The threat is not from the basic side. To the contrary basic research is flourishing as never before. Rather, the threat comes from the failure of the cadre of physician scientists to grow in proportion to the number in basic research. Indeed this cadre is shrinking as young physicians are forced to choose between performing research or practicing medicine but not both.*"⁷ Even if we allow physician-scientists to do both, there must be institutions to host them and to provide stable careers for this talented group.

Herein lies the importance of the graduate medical school. It allows for the transformation of at least 3 teaching hospitals and 5 national centres into academic medical centres. The creation of a "Medipolis" at the Outram campus will parallel and complement the huge investment in Biopolis. After all, "*translational clinical research cannot readily be accomplished by research institutes, university science departments, or isolated molecular medicine centres because these institutions lack the clinical investigative expertise required.*"⁸

Value Proposition of the Graduate Medical School

The value proposition of the Graduate Medical School has to be significantly greater than that of producing doctors for the health system. As it is, the cost of medical education is difficult to calculate. A new medical school with a small initial intake of students will inevitably cost more than the current medical school, which has been in existence for a hundred years. As the new school becomes better established and as the intake of students increases, the cost per student will approach that of the more established medical school.

It would be a big mistake to view the purpose of the proposed medical school as that of primarily providing education for students to become physicians. The transformation of the teaching hospitals into academic medical centres offering comprehensive and integrated programmes in healthcare services, teaching and

translational research is the main value proposition of the graduate medical school. It brings together resources from the ministries of Education, Health and Trade and Industry to build resilient biomedical institutions. These institutions become iconic, and attractive to both local and international talent. The scientists, graduate students from the laboratories, and physician scientists will push the frontiers of biomedical sciences and clinical research. This is especially important as we try to revive medical tourism. It is true to say that anything we can do medically, our neighbours can do almost as well, at half or less of our cost. The premium our medical tourists pay for must then be academic medicine. Our doctors will have to be leading researchers, publishing well in the medical conditions prevalent in our region. It is a fallacy to think that medical tourism in Singapore can be sustained solely by the provision of efficient and competitively priced care by private medical practitioners. Even if this were possible, there is the inevitable degradation of our cutting edge outside of academic medicine.

There is a tremendous shortage of healthcare workers worldwide. As this region improves economically and as our population ages, the demand for healthcare workers will become even more pressing. A biomedical university at the Outram campus will help to address these pressing needs. It should play an important role in the government's agenda to transform Singapore into an educational hub for the Asia-Pacific region.

Strategic Investment in the Graduate Medical School

There are compelling reasons for a strategic investment in the creation of this medical school by the country. The effort should be supported not only by those belonging to the Singhealth Cluster but by the whole medical community. The benefits of this strategic investment should not be underestimated and they include the following:

1. Training of More Doctors

As Singaporeans become more sophisticated, they expect more personalised care and better-informed healthcare providers. In addition, Singapore's ageing population, with its greater proportion of chronic ailments, will place greater demands on healthcare. The life sciences have been identified as a new and important engine of economic growth for the country. There is thus a compelling need to produce more doctors and physician-scientists.

2. Improvement of the Quality of Medical Graduates and Faculty Productivity

Most top medical schools keep class sizes reasonably small to allow for closer staff student interaction and to provide the faculty with enough time for research and other academic activities. The Mayo Medical School has a class

size of 42.⁹ Stanford has a class of about 80 (Personal communication – Gardner P, 2001) and the Baylor College of Medicine, a class of about 170.¹⁰ The National University of Singapore (NUS) MBBS programme has a class of 230. Even then, there is a shortage of 50 to 100 doctors each year. Decanting the class such that the MBBS programme will have 180 and the graduate school, 70, will considerably improve the quality of medical education for both and also reduce the tremendous pressure on the academic staff at the current Faculty of Medicine.

3. An Innovative Curriculum

The biomedical initiative of the Government requires institutions and academic biomedical centres to be populated by creative researchers and physician-scientists. These people ask the clinically relevant questions in biomedical research, transform clinical observations into testable research protocols, translate research findings into medical advances, have the skills and training to design and undertake rigorous clinical trials, and will be the teachers in the evolving fields of genetic medicine, pharmacogenetics and bioinformatics. In addition, they are a critical resource for assuring excellence in medical education. With a twin track in the production of medical graduates, there is lower risk in experimenting with innovative curriculum to produce such people. The MBBS programme will assure the country that its service requirements will continue to be met. Innovations can be undertaken in the new programme and some of these can be replicated in the traditional programme if shown to be particularly successful. One such example is the programme of the Harvard-Massachusetts Institute of Technology (MIT) division of Health Sciences and Technology. The explicit objective of such a programme is to educate leaders in biomedical sciences and academic medicine.

4. Access to a Wider Pool of Talent from the Region

There is an important need to ensure that not all local talents are drawn into medicine. There is a need to distribute our talents among the various professional fields. Yet the demanding field of biomedical research requires the best and brightest. A graduate-entry programme will considerably widen the regional talent pool we can draw on, especially as most of the regional countries do not have the basic entry requirements into our undergraduate programme – the A-level examinations. The foreign talent pool recruited will have an opportunity to establish roots in Singapore, and even if they were to return to their respective countries, they will treat Singapore as their spiritual home. There will thus be created in the medium term, a vast network of doctors in the surrounding countries continuing to consult and refer patients back to Singapore.

5. Transformation of the Outram Campus

The establishment of a new campus of NUS at the Outram site will become the most significant event for the medical institutions and research institutes in the campus. It will establish a culture of scholarship and creativity. The IAP has suggested the need for such a profound cultural change in Singapore medicine. The leadership and remarkable accomplishments of the US in the medical sciences and biotechnology is based on this fine fabric of medical research, education and quality care existing in academic biomedical centres.¹¹ With the completion of the Human Genome Project, there has been an explosive increase in biological and genetic information. Coupled with the advances in imaging technology and computational sciences, this allows not only for the better understanding of diseases but also the means to predict and prevent them. All these would suggest that in the decades to come, there will be an exponential increase in the capacity to prevent, treat and cure diseases. The academic transformation of the Outram campus will enable its clinicians and scientists to participate in these important unraveling events of medical discoveries.

6. NUS Multi-Campus Development

NUS has made a fundamental and strategic decision to establish multiple new campuses starting with one in the SGH complex.¹² It is thus able to leverage on the tremendous resources already in place—human (physicians, paramedical workers, scientists), clinical throughput, data and tissues, physical infrastructure, system and synergies. With all these, its investments will be incremental and there are naturally tremendous cost savings. Perhaps there is nothing as prohibitively expensive for the University than attempting to create the equivalent of Singapore General Hospital and its sister institutions, together with the tremendous goodwill and faith the population has in this venerable institution.

This campus can easily be transformed into a potent Health Sciences campus producing not just medical graduates but also graduates in nursing and other allied health sciences, all of whom are in shortage, not only in Singapore but worldwide.

7. An Evolving Medipolis to Complement and Synergise with Biopolis

Within the SingHealth cluster is a complete range of medical institutions, including the largest tertiary hospital in the country, the Singapore General Hospital. It has, in addition, the National Heart Centre, the National Cancer Centre, the Singapore National Eye Centre, the National Dental Centre, and the National Neuroscience Institute. These institutions see about 70% of the public sector patients in their respective fields.¹³ It also has the largest Women's and Children's Hospital in the country, if not the

ASEAN region. The clinical output, patient database and tissues for the repository from these provide a large throughput to support thriving translational research in disease- and patient-orientated research, which is essential if the nation's biomedical initiative is to succeed. Its attractiveness is not lost on large pharmaceutical companies or reputable overseas medical institutions like the Duke's Clinical Research Institution. There is a great desire to involve our doctors and other staff in clinical research on devices and clinical trials studies, etc. The host institutions, however, must have sufficient exposure to such academic activities and be able to maintain the same intellectual rigour, ethical standards and speed of delivery, so as to produce biomedical intellectual output and perform as engines of economic growth.

The evolution of the Graduate Medical School into a Medipolis will greatly complement the development of Biopolis. Pharmaceutical and biotech companies are increasingly outsourcing R & D and clinical investigation to contract research organisations (CRO) and academic clinical investigators. Such outsourcing rose from 31% in 1996 to 51% in 2000, representing a 6-year Cumulative Annual Growth Rate (CAGR) of 11.6%. There was thus an estimated US\$14 billion opportunity in 2001 for outsourced R & D.¹⁴ The Outram campus, with its strong academic foundations, would be able to bid competitively for a share of this revenue. Singapore, with its ethnic diversity, represents half of the world's population, and has tremendous opportunities in this rapid growth area.

8. Regional Medical Tourism Anchored on Successful Academic Biomedical Centres

The US leads the world in medical tourism. People the world over either go there to receive state-of-the-art treatment or access the websites of US academic medical centres for information regarding new technologies, innovative treatments, and promising lines of investigation. This is the fruit of more than 50 years of judicious investment in research and academic biomedical centres. Singapore used to lead the region in medical tourism but its lead has been seriously threatened by the rapid improvement in medical practice by its neighbours and the very high-cost structure and currency differential in Singapore. The premium that regional patients are prepared to pay must reside in the practice of academic medicine and innovative techniques and drugs that come out of R & D in the major teaching hospitals.

9. Iconic Institutions and the Diversification of Research Portfolios

In the globalised knowledge-based economy, the only real competition is that for human resources. There is a tremendous need for local talent to be developed, foreign

talent to be attracted, and Singaporeans in “intellectual diaspora” to be tempted back. The lack of breadth and depth in research has been clearly identified by the IAP’s report on medical education. A spectrum of academic medical centres and research institutions needs to be developed. These will undertake serious research, train physician-scientists, and also serve as icons in order to recruit outstanding scientists and to stimulate the young to choose clinical research as their professional careers. As it is extremely difficult to predict winners in biomedical research, it is of strategic importance for the country to have diverse research institutions, academic medical centres and medical schools.

10. Biomedical Innovation and Healthcare Costs

There is a tendency to presume that investing in medical education requires significant financial commitment and that it drives up costs with marginal returns. Biomedical innovation is undervalued. Productive innovations in healthcare are multi-dimensional. Improved outcome studies and measures could enhance understanding of what treatments work and for whom. Advances in information systems could improve the care with which physicians stay abreast of state-of-the-art treatments. New types of facilities could improve the quality and efficiency of healthcare delivery. Most important of all, biomedical advances could lead to an ongoing stream of new treatments, and cures for widespread or chronic diseases. It has been estimated that the introduction of the polio vaccine resulted in annual savings of US\$30 billion, while the introduction of lithium treatment for depression reduced hospital costs by US\$145 billion over a 25-year period.¹⁵

Biomedical education and research are long-term investments the country needs to make. It only pays for itself many times over in the aggregate. The history of medicine is replete with instances of dramatic cost savings from such investments.

A Historic Opportunity

At the 100th anniversary of the establishment of the King Edward VII Medical School, we are at another historic milestone – the establishment of a second medical school. The willing participation of Duke University, and the strong support from our Ministries of Health, Education and Trade and Industry, all suggest that the time is ripe. It will be a singularly significant event for Singapore and the Outram Campus. I believe it will also be a most transformative event for Singapore medicine.

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