

Health technology assessment in Singapore

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The Republic of Singapore is an island city-state in Southeast Asia. Its population enjoys good health and the Singapore Ministry of Health's mission is to promote good health and reduce illness, ensure access to good and affordable health care, and pursue medical excellence. This is achieved through a healthcare system that includes both private and public sector elements. The financing philosophy of Singapore's healthcare delivery system is based on individual responsibility and community support. Health care in Singapore is financed by a combination of taxes, employee medical benefits, compulsory health savings, insurance, and out-of-pocket payment. The capability for health technology assessment in Singapore was developed concurrently with its medical device regulation system in the 1990s. The first formal unit with health technology assessment (HTA) functions was established in September 1995. Today, HTA features in decision making for the Standard Drug List, licensing of medical clinics, the Health Service Development Programme, healthcare subsidies, and policy development. The public sector healthcare delivery clusters have also recently started health services research units with HTA functions. Singapore is organizing the 6th Health Technology Assessment International (HTAi) Annual Meeting in June 2009. Bringing this prestigious international conference to Asia for the first time will help raise awareness of HTA in the region.

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SINGAPORE: TROPICAL ISLAND AND CITY-STATE

The Republic of Singapore lies less than 2 degrees North of the equator, at the Southern tip of the Malay peninsula, in Southeast Asia. It is a tiny country with an area of just over 700 square kilometers, comprising a main island and some much smaller islands. It is densely populated, with a total population of 4.6 million (3.6 million resident population) (16).

Singapore's location, size, cultural mix, economics, and history have shaped its character and contributed to the current state of its population's health and the development of its healthcare system and health technology assessment activities.

The Health of Singaporeans

Singaporeans enjoy good health. Men have a life expectancy of 78 years, and women have a life expectancy of 83 years. The infant mortality rate is 2.1 per 1,000 live-births and the Maternal Mortality Ratio is 8 per 100,000 live-births and

still-births (figures for 2007) (4). Singapore was ranked sixth in overall health system performance in the World Health Report 2000 (19). Factors that have contributed to this are a relatively young population and a sustained period of good economic growth with rising standards of living, safe food and water supply, good housing, sanitation, education, and public health.

The Singapore Healthcare System

The healthcare system in Singapore is made up of preventive, therapeutic, rehabilitative, and intermediate and long-term care services, complemented by good housing, sanitation, education, and a safe water supply (11).

The government manages the public healthcare system and regulates the private healthcare sector through the Ministry of Health. The vision of the Ministry of Health is to champion a healthy nation with our people—to live well, live long, and with peace of mind. The Ministry is committed to medical excellence, promoting good health, and reducing illness, and to ensuring that Singaporeans have access to good

and affordable health care that is appropriate to their needs (3).

Medical Practice in Singapore

The practice of medicine in Singapore is regulated by various statutory Acts. The Medical Registration Act (Chap. 174) provides for the registration of medical practitioners by a Singapore Medical Council and determines who may practice as a doctor in Singapore. The Act also covers specialist medical practice, defining medical specialties and the training and qualifications required of a specialist doctor. Doctors practicing within Singapore are bound by the Singapore Medical Council's Ethical Codes and Ethical Guidelines. The Ethical Code states that a doctor should "Keep abreast of medical knowledge relevant to practice and ensure that clinical and technical skills are maintained." The Ethical Guidelines clarify further that a Standard of Good Medical Practice, where it covers untested practices clinical trials, is that, "A doctor shall treat patients according to generally accepted methods and use only licensed drugs for appropriate indications. A doctor shall not offer to patients, management plans or remedies that are not generally accepted by the profession, except in the context of a formal and approved clinical trial." Where it covers continuing medical education, the guidelines state that, "The doctor is expected to be up to date with the most appropriate methods of medical management, procedures, and operative techniques" (17).

Healthcare Services in Singapore

Singapore has a colonial past: after gaining independence from the British in the 1960s, it inherited their administrative systems, including systems for providing health care. Under the British, medical services were provided mainly by the public sector and financed through general taxation; the private sector played only a minor role. Since then, the country has evolved to suit its changing circumstances and today, healthcare services are provided by both the government and the private sector.

Private practitioners provide 80 percent of primary care healthcare services, while government polyclinics (eighteen outpatient polyclinics are located around the island) provide the remaining 20 percent. At the hospital level, the proportion is reversed with 80 percent provided in public hospitals (seven restructured hospitals and six national specialty centers) and 20 percent in private hospitals. A range of residential and community-based intermediate and long-term care services are available, including community hospitals, chronic sick hospitals, nursing homes, hospices, home-based services, and day care centers (11).

In Singapore's early years, the public healthcare sector was wholly owned and managed by the government. In the 1980s, against a background of decentralization of social services, the process of restructuring the country's hospital services began. The aim was to allow hospitals greater au-

tonomy in management, which it was hoped would result in greater efficiency, higher standards, and a more personalized service to patients. The first hospital to come under this more autonomous mode of operation was the newly completed National University Hospital in 1985. The other existing government hospitals and national specialty centers followed in a process of restructuring continuing into the 1990s (14).

In 2000, a further organizational change was effected with the incorporation of two public sector healthcare delivery clusters, the National Healthcare Group and Singapore Health Services. The clusters were formed from the restructured hospitals, national specialty centers, and government polyclinics, divided geographically into two integrated health systems with primary, secondary, and tertiary care elements. The objective of the clustering was to encourage cooperation among institutions within a cluster, foster vertical integration of services, and enhance synergy and economies of scale. The friendly competition between the two clusters was intended to spur them to innovate and improve quality of care, while ensuring that medical costs remained affordable (5).

In 2008, the public healthcare sector landscape continued to evolve with the formation of the National University Health System, a joint entity comprising the National University Hospital, the National University of Singapore's Yong Loo Lin School of Medicine and Faculty of Dentistry, and the announcement of a new general hospital to be built in the Western region of Singapore. This new hospital would be co-located with a community hospital to facilitate sharing of common resources, expertise, and patient transfers (12;13).

In the private sector, fifteen hospitals are run by a few private healthcare groups, such as Parkway Holdings (East Shore Hospital, Gleneagles Hospital, Mount Elizabeth Hospital) and the Raffles Medical Group (Raffles Hospital), to name but two.

Healthcare Financing in Singapore

In 2005, Singapore spent approximately S\$7.4 billion or 3.7 percent of gross domestic product (GDP) on health care. Of this, Government expenditure on health services was S\$1.8 billion or 0.9 percent of GDP. Health care in Singapore is financed by a combination of taxes, employee medical benefits, compulsory health savings, insurance, and out-of-pocket payment (10).

The financing philosophy of Singapore's healthcare delivery system is based on individual responsibility and community support. Patients are expected to co-pay part of their medical expenses and to pay more when they demand a higher level of service. At the same time, Government subsidies help to keep basic healthcare affordable.

Public health services are subsidized through general taxation. The healthcare delivery clusters receive a subvention from the government to provide healthcare services. In the public hospitals, patients can choose different classes

of ward accommodation ranging from a single- or double-bedded room (Class A) to an open ward with eight or more beds. Patients in the single-bed rooms pay the full cost, whereas patients in other ward classes enjoy subsidies ranging from 20 percent of the cost for the four-bedded rooms (Class B1) to 80 percent of the cost for the open wards (Class C) (10).

In the private sector, patients pay the amount charged at private hospitals and outpatient clinics on a fee-for-service basis. Employee medical benefits or insurance may also cover some costs.

The financing framework that helps Singaporeans to pay for medical expenses has several components: Medisave, MediShield, Medifund (given the colloquial name, the 3Ms) and Eldershield.

In the 1980s, the government anticipated an ageing population and increased healthcare needs and expenses, and started to put in place its health financing framework. First to be established was a compulsory health savings scheme, Medisave, in April 1984. At that time, Singaporeans already had compulsory savings in the form of Central Provident Fund savings, where employees put aside a percentage of their salary for their retirement. Medisave was introduced primarily to cover acute hospitalization expenses. Over the years, Medisave has developed to become the current national savings scheme that it is, helping individuals set aside part of their income to meet future hospitalization, day surgery, and some outpatient expenses. Medisave can be used for the individual as well as his or her immediate family. Under the Medisave scheme, an employee sets aside 6.5 percent to 9 percent (the percentage varies with age) of monthly salary to a personal health savings account; these savings are not pooled (8).

In 1990, a low cost catastrophic insurance scheme, MediShield, was introduced, to help Singaporeans cope with medical expenses from major illnesses, which could not be sufficiently covered by Medisave. MediShield premiums can be paid through Medisave, and there is a co-payment and deductible component for MediShield claims. MediShield can cover up to 80 percent of medical bills at the Class B2 or C level (9).

The third of the 3Ms is Medifund, an endowment fund set up in 1993 to help Singaporean who are unable to pay for their medical expenses. Medifund is a safety net for those who are unable to pay their subsidized medical expenses, despite Medisave and MediShield coverage. The government uses the interest from a capital sum (which stands at S\$1.66 billion today) to help Singaporeans who have exhausted all other means of paying their medical bills (7).

In the same year (1993), the Government published a White Paper on Affordable Health Care (2). The White Paper was the outcome of a Ministerial Committee to review the state's role in providing health care, and recommend ways to improve the health-care system while containing the long-term increase in costs and subsidies. The White Paper

explicitly spelled out the Government's healthcare philosophy, which was based on five fundamental objectives: (i) to nurture a healthy nation by promoting good health; (ii) to promote personal responsibility for one's health and avoid over-reliance on state welfare or medical insurance; (iii) to provide good and affordable basic medical services to all Singaporeans; (iv) to rely on competition and market forces to improve service and raise efficiency; and (v) to intervene directly in the healthcare sector, when necessary, where the market fails to keep healthcare costs down.

In 2002, ElderShield was initiated as an affordable severe disability insurance scheme, which provides basic financial protection to those who need long-term care, especially during old age. It provides a monthly cash payout to help pay the out-of-pocket expenses for the care of a severely disabled person. ElderShield premiums may be paid for with Medisave or cash (6).

In addition to these schemes, an employed Singaporean could also pay for medical care through employee medical benefits or out-of-pocket payment. Figure 1 shows the components that go into Singapore's national healthcare expenditure.

Paying for Drugs in Singapore

Medical product licensing and registration is administered by the Health Sciences Authority in Singapore. There are no price controls on drugs at the point of registration: any drug that is licensed may be marketed in Singapore. Subsidies are provided for essential drugs in the public sector; these drugs are identified in the Standard Drug List.

The Standard Drug List

The Standard Drug List is a tool for subsidizing drugs in the public sector. First established in 1979, the Standard Drug List was modeled after the WHO Essential Drug List, with modifications to suit local disease patterns. Standard drugs are defined as clinically relevant and cost-effective drugs that are considered as basic therapies and essential for management of common diseases afflicting the majority of the patients. The Standard Drug List consists of approximately 800 preparations categorized into Standard Drug List 1 and Standard Drug List 2. Standard Drug List 1 comprises essential first line drugs, whereas Standard Drug List 2 comprises relatively more expensive essential drugs. A patient attending a public healthcare institution would have to pay a standard charge of S\$1.40 per item per week for a Standard Drug List 1 drug; for a Standard Drug List 2 item, the patient would have to pay 50 percent of the charges for the drug.

The Standard Drug List is reviewed every year. Clinicians in public healthcare institutions identify patients' needs for new drugs and apply for the drugs to be included in the Standard Drug List. Applications are reviewed, selected, and prioritized at institutional level and then submitted to the Ministry of Health Drug Advisory Committee. The Drug

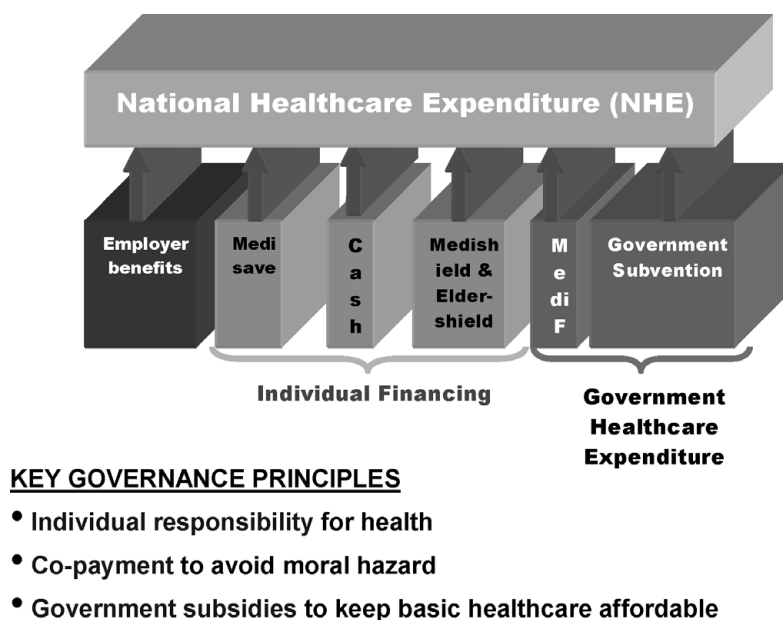


Figure 1. Components of Singapore's national healthcare expenditure.

Advisory Committee is an expert panel, assisted by a secretariat that assesses the proposed drugs and makes recommendations to the Ministry on the drugs. The technology assessment of a drug is based on its regulatory and formulary profile, the epidemiology of the disease it is for, the drug's clinical role, incremental efficacy and safety, relative cost-effectiveness, and the financial impact of including the drug in the Standard Drug List. The Ministry considers the Committee's recommendation and will weigh the clinical value, budget impact, and various prioritization criteria in arriving at a decision on a drug. These criteria include whether the drug fills a therapeutic gap, where the drug lies in the line of therapy, disease prevalence, type of outcome expected from the drug, affordability of the drug to patients, and overall cost-effectiveness. In addition to deciding on whether to include new drugs in the Standard Drug List, the Ministry will also consider including new formulations of existing drugs and removing obsolete drugs from the list.

As a tool to keep essential drugs affordable for all Singaporeans, the Standard Drug List is constantly reviewed to ensure its continued relevance to clinical practice. The challenge is to keep pace with an ever-expanding number of essential but costly therapies within the constraints of the allocated budget.

Health Technology Assessment in Singapore

The preceding paragraphs provide the context for health technology assessment (HTA) in Singapore. What follows is a

short narrative of the development of HTA activities in Singapore.

Before the 1990s, there were no formal HTA activities in Singapore. The Ministry of Health relied on individual experts or expert committees to provide it with professional advice. The late 1980s and early 1990s was a period marked by organizational change in the national healthcare system—this was the era of restructuring of the public sector hospitals and institutions, and the Ministry of Health and the public sector hospitals were adjusting to the changed interorganizational dynamics. In addition, rapid economic growth in the years since independence of the country in 1965 contributed to development of both the public and private healthcare sectors: the influence of medical developments elsewhere was felt in a society able to afford the latest health technologies.

In April 1991, the Minister for Health set up a Review Committee on National Health Policies to review current healthcare policies. To assist the Review Committee in its functions, three subcommittees were set up in the specialized areas of undergraduate and postgraduate training, medical specialization and subspecialization, and healthcare financing. One of the terms of reference of the Subcommittee on Medical Specialization and Subspecialization was to review the application and introduction of new medical technology and procedures into Singapore and recommend mechanisms for evaluating the safety and efficacy of these new techniques and for coordinating the introduction of high technology medicine to prevent unnecessary duplication and healthcare cost escalation.

The Subcommittee noted that, at that time, apart from the regulation on the import and use of radiological equipment and devices emitting nonionizing radiation, there was no control over the introduction of new medical technology into the country. The Subcommittee considered the concept of a "Certificate of Need" as a means of limiting the proliferation of expensive medical technology but rejected it as unsuitable for Singapore, citing the experience in the United States, where it did not help to control healthcare costs. It was also believed that it might impede the progress of medical development in Singapore (18). In the Main Report of the Review Committee on National Health Policies, the recommendation was that "In the public hospitals, the supply and use of expensive technology should be controlled and regulated to avoid unnecessary duplication and wastage. Furthermore, expensive technology should be introduced only after its effectiveness has been proven" (15).

Subsequently, the Ministry followed up on the recommendations of the Committee, putting in place over the years a system for regulating the marketing of medical devices in Singapore. Today, the Health Sciences Authority, a statutory board under the Ministry, oversees the regulation of marketing of medical devices in Singapore. The regulatory framework for medical devices takes reference from similar agencies around the world, including the US Food and Drug Administration (FDA) and the Australian Therapeutic Goods Administration. The framework is also based on principles endorsed by the Global Harmonization Task Force, with modification to suit Singapore's context. The Health Sciences Authority's approach is a measured one, to safeguard public health but without unduly restricting consumer choice and their access to new technologies. Since the implementation of the Voluntary Product Registration Scheme in 2002, the Health Sciences Authority has had an active postmarket monitoring and surveillance program for medical devices in place. With the passage of the Health Products Act 2007 in February 2007, the Health Sciences Authority will be implementing the Health Products (Medical Devices) Regulations to better regulate medical devices in Singapore (1).

Concurrent to this statutory regulation, the Ministry also began to develop its capability for health technology assessment, to inform policy development and decision making. In September 1995, the first Technology Assessment Department was set up within the Ministry to evaluate the benefits, risks, and clinical effectiveness of health technologies to provide an input for policy making in the management and planning of health services in Singapore. In its first year, the department assessed and reported on three technologies: (i) ethylenediaminetetraacetic acid (EDTA) chelation therapy for the treatment of atherosclerotic coronary heart disease; (ii) positron emission tomography (PET); (iii) autologous target cytokines for the treatment of cancers. The reports helped to inform the Ministry's policies on these technologies.

In the following years, some organizational restructuring took place. In September 1996, the department merged with another department to become the Department of Research and Technology Assessment. In 1997, the department became the Department of Clinical Standards, and took on the work of administering the Ministry of Health's Clinical Practice Guidelines Programme. In 1998, the first two guidelines (on Management of Paediatric Asthma and Management of *Helicobacter pylori* Infection) were published and to date there have been fifty-eight guidelines published, including updates of previous guidelines. Guideline development has in common with HTA an evidence-based approach and shares methodologies (e.g., the systematic review), hence, the collocation of these functions in one department.

Further reorganizations in subsequent years saw changes of the name of the unit to the Clinical Standards and Technology Assessment Branch, then the Clinical Guidelines and Technology Assessment Branch, and most recently in November 2006 to the existing Health Technology Assessment Branch. Nevertheless, through the name changes, the functions of clinical practice guideline development and health technology assessment to support decision making have remained and developed.

Over the years, the unit has looked to overseas HTA agencies and expert consultants to learn and observe best practices in HTA. In its first year, for example, the unit was visited by Dr. David Banta from TNO Health Research in the Netherlands and Dr. Sadasivan Sivalal from the Health Technology Assessment Unit of the Ministry of Health, Malaysia (which was building up its HTA capability at the same time). In 2003, Professor Michael Drummond, from the Centre for Health Economics in the University of York, was a visiting expert under the Ministry's Health Manpower Development Plan (HMDP). The unit's staff had been sent for training in HTA. Locally, the Community, Occupational, and Family Medicine Department of the Medical Faculty of the National University of Singapore had invited Dr. Devidas Menon of the Canadian Coordinating Office for Health Technology Assessment (CCOHTA) to conduct short courses in HTA. A staff member was also subsequently attached with CCOHTA on a work attachment for 6 months in 2002, under the HMDP. For several years now, the unit's staff has been attending the International Society for Technology Assessment in Health Care's (ISTAHC) annual meeting and the annual meetings of its successor organization, the Health Technology Assessment International (HTAi).

The HTA Branch serves the policy needs of the Ministry of Health. These needs are varied and may range from ad hoc rapid reviews on technologies that come to the attention of the Health Regulation Division during licensing of medical clinics, to longer assessments on treatments that may be under consideration for subsidy or Medisave use. Table 1 shows work done by the HTA branch in 2008.

An area where HTA has proved useful is in the introduction of new technologies to the public healthcare system. In

Table 1. Health Technology Assessments and Clinical Practice Guidelines Developed by the Health Technology Assessments Branch in 2008

Health technology assessments	
•	Cost-effectiveness analysis of pneumococcal vaccine for children in Singapore
•	Rapid review of the terminology and definitions related to “infertility”
•	Automatic external defibrillators
•	Electromagnetic signal therapy (pulse signal therapy)
•	Intraoperative radiation in the treatment of colorectal cancer
•	Cold laser therapy
•	Review of evidence in guidelines for aesthetic practices for doctors
•	Stem cells in renal organogenesis
•	Effectiveness of isolation versus cohorting on methicillin-resistant <i>Staphylococcus aureus</i> colonizers in hospital-acquired infections
•	Simulation training – literature search
•	Ankaferd blood stopper
Clinical practice guidelines	
•	Management of asthma
•	Prescribing of benzodiazepines
•	Use of electrocardiogram for screening for coronary heart disease in asymptomatic patients with heart disease

2000, the Health Service Development Programme (HSDP) was established by the Ministry, with the objective of developing new health services and medical capabilities through the funding of three categories of projects on a pilot basis: (i) new cutting-edge medical technology, which require a period of evaluation; (ii) advanced and costly treatments, which are well-established treatments but which are costly and would be offered, on a subsidized basis, only to those patients who have a good likelihood of benefiting from them; and (iii) major augmentations of existing management capability for key diseases

Since its inception, all proposals for funding under the HSDP are required to include evidence to support the use of the proposed technology, and this is best achieved by submitting an HTA report of the technology. The HTA Branch provides assistance in critically appraising the assessments submitted to support applications for funding.

Within the public sector, individual healthcare institutions have for many years had committees to determine institutional policies on the use of health technologies. For example, Pharmaceutical and Therapeutics Committees to advise on the use of drugs within the hospital. More recently, health services research units have been formed in both public sector healthcare delivery clusters, which include formal HTA activities among their portfolios.

This increased interest in using health services research including HTA in the public healthcare system has manifested in a collaboration between the HTA Branch in the Ministry of Health and the health services research units in the clusters, which has successfully bid to host the 6th Health Technology Assessment International Annual Meeting in Singapore from 21 to 24 June 2009. The intention of holding this prestigious international conference in Singapore is to raise awareness of HTA among local clinicians, administrators, and policy makers. Recognizing that the con-

ference will also benefit other regional health authorities, the collaboration extends to regional co-organizers such as HTA units in neighboring countries.

SUMMARY

In summary, Singapore's circumstances have contributed to the health of its population and the development of its healthcare system. The Ministry of Health is committed to promoting good health and reducing illness, ensuring access to good and affordable health care, and pursuing medical excellence, for the benefit of all Singaporeans. An innovative and complex healthcare financing system is aimed at keeping good health care affordable for the population. The marketing of drugs and medical devices is regulated, and there are no price controls at the point of registration. Health technology assessment is used as a tool for evidence-based policy development and decision making. The capabilities for HTA work is building in the public healthcare sector, and it is hoped that the HTAi Annual Meeting in 2009 will raise interest and awareness in HTA in Singapore and the surrounding region.

CONTACT INFORMATION

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