Commentary

Is Cost-Effective Healthcare Compatible with Publicly Financed Academic Medical Centres?

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Abstract

Probably more than any country, Singapore has made significant investment into the biomedical enterprise as a proportion of its economy and size. This focus recently witnessed a shift towards a greater emphasis on translational and clinical development. Key to the realisation of this strategy will be Academic Medical Centres (AMCs), as a principal tool to developing and applying useful products for the market and further improving health outcomes. Here, we explore the principal value proposition of the AMC to Singapore society and its healthcare system. We question if the values inherent within academic medicine —that of inquiry, innovation, pedagogy and clinical exceptionalism—can be compatible with the seemingly paradoxical mandate of providing cost-effective or rationed healthcare.

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Nearly all legislation involves a weighing of public needs as against private desires; and likewise a weighing of relative social values.

—Louis D Brandeis

As a small island state with finite resources, Singapore's healthcare philosophy is governed by pragmatism,[1] rationing and cost-effectiveness (see Appendix 1 for definition) with an unrelenting emphasis on keeping healthcare spending on a fiscally sustainable path. In recent years, selected restructured hospitals have been given the expanded mandate of promoting the development of academic medicine within Singapore's clinical health services clusters. This mandate pushes any academic medical centre into a potential conflict with the overarching priority of providing basic and affordable healthcare[2,3] and raises deeper questions about the cost-intensive role of medical research in the context of publicly financed healthcare institutions.

In this article, we contend that although this conflict may arise, it is just one facet of a larger creation, which is the successful and robust academic medical centre (AMC) that stands for generating value for patients and society. The differences lie not only in costs, but more fundamentally in values, ideals, strategies and standards. These standards may respect cost as one of many considerations, but cannot be subservient to it. To drive innovation effectively, standards will need to be set high so as to inspire academics who work locally but compete internationally. To succeed, it appears we have to review this tenet of basic, affordable care when defining the objectives of tertiary and quaternary AMCs. The payback though is a more integrated biomedical and clinical research system to drive scientific discovery, medical excellence, and improved patient outcomes.

AMCs Are Difficult to Create

Looking back the last century, few can deny the extraordinary contributions academic medicine has made to human health. But because it is difficult and success is uncertain,[4-6] academic medicine is a path infrequently embarked on. AMCs require the accumulated ferment of deep expertise across many domains including basic science (including molecular biology, genomics, molecular

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imaging, and animal sciences), translational medicine (including phase I, 2, 3 clinical trial design developing drugs and devices, biostatistics, biospecimen processing, ethical councils, legal, and risk management) and pedagogy to educate future healthcare professionals in addition to clinical medicine.

Investing in research means possibly going through failed ideas and experiments before attaining success. In a general public healthcare setting, this experimenting is not only risky but is also likely perceived by some cost-conscious administrators to be wasteful or a luxury.[7,8] In an AMC however, these costs represent an indispensable investment, and a base for value creation in education and the innovation enterprise of a 21st century knowledge economy.

As the sophistication and complexity of scientific tools, processes, and skills increase, so too the costs of academic medicine.[9,10] Money needs to be raised at frequent intervals and from multiple channels in an environment of increasing competition. Success is predicated on an AMC having a critical mass of talented researchers and clinicians, putting in place the systems that promote the virtuous feedback loop of excellence begetting excellence. These positive feedback loops are difficult to initiate by other healthcare groups and pose a substantial barrier to new entrants. These barriers to entry, combined with the significant spillovers from successful research that benefit society (rather than just individual researchers or their institutes), provide the justification for important government investments in academic medicine.

Value Proposition

We believe there are distinct benefits from having strong, vibrant AMCs.[11,12] Firstly, patients can benefit from participating in clinical research and from new treatments informed by research. Secondly, doctors involved in research will bring in-depth knowledge about innovative treatments to patient care. It would be wrong to assume that the public can always obtain the most advanced treatments by waiting for others in developed countries to do the research for us, and then inform us on their outcomes. The third benefit feature of a successful AMC: a culture of perpetual learning, knowledge, innovation and enterprise to support the biomedical industry.

The value of an AMC harnesses the combined knowledge and resources of all its component doctors, researchers, technology, systems, staff and patients to innovate and create paradigm changes in medical care.[12] This is combined in an organisational manner as a "cultural form". This culture is more than the sum of corporate vision and mission statements. When individuals, driven by passion and knowledge, converge and contribute their intellects, intuitions, information, integrity and personal history, a different kind of value emerges. From within collective institutional memory, a culture develops that draws its strength from its unique narrative and that of its past heroes[13] that have made great contributions to medicine.

For AMCs, it is this narrative that is the source of their brand and their creative power.[14] Few cancer physicians or researchers walking down the memory wall in the Harvard-affiliated Dana Farber Cancer Institute (DFCI) in Boston, Massachusetts, can fail to be moved by the unfolding of characters, stories, heartaches, failures and achievements that lie behind the brand. The very foundations of cancer chemotherapy began here with the development of cytotoxic drugs, firstly, against childhood blood cancers with the spectacular achievement of high cure rates, then against adult malignancies. Today, the Boston-Cambridge area hosts one of the world's most dynamic biomedical hubs and powerhouse economic engines.

Because it is a product of people, their environment and choices over a very long period of time, such a culture is hard to imitate or recreate, not least because of its complex fermenting ecosystem. This is also why culture is one of the strongest sources of competitive advantage for any successful AMC. AMCs are living organisms, which have to evolve in relationship to their own habitat if they are to be well adapted to thrive in a complex and highly uncertain landscape.

Because AMCs operate with scale from a large pool of patients, they also allow for a greater degree of medical specialisation and so are positioned towards providing more advanced and complex care. Besides attracting patients by such differentiation, scientific discovery creates a multiplier effect by translating one discovery into benefits for many. For example, the relatively modest sums of money spent on researching combination antibiotics led to a cure for leprosy, and saved lepers and their families from the need for segregated housing. Often, the cost to us is in the not knowing.

A Differentiated Product

Each day, hundreds of patients fly from across the world into Houston, Texas—not seeking cost-effective treatments, but exceptional or cutting edge healthcare. Most patients usually will not come seeking a specific named doctor but instead make their choices based on the reputation of the centre. The Texas Medical Center has the largest amalgamation of health institutions in the world and receives 160,000 visitors daily. It employs over 93,500 people and supports 121,000 indirect jobs with an impact on the economy of USD 14 billion annually.[15]

The last decade here in Asia has seen tremendous economic development, rising incomes and the growth of the middle class. New hospitals have been built across

Asia anticipating the return of the medical diaspora to state-of-the-art facilities in their respective countries reshaping the competitive landscape. AMCs have the capacity to survive healthcare competition, economic cycles, changes in governments, wars and fads. Because their main goal is primarily not-for-profit, but rather patient-driven inquiry, scientific discovery, education, medical excellence, self achievement and societal welfare, AMCs can become a dynamic engine for countries already at the leading edge of economic development.

AMCs can also play an important role in raising health literacy and contributing to policy debates. At a time of growing healthcare consumerism and asymmetric health information, AMCs play an important role in being an independent source of knowledge both to the general public and the government. It should use its vast store of knowledge and comprehensive database to promote better individual health choices, publish tangible health outcomes, lead in evidence-based medicine, and inform public health policy.[16,17]

The AMC Brand: Expensive or Cheap?

Developed countries have always driven medical excellence through AMCs, be it Johns Hopkins in Baltimore, United States or Imperial College Healthcare in London, England. In Singapore, however, the presence of AMCs in the public sector has engendered a certain paradox and contradiction. It has previously been stated that "Lexus" care should be sought on Orchard Road, whereas public hospitals should offer "Toyota" style care.[3]

For Singapore AMCs to be self sustaining and viable however, they must be effective at communicating a clear brand to all stakeholders. The brand will need to be internally consistent with their mission, people, culture and capabilities. We believe that excellence and leadership is not incompatible with a dual mandate of a publicly funded AMC.[18,19] Research, for example, may focus on prevention—a stage where intervention may yield significant impacts on outcomes, yet relatively difficult for industry to produce evidence and operate in.[20] Since one third to half of individuals in developed countries will be diagnosed with cancer in their lifetimes,[21,22] and cancer treatment is becoming increasingly expensive, the relevance of AMCs to public health in the modern era may not be trivial. Further, the non-commercial research culture of a public AMC may provide advantages for addressing certain types of questions that cannot be addressed in the non-commercial setting.[23] Industry decisions concerning development of promising agents may not be solely based on scientific merit or efficacy in a particular disease area, but may instead be market-based decisions for example return-on-investment.[24] This is especially true for the development of off-patent drugs for new indications, and treatment of rare diseases. Since healthcare is a public good which the free market in some aspects may under-provide, public AMCs may offer an avenue to correct "market failure".

AMCs do not operate outside the orbit of economic forces, but their mission cannot be a servant to costs, otherwise the enterprise will fail. Cost-discipline is essential, but in attempts to communicate, the AMC leadership must be careful not to send the wrong signal to the designers and engineers of innovation. Penicillin, insulin, and cytokines would never have made it if cost had been the primary basis for discovery. When production of industrial penicillin first began in 1940 (discovered at St Mary's Hospital Medical School, now part of the Imperial Healthcare AMC), the drug was virtually priceless. Within 3 years, the prices fell rapidly to $260 per dose in 1943. Today the cost is less than a cent. In the paradigm of development, it is probably more important to prove efficacy first, and focus on scalability and costs later, rather than vice versa. The development of penicillin was not a burden but a force that transformed GlaxoSmithKline plc into the multinational pharmaceutical powerhouse today.[25]

At a macroeconomic level, Singapore has now accepted a model of higher wages where higher total-factor productivity becomes a crucial competitive factor. This means a mature economy operating on the basis of gains in dynamic efficiency (see Appendix for a definition) through research and innovation, rather than on a basis of imitation, improvement and pure cost competition.[26] This change in mindset offers an opportunity to fundamentally alter the calculus of cost-and-return for AMCs and open up multiple and new avenues for value creation. Furthermore, because public AMCs offer a subsidised yet highly differentiated product in the public domain, they have the potential of promoting equality by offering state-of-the-art care and cutting edge medicine that is accessible to one and all.

Sustaining AMCs Amidst Cost Constraints

The extreme financial pressures on several American AMCs in the 1990s and in the late 2000s provide a stark reminder on the importance on getting financial systems at AMCs right. AMCs in the United States (US) operate from a different economic structure vis-a-vis Singapore, nevertheless, the capital and labour intensive nature of the AMC activities, coupled with the complexity and diversity of their operations translates into a higher risk of cost overruns. Public AMCs operating under government subventions must therefore place a special premium on operational efficiency, in addition to conducting research providing evidence for cost-effective health solutions. In pursuing cutting edge research and treatments, AMCs in Singapore must also secure non-governmental funding and will need

to tap private philanthropy effectively. To do this, they will need to retain talent, and produce results in keeping with a premium brand. Success in securing private philanthropy can create virtuous feedback loops that can be a powerful competitive advantage. The Harvard endowment (USD 32 billion) has become so large, that the interest earned from its principal will be able to support research, retention and recruitment of top faculty, perhaps into perpetuity.

Healthy revenue from clinical operations can also cross-subsidise research, especially since AMCs are in essence not-for-profit. Surpluses can be ploughed back into research and endowments to sustain activities consistent with their core mission. Pennsylvania Medicine, one of the leading global AMCs, operates one of the most effective clinical and translational research programmes. Although significantly well funded, and ranked first by the US National Institutes of Health (NIH), research costs are cross-subsidised from revenue from the Medical Centre and School.[27] Such clinical research cross subsidy can only take place if there is sufficiently healthy clinical revenue achieved through clinical and brand excellence.

As Singapore moves towards a mature and complex economy, the geographic clustering[28] of economically beneficial activities will become more important than ever. For example, the medical industry's public-private partnership can take a leaf from the successes built between Stanford University and Silicon Valley. Beyond facilitating more expeditious interactions, clustering has facilitated complex activities and offered much more opportunities to build "externalities" (See Appendix 1 for a definition). Clustering in medical sciences, can only take place under the institutional framework of the AMCs because it is the only patient care interface. AMCs are therefore indispensible features on the Singapore healthcare landscape and necessary, if Singapore's massive investments into biomedical sciences are to make sense or bear fruit.[29-31]

Promoting Health As a Public Good

In many ways, the utilitarian focus on cost-benefit (see Appendix for a definition), and distribution efficiency (means testing) misses an important aspect of public health provision – which is equity, stability and social cohesion. All stable societies, past and present, have provided some form of public goods to their community. For the ancient Greeks and Romans it was public baths and sports; and in Jewish communities it is education and religious societies. Many organised societies of the past did not choose healthcare or assistance for the poor. But they did provide what they thought as necessary goods to maintain the functions and harmony of their respective communities.[32]

In this regard, AMCs may be perceived not only as cost sinks, but also as a public goods to improve the health of the nation, promote equality, create new jobs and impart new knowledge. AMCs should be conceived as a brand owned by the public and at the service of public interests. They will need to work harder to generate publications but also to direct their knowledge and capabilities to benefit their communities.[33,34]

In a more difficult healthcare operating environment where the population has become more demanding, public adoption of the AMC brand may offer the government more leeway to maneuvre, that of offering the highest level of knowledge-driven cutting edge healthcare if needed. In the same way that the Japanese are more tolerant of crowding on their public transport system (peak crush load factor in Japan is far higher than Singapore), and most English patients are deeply grateful for the National Healthcare Service (NHS) (despite long waiting times), Singaporeans are likely to be much more tolerant of shortcomings, if they perceive the faults to be in the "homes they own", instead of the (service) "apartments they rent". Complaints of long waiting time by some public patients may perhaps be surrogates for their inexpressible desire for dignity, priority and membership.

Looking to the Future

In healthcare we are currently witnessing that both purely socialised and choice-driven free market models of healthcare provision are moving along unsustainable trajectories. But we also live in a time of tremendous hope where science and technology are providing us the ability to make human life better in ways never previously imagined. The rapid advances of genomics, proteomics, biomarkers, bioimaging, bioinformatics and targeted therapies now offer us real promise that stratified medicine will be more effective, less toxic and highly tailored to individual needs.[35] These are truly disruptive technologies that may secure Singapore's healthcare's lead in our region for another generation, if we are careful to embrace and cultivate it. Herein, partnership and specialisation may hold the key. For example, Stanford Medical Center is constructing a form-fits-function hospital system of the future in close partnership with Apple, Hewlett Packard, eBay, Intel, Intuit and Oracle to design an interface that embraces the best of technology and design to serve humanity. This enterprise has been funded largely by industry philanthropy and has the possibility of transforming the nature of how medical care is delivered.

The leadership of AMCs will need much credibility. They will have to persuade the government that they are good stewards of such a complex globally aspiring multifaceted enterprise, and will act responsibly with cost-discipline for the benefit of the community.[36] They will need to exert tighter control over how evidence-based healthcare

is delivered and be creators of new evidence of practice. Even as we embrace new ways of delivering care, and find new efficiencies[37,38] to the extent of commoditisation of healthcare, our leadership will also need to preserve the values of access, equitability, and human dignity, if the system is to be inclusive, egalitarian and work sustainably for the long term.

No one single AMC model will have formulaic universal applicability.[39] The challenges and opportunities that each Singaporean AMC must face, will be influenced by differing institutional strengths, priorities and organisational structures, economic realities and competing needs. Each AMC needs to adapt to what will and will not work on the basis of its own experience. AMCs will need to constantly respond, adapt and evolve to an even stronger entity in a fast changing world if they are to thrive, survive and maintain a commanding position in any nation's healthcare system.

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Appendix 1. Working Definitions of Terms

Cost-effectiveness Analysis. A form of economic analysis that compares the relative costs and outcomes (effects) of 2 or more courses of action. Usually expressed in terms of a ratio where the denominator is a gain in health (ie. quality adjusted life years gained) and the numerator is the dollar cost associated with health gain.[1] Cost-effectiveness analysis is a useful tool in Decision Analysis Methodology, to achieve good value within the constraints of inevitably limited resources. However, it has come under criticism for its utilitarian moral calculus and inappropriate monetisation of health effects,[2] in addition to the practical problems surrounding the availability, quality, bias and assumptions within the data used for the estimations of benefit.[3,4] Cost-effectiveness comparisons is more useful than cost alone (cost-minimisation) comparisons but should never be used as the sole criterion for decision-making. Further, although cost-effectiveness analysis may improve the efficiency of resource utilisation, it cannot substitute for the political process of societal consensus[5] that should ultimately determine threshold values of healthcare reimbursements, equality and welfare.

Cost-benefit analysis (CBA). A process of calculating and comparing benefits and costs of a decision or policy to see whether the benefits outweigh the costs, and by how much. It is related to cost-effectiveness analysis, but in CBA, benefits are expressed in monetary terms and are adjusted for the time value of money, and are expressed in terms of 'net present value'.[6] CBA has often been abused and misused. High profile errors include Ford Motor Company's decision against fixing of the faulty fuel tanks in its Ford Pinto model, and the Phillip Morris study supporting cigarette smoking in Czech Republic.[5] CBA has been criticised as imitating the ideology of the "free market" and an attempt to introduce market principles into government, or making governments behave more like the markets. It has been criticised for attempting to place a financial value onto life or pursuing a strategy of wealth maximisation rather than utility maximisation. On the other hand, proponents for CBA see it as a pragmatic instrument of public policy, agnostic on deep issues and values, and a tool to assist people in making complex judgments where multiple goods are involved.[7] The CBA methodology is more shielded from political influence, and benefits from the discipline of insisting explicitly for valuation. Although CBA treats a dollar as worth the same to everyone (thus running against the "equalising" considerations of distributive justice), its utilitarian approach is synonymous with welfare economics, and is used as a valuable tool for public policy.[8]

Externality (spillover effect). A cost or a benefit that is not transmitted through prices and is incurred by a party who was not involved as either a buyer or seller of the goods or services causing the cost or benefit.[9] In the case of externalities (whether positive or negative), prices in a competitive market do not reflect the full costs or benefits of producing or consuming a product or service.[9] Examples of positive externalities include (i) increased education of individuals can lead to broader society benefits in the form of greater economic productivity, lower unemployment rate and greater household mobility; (ii) an individual planting an attractive garden in front of his house may provide benefits to others living in the area, and even financial benefits in the form of increased property values for all property owners; and (ii) an individual buying a product that is interconnected in a network (i.e. video cellphone) will increase the usefulness of such a product to other people who have a similar device (network effect). Network externalities often have "tipping points".[9]

Utilitarianism. An ethical theory holding that the proper course of action is the one that maximised overall "happiness" within a population or group.[10] It can be thought of as achieving the greatest good for the greatest number of people.

Dynamic Efficiency. An economic term which refers to an economy that appropriately balances short run concerns (static efficency) with concerns in the long run (focusing on encouraging research and development).[11] For example the patent system (protecting intellectual property) means that knowledge is temporarily used less efficiently due to the exercise of monopolistic power and intellectual property. But if a patent system is able to generate more innovation, its long-term benefits may outweigh short run costs.[12]

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