

STATE OF HEALTH Report of the Director of Medical Services 2003 - 2012

State of Health

Report of the Director of Medical Services
2003 - 2012



College of Medicine Building Ministry of Health



MINISTRY OF HEALTH
SINGAPORE

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ISBN 978-981-07-6828-7



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Foreword

The last annual report of the Director of Medical Services, entitled "State of Health", was published in 2001. Major events involving the Ministry of Health (MOH) were subsequently documented annually in the Singapore Yearbook published by then Ministry of Information, Communications and the Arts. Publications however ceased from 2009.

The report of the Director of Medical Services consolidates developments, achievements, as well as lessons learnt. By providing a record of significant developments and achievements, we hope that our healthcare workforce, partners and stakeholders will have a better understanding of recent developments and build on past experiences even as we chart the course for the future.

The last decade or so was especially characterised by several outbreaks of infectious diseases. These new

challenges underscored the importance of a high level of vigilance and surveillance. Some of these included Severe Acute Respiratory Syndrome (SARS) in 2003, the first report of indigenous chikungunya fever in Singapore in 2008 and the arrival of the first influenza A (H1N1-2009) pandemic of the 21st century in 2009.

These outbreaks not only caused significant economic impact, morbidity and mortality, but also tested the resilience of our healthcare delivery systems. Our healthcare workforce remained steadfast and showed its fortitude, enabling Singapore to overcome these challenges in commendable fashion. We remember the sacrifices that many of our colleagues have had to make. Their dedication and professionalism are etched in our hearts -- they are standard-bearers for the healthcare profession. Infectious diseases will continue to emerge and threaten our way of life. Our people must remain vigilant; surveillance systems must continue to be

tested and relevant; our response must be nimble and adaptable when faced with uncertainty.

Singapore has to face in the longer term the rising prevalence of chronic disease which not only increases the demand for health services but will also change the way that care is delivered. The move from a provider to a more holistic patient-centric care will require a re-think of the way we deliver our healthcare services.

The Khoo Teck Puat Hospital (KTPH), officially opened by then-Minister Mentor Lee Kuan Yew on 15 November 2010, heralds this approach to seamless patient-centric healthcare delivery which was envisaged to meet increasingly complex healthcare needs. KTPH will form the anchor of the northern medical hub, together with a polyclinic and a community hospital, to provide continuing care, hassle-free for the patient. This approach also formed the blueprint for the development of the western JurongHealth cluster. Slated for completion in 2014, the western medical hub will similarly be anchored by Ng Teng Fong General Hospital and twinned with a community hospital.

Palliative and end-of-life care will become increasingly important as the population ages. These can become highly emotive issues if not handled sensitively and sensibly. Patients should receive quality care according to their wishes, and in a way that preserves their dignity. We must strive for dignity and peace, both in life and in death.

MOH has been traditionally viewed as the enforcer and regulator. Legislations will always be necessary to safeguard the interests of patients, given the degree of information asymmetry between doctors and patients. We have recognised the need, however, to be innovative and adaptive in the way we engage our partners. "Smart regulation" is the preferred approach as it minimises the use of legislative powers, facilitates self-regulation, and leverages market forces or instruments, whenever possible.

Similarly, we have taken on roles as facilitator and collaborator on the clinical quality journey and established various platforms for institutions to innovate and direct its own quality improvement. The Healthcare Quality Improvement Fund, launched in 2005, was set up to provide seed funding to pilot-test patient safety and quality improvement projects. This was later merged with the Health Innovation Fund and was renamed the Healthcare Quality Improvement & Innovation Fund, with increased annual funding to support innovative approaches towards quality improvement. The Ministry's investment in over 130 projects since its

inception has brought about credible clinical quality improvements in the institutions. Outstanding projects have also been deservedly recognised at international conferences and published in acclaimed journals. MOH will continue to provide platforms which incentivise and recognise contributions towards quality improvement. Hospitals and institutions, however, must take on the responsibility of sustaining and translating these achievements into better outcomes for the patient.

Our greatest asset in healthcare is our workforce. A high-quality healthcare workforce is needed to meet the growing disease burden and to sustain our pursuit of medical excellence. The residency system for postgraduate medical education was implemented in 2010. We incorporated the best-practices from developed countries and customised it to meet local needs. These changes were made as we recognised that medical education and training was a serious commitment which required investment of resources; and that our training system must produce specialists and family physicians in a manner that could meet evolving local healthcare needs.

The Ministry is continuously looking for ways to improve primary care. The Register of Family Physicians serves to recognise medical practitioners with relevant qualifications and sets the standards of practice for Family Medicine. Entry into the Register can be obtained by diploma and practice routes. The practice route is designed to be flexible and inclusive so that general practitioners with years of experience can be recognised as family physicians.

This decade saw the implementation of a wide range of initiatives. The success and progress achieved so far would not have been possible without the understanding and support from organisations and individual healthcare professionals from both public and private sectors. I would like to take this opportunity to acknowledge and commend their contributions and unwavering commitment. As healthcare continues to evolve at a rapid pace, we can expect exciting changes and trying challenges in the future. The Ministry looks forward to continuing the strong partnerships, and together, forging a legacy of better health for the nation.

Professor K Satku
Director of Medical Services

Chapter I

Overview of the Health Status in Singapore

“ Singapore spends a little less than 4% of its GDP on health. Life expectancy at birth is 81 years, and the infant mortality rate is 2.2 per 1,000 births, which is the lowest in the world. Our population has doubled in the last 30 years, and is also aging rapidly. The number of elderly has doubled in the last 20 years, and is expected to triple in the next 20. This has resulted in an increasing prevalence of chronic diseases and greater demand for healthcare. ”

Professor K. Satku,
Accreditation Council for Graduate Medical Education (ACGME)
Educational Conference, 2011



Overview of the Health Status in Singapore

by: A/Prof Derrick Heng

Population Profile

The resident population of Singapore (comprising Singapore citizens and permanent residents), was 3.82 million as of end June 2012, as compared with 3.38 million in 2002. The total population (including non-residents) increased from 4.18 million in 2002 to 5.31 million in 2012.

The ethnic distribution in the resident population remained stable with 74.2% Chinese, 13.3% Malays, and 9.2% Indians. The ageing trend in Singapore (Fig 1) continued with the number of elderly aged 65 years and above increasing from 7.4% in 2002 to 9.9% in 2012. In 2012, the old-age support ratio had declined to 6.7 residents aged 20-64 years for each elderly resident aged 65 years and above compared to 8.7 in 2002. In 2012, the median age of the resident population was 38.4 years, up from 34.7 years in 2002.



Life Expectancy and Health-adjusted Life Expectancy

Longevity has improved significantly for Singapore residents over the years. Life expectancy at birth for all Singaporeans in 2011 was 82.0 years, up from 78.3 years in 2001. In 2011, females continued to have a higher life expectancy at birth of 84.3 years compared to males at 79.6 years (Fig 2).

Health-adjusted life expectancy (HALE) estimates the number of healthy years an individual is expected to live at birth by subtracting the years spent in ill health (weighted by severity of ill-health) from overall life expectancy. For reference year 2007, the HALE at birth for Singapore residents was 71.6 years for males and 75.8 years for females (Fig 3).

Disease Burden

DISABILITY-ADJUSTED LIFE YEARS (DALYS)

Singapore conducts comprehensive assessment of the health status of Singapore residents in term of mortality and morbidity for specific diseases. The burden of disease is measured by a single indicator known as disability-adjusted life years (DALYs). One DALY can be thought of as one lost year of 'healthy life' and is calculated as a combination of years of life lost (YLL) due to premature mortality and equivalent years of 'healthy life' lost due to ill-health or disability (YLD). These indicators provide a measure of the gap between current health status and an ideal situation in which everyone lives into old age without any disease or ill health.

Over 390,000 years of 'healthy' life (i.e. disability adjusted life-years or DALYs) were lost due to premature deaths and ill-health in Singapore in 2007. This translates to 110 DALYs lost per thousand residents or, in other words, an average probability of 0.110 of losing health due to illness or death in the population. Non-communicable diseases contributed 89% of DALYs while communicable diseases accounted for only 5% of total burden. This reflects the epidemiological transition towards a disease pattern dominated by chronic non-communicable diseases.

NON-COMMUNICABLE DISEASES

Cardiovascular diseases and cancers were the leading causes of the burden of disease and injury, accounting for 37% of total DALYs (Fig 4). More than four-fifths (83%) of that burden were from premature deaths. Ischaemic heart disease (55%) and stroke (32%) dominated the burden of cardiovascular diseases while lung (19%), breast (14%), and colon and rectum (14%) cancers were the top specific causes of cancer burden. Neurological, vision and hearing disorders, mental disorders, and diabetes were the next largest contributors, which together, accounted for another

34% of total DALYs. Premature mortality attributed to the burden from these groups was small (7%), highlighting the importance of including non-fatal health outcomes in population health measurement. Vision disorders (34%), dementia (24%) and adult-onset hearing loss (21%) were the main specific causes of neurological, vision and hearing disorders. The leading conditions of mental disorders burden were anxiety and depression (54%), schizophrenia (24%) and autism spectrum disorders (10%).

Overall, the distribution of DALYs between the sexes was approximately equal. For musculoskeletal diseases and mental disorders, the burden was notably higher in women. Conversely, the burden in men was higher for injuries, chronic respiratory and cardiovascular diseases.



COMMUNICABLE DISEASES

Communicable diseases comprising infectious diseases and respiratory infections made up 5% of total DALYs (Fig 4). Close to three-quarters of this burden was attributed to premature mortality due primarily to respiratory infections.

The respiratory infections group had a slightly higher share of disease burden at 2.6% of total DALYs while the proportion for the infectious diseases group was 2.4%. Most of the burden from respiratory infections was due to premature deaths (YLL) (91%) rather than ill-health (YLD) (9%). On the other hand, the distribution between YLL (49%) and YLD (51%) for infectious diseases was almost even.

In terms of specific causes, lower respiratory tract infection (primarily pneumonia) was the most significant contributor of disease burden among all communicable diseases. It was ranked as the 12th and 4th leading causes of total DALYs (2.5%) and YLL (5.1%), respectively. The second largest specific cause was Human Immunodeficiency Virus / Acquired

Immunodeficiency Syndrome (HIV/AIDS) [0.8% of total DALYs followed by tuberculosis (TB) (0.3%) and hepatitis (mainly due to hepatitis B (0.2%)). Owing to our effective routine immunisation programmes, the burden from childhood-cluster diseases was minimal.

There were marked differences in the attribution of total burden to deaths and ill-health or disability among the specific causes of communicable diseases. The share of total DALYs due to fatal outcomes was highest for lower respiratory tract infections (95%) followed by TB (81%) and HIV/AIDS (55%) (Fig 5). The burden due to ill-health or disability was higher among the population who suffered from septicaemia (100%), otitis media (100%), upper respiratory tract infections (100%) and hepatitis (84%).

While our resident population has a low burden of communicable diseases, this does not fully capture the potential disease burden or health threat posed by emergence of epidemics like severe acute respiratory syndrome (SARS) or pandemic influenza.

Fertility Trends

For the last decade, the annual number of total live births had declined from 41,451 in 2001 to 39,654 in 2011. The resident total fertility rate (TFR) declined further from 1.41 births per female in 2001 to 1.20

in 2011. This decline was observed among all ethnic groups. Among the three ethnic groups, the resident TFR for Chinese remained lower (1.08) than that for Malays (1.64) and Indians (1.09) in 2011.

Mortality

The resident crude death rate increased marginally from 4.3 deaths per 1,000 residents in 2001 to 4.5 in 2011. The impact of increasing life expectancy was mitigated by the growing middle-aged and elderly population.

Cancer, heart disease, stroke and pneumonia remained the major causes of death in Singapore. Together, these diseases accounted for over 76% of all deaths in 2011.

Infant and Maternal Mortality

The infant mortality declined marginally from 2.2 per 1,000 resident live-births in 2001 to 2.0 per 1,000 live-births in 2011 (Fig 6).

Concomitantly, the maternal mortality remained at 0.1 per 1,000 live-births between 2001 and 2011.

Major Health Problems

CANCER

Cancer has consistently been the leading cause of death in Singapore since 2001. In 2011, it accounted for 30% of all deaths. The crude incidence rates for cancer for male and female residents for the period 2007-2011 were 286.3 and 295.3 per 100,000 resident population per year, respectively. When age-standardised to Segi's world population for international comparability, the rates were 229.7 and 209.2 per 100,000 population for males and females, respectively.

In the five-year period between 2007 and 2011, data from the Singapore Cancer Registry showed that colorectal cancer was the most common cancer in male residents (17.6%), followed by lung (15.5%) and prostate cancers (11.8%) (Fig 7). In female residents, the most common cancer was breast cancer (29.3%), followed by colorectal (13.9%) and lung cancers (7.7%) (Fig 8).

CARDIOVASCULAR DISEASES

Among the vascular diseases, ischaemic heart disease

and stroke accounted for more than one-quarter of all deaths in Singapore.

ISCHAEMIC HEART DISEASE

Annually, there are about 7,200 incident acute myocardial infarction (AMI) episodes, caused by underlying coronary heart disease in Singapore. In 2011, the AMI rate in males (313.2 per 100,000) was more than twice that of females (127.4 per 100,000). The rate of AMI was highest among ethnic Malays (439.2 per 100,000) followed by Indians (421.5 per 100,000) and Chinese (151.2 per 100,000).

STROKE

Between 2001 and 2011, cerebrovascular diseases including stroke, remained the fourth leading cause of mortality and a major cause of adult-onset disability in Singapore. The age-standardised mortality rate for stroke decreased from 45.5 per 100,000 population in 2001 to 32.2 per 100,000 population in 2011.

Prevalence of Chronic Diseases and Risk Factors for Disease Among Singapore Residents

Overall, between 2004 and 2010, there had been favourable trends in the age-standardised prevalence of hypertension (26.8% in 2004 against 23.5% in 2010 among adults aged 18-69 years old), high blood cholesterol (19.1% in 2004 against 17.4% in 2010 among adults aged 30-69 years old), and behavioural risk factors such as cigarette smoking, regular leisure time exercise and regular drinking (Fig 9)¹. The age-standardised prevalence of diabetes among adults 18-69 years old in 2010 (11.3%) was lower than that in 1992 (11.5%), despite an increase between 2004 and 2010. However, the age-standardised prevalence of obesity in the same age group had been on a rising trend from 5.5% in 1992 to 10.8% in 2010.

DIABETES

Diabetes prevalence for adults aged 18-69 years in 2010 was 11.3%. A slightly higher proportion of males (12.3%) were diabetic compared to females (10.4%). Indians had the highest prevalence among the ethnic groups (Indians: 17.2%, Malays: 16.6%, Chinese: 9.7%). The diabetes prevalence increased sharply with age; from 1.0% among those aged 18 to 29 years to 12.1% of adults in the 40-49 year age group and 29.1% in those aged 60 to 69 years. The proportion of undiagnosed diabetics was 51.4% (49.4% in 2004). Among the known diabetics,

the proportion with poor sugar control (HbA1c \geq 8.0%) was 32.0% (30.4% in 2004).

HYPERTENSION

In 2010, 23.5% of adults aged 30-69 years were hypertensive. Hypertension was more common among males (26.4%) than females (20.7%). Malays had the highest prevalence (28.0%), followed by Chinese (23.4%) and Indians (19.3%). The prevalence of hypertension increased markedly with age; from 7.6% in the 30-39 year age-group to 53.4% among the 60-69 year-old adults. The proportion of undiagnosed hypertensives was 26.3% (38.5% in 2004). Among the known hypertensives, the proportion with poor blood pressure control (\geq 140/90 mmHg) was 32.6% (50.5% in 2004).

HIGH BLOOD CHOLESTEROL

The prevalence of high blood cholesterol for adults aged 18-69 years in 2010 was 17.4%. This condition was more prevalent in males (18.3%) than in females (16.5%). Among the ethnic groups, Malays had the highest prevalence (22.6%), followed by Chinese (17.1%) and Indians (12.6%). High total cholesterol level increased progressively with age and was highest in the 50-59 year age group (25.3%) but declined to 23.3% in the 60-69 year age group. Among adults not on treatment, 17.6% were found to have high cholesterol.

¹ The reference population used for the age-standardised prevalence in this paragraph is the Census 2010 Singapore resident population.

Behavioural Risk Factors

OBESITY

In 2010, 10.8% of adults aged 18-69 years were obese. The prevalence was higher in males (12.1%) than in females (9.5%). Obesity was most common among Malays (24.0%). Indians (16.9%) and Chinese (7.9%) had relatively lower prevalence. The same obesity pattern among the ethnic groups was observed in 1992, 1998 and 2004. The obesity levels were relatively higher in adults less than 60 years old (10.6%-12.3%) than those aged 60-69 years (7.2%).

CIGARETTE SMOKING

In 2010, the daily cigarette smoking prevalence among adults aged 18-69 years was 14.3%. It was six times higher in males (24.7%) compared to females (4.2%). Malays had the highest daily cigarette smoking prevalence (26.5%) followed by Chinese (12.8%) and Indians (10.1%). It was more prevalent in younger adults aged 18-29 years (16.3%) and adults aged 30-39 years (16.4%) than in other age groups (11.4%-14.5%).

REGULAR EXERCISE

In 2010, 19.0% of adults aged 18-69 years were engaged in regular leisure-time exercise of moderate or greater intensity. On the other hand, 54.0% of them did not participate in any leisure-time sports or fitness

activities, an increase from the 2004 level of 48.1%. A higher proportion of females did not exercise (60.9%) compared to males (47.0%). The proportion with no exercise increased with age; from 38.8% in the 18-29 year age group to 57.4% in the 40-49 year age group and 67.0% in the 60-69 year age group.

TOTAL PHYSICAL ACTIVITY

Total physical activity is generally a more holistic estimation of the physical activity level of individuals compared to leisure-time exercise alone, because it takes into account physical activity participation in three settings - at work, while travelling to and from places (by walking or bicycling for at least 10 minutes continuously) and recreational activities during leisure time. In 2010, 60.9% of adults aged 18-69 years had sufficient (high and moderate) total physical activity. A higher proportion of females had sufficient total physical activity compared to males (females: 63.2%, males: 58.5%). Sufficient total physical activity was more prevalent among Indians (65.3%) and Malays (64.8%) than among Chinese (59.8%). The total physical activity of Singapore adults comprised 24% work-related physical activity, 49% travelling-based physical activity and 27% leisure-time physical activity.

Figure 1: Population pyramids of resident population, 2002 and 2012

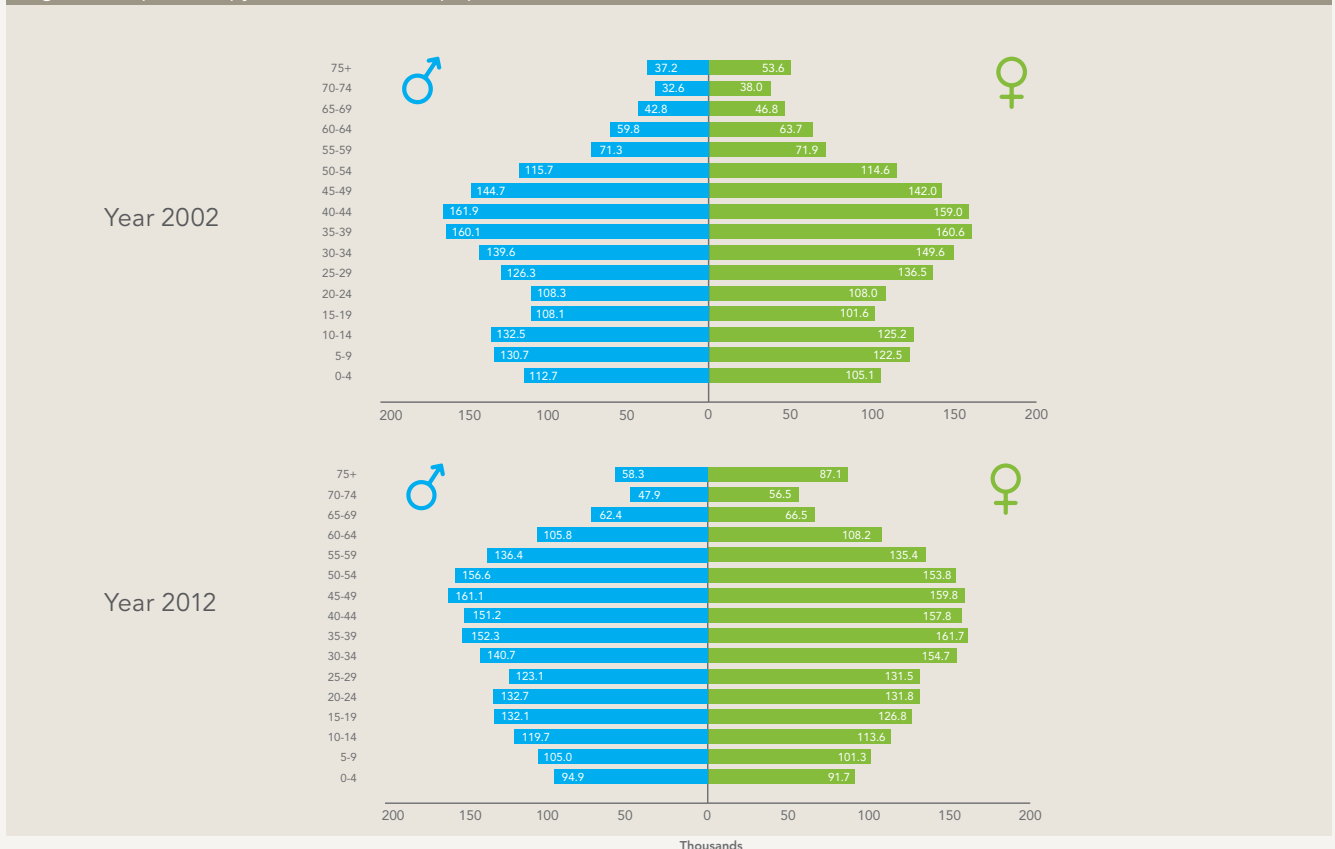


Figure 2: Life expectancy of Singapore residents at birth (in years), 2001-2011

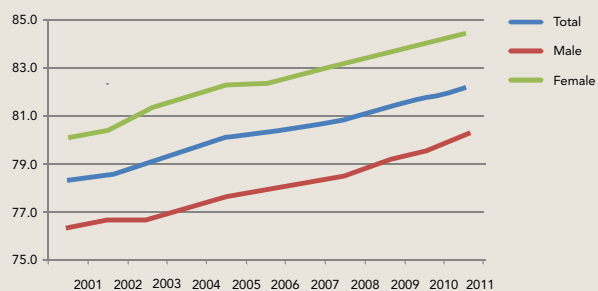


Figure 3: Health-adjusted life expectancy of Singapore residents at birth (in years), 2004 and 2007

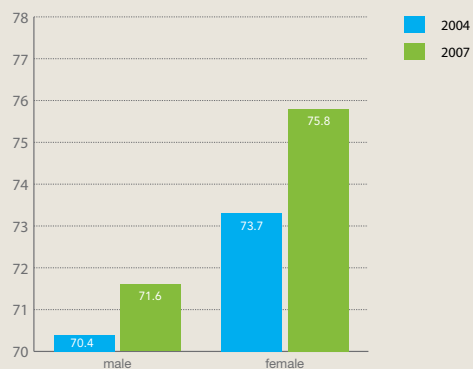
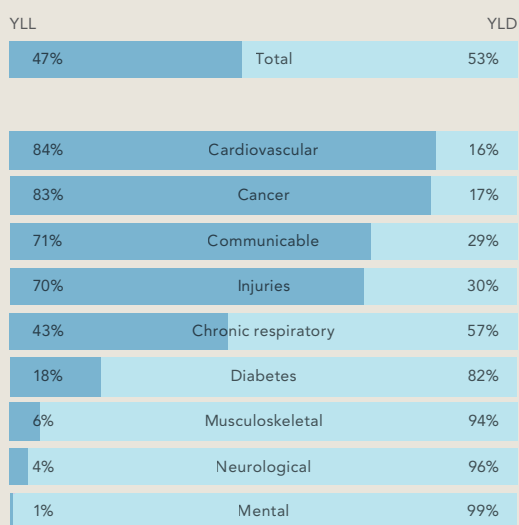
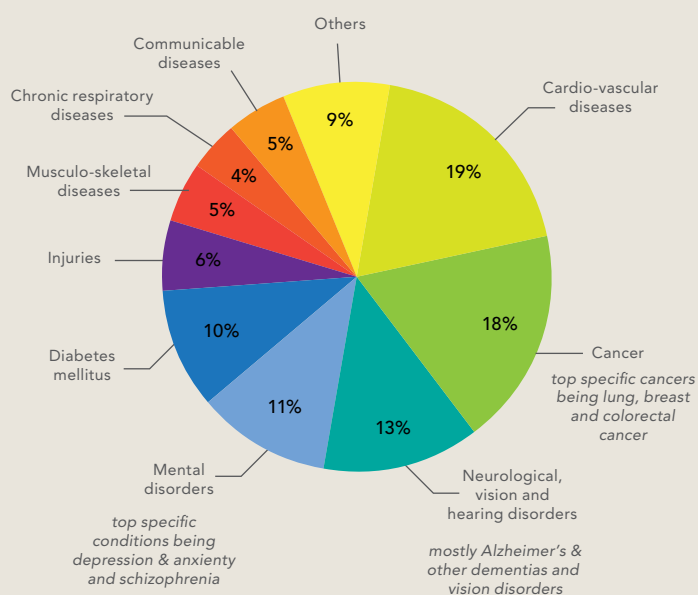


Figure 4: Disease burden in Singapore in terms of DALYs, 2007



Notes:
 DALYs : Disability-adjusted life years [Sum of years of life lost due to premature mortality (YLL) and years of life lost due to living with ill-health or disability (YLD)]

Figure 5: DALYs for communicable diseases expressed as proportions due to YLL and YLD by specific causes, Singapore, 2007

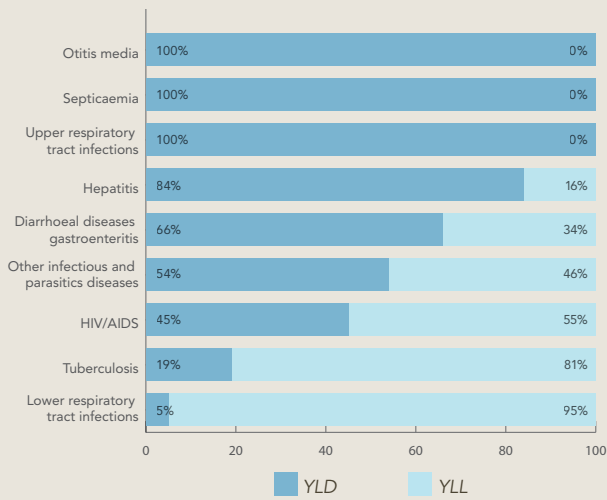


Figure 6: Infant mortality rate (per 100,000 resident live births), 1991-2011

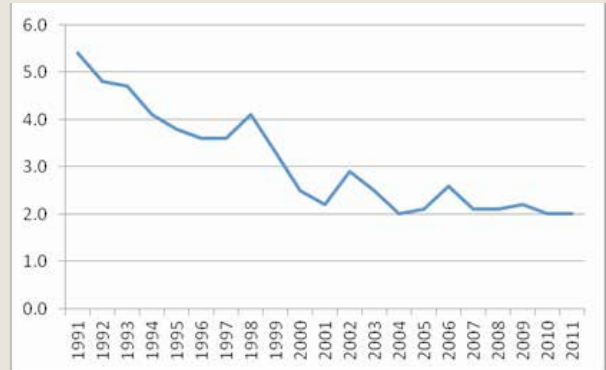


Figure 7: Ten most frequent cancers (%) in Singapore males, 2007 - 2011

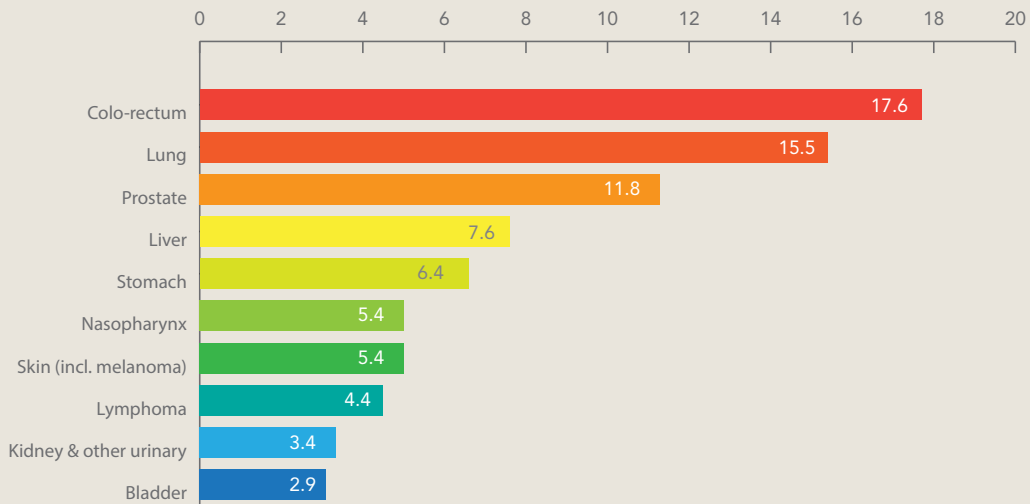


Figure 8: Ten most frequent cancers (%) in Singapore females, 2007

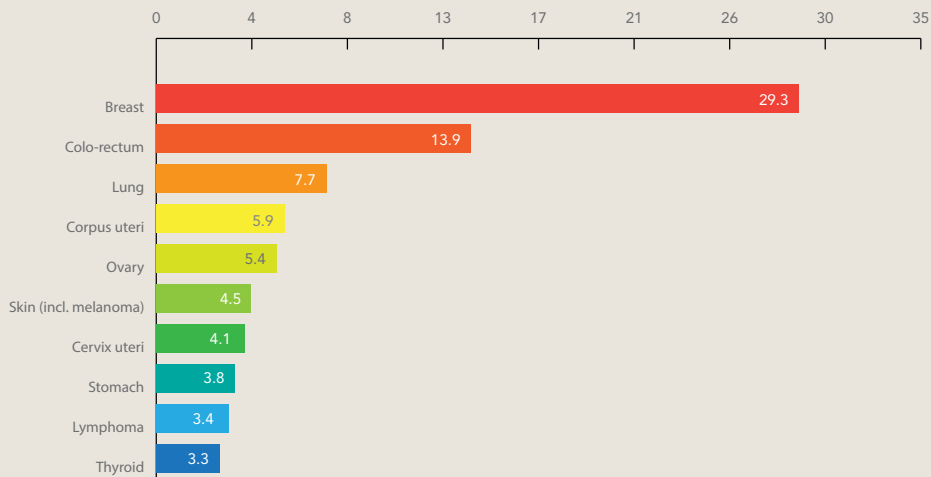
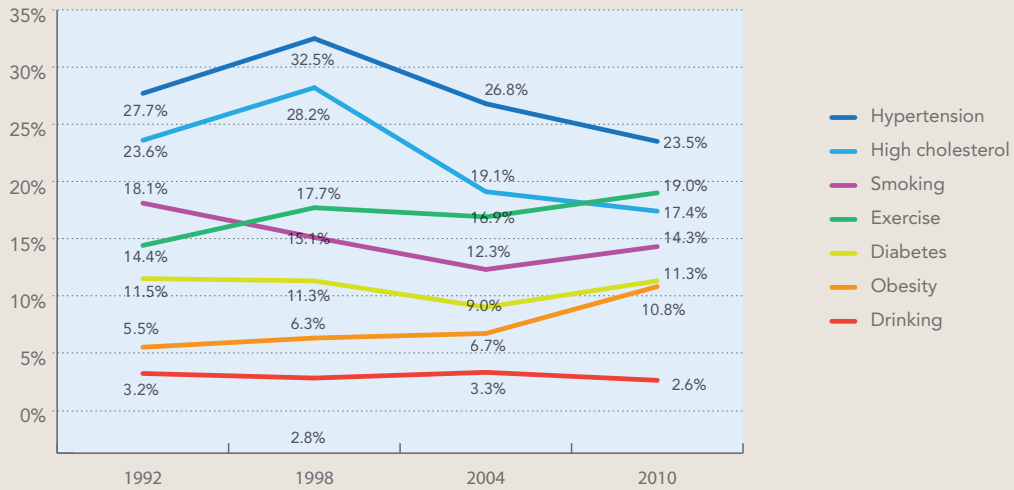


Figure 9: Age-standardised prevalence of chronic diseases/risk factors, 1992, 1998, 2004 and 2010



1. Data is from the National Health Survey 1992, 1998, 2004 and 2010.
2. The reference population used in age-standardisation is the Census 2010 Singapore resident population.
3. For regular exercise during leisure time, it refers to the participation in any form of sports or exercise for at least 20 minutes per occasion, for 3 or more days a week.
4. For drinking, it refers to alcohol consumption for more than 4 days a week.

Chapter 2

Control of Communicable Diseases

“ In the latter half of the last century, many were lulled into complacency, when, with the discovery of antibiotics and other agents, the war against infectious diseases was declared to be effectively at an end. It was suggested that heart diseases and cancer will be the last frontiers in the war against diseases. Although HIV and other emerging or re-emerging infections gave cause for concern, it was SARS that rudely awakened us from this complacency. ”

Professor K. Satku,
Lancet Asia Medical Forum, 2006



Control of Communicable Diseases

by: Dr Jeffery Cutter and Dr Steven Ooi

The decade from 2003 to 2012 presented serious challenges to communicable diseases control and witnessed significant milestones in safeguarding our population against novel and emerging diseases. These included our rationalisation of public health functions, management of Severe Acute Respiratory Syndrome (SARS) and other pandemics, vector-borne outbreaks response, national disease control programme enhancements, and capability building to meet public health threats.

RATIONALISATION OF PUBLIC HEALTH FUNCTIONS

In 2003, the Ministry of Health (MOH) and the then Ministry of the Environment (ENV) agreed to rationalise their respective public health functions. Prior to this, MOH was responsible for the surveillance, prevention and control of tuberculosis, sexually transmitted infections and HIV, as well as vaccine-preventable diseases of childhood such as measles and poliomyelitis. The Expert Committee on Immunisation advised MOH on the National Childhood Immunisation Programme. ENV, on the other hand was responsible

for surveillance of all other notifiable diseases of public health importance and the prevention and control of contact-transmissible, airborne, vector-borne and food-borne communicable diseases. Its Quarantine & Epidemiology Department (QED) carried out epidemiological investigations into outbreaks of these diseases. A Joint Coordinating Committee on Epidemic Diseases, chaired by the Director of Medical Services provided leadership and coordination of measures to control the various communicable diseases.

In the rationalisation, it was decided that MOH would be responsible for the surveillance, prevention and control of all communicable diseases while ENV remained responsible for the environmental determinants of health such as vector control, public and food hygiene. Port health also remained under the purview of ENV. To this end, 33 manpower posts from QED were transferred to the Epidemiology & Disease Control Division of MOH. This transfer was completed in early 2003 shortly before the outbreak of SARS.

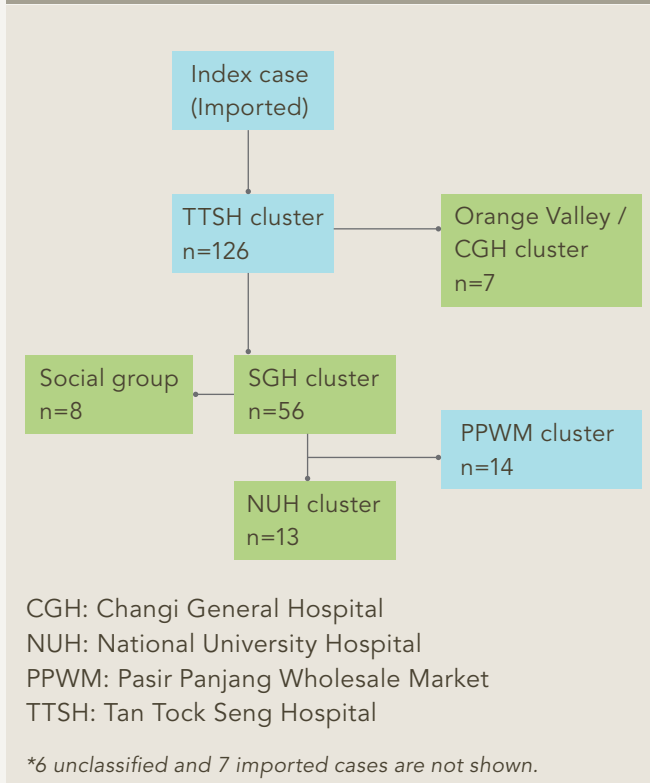
Management of SARS and Other Pandemics

SEVERE ACUTE RESPIRATORY SYNDROME (SARS)

SARS was introduced into Singapore in late February 2003 by a local resident who returned from a holiday in Hong Kong and started an outbreak in Tan Tock Seng Hospital where she was admitted on 1 March 2003. The disease subsequently spread to four other healthcare institutions and a vegetable wholesale centre (Fig. 1). During the period between March and May 2003, 238 probable SARS cases, including eight imported cases and 33 deaths, were reported. Transmission within the healthcare and household settings accounted for more than 90% of the cases. Factors contributing to the spread of infection included the failure to recognise the high infectivity of this novel infection caused by the SARS-coronavirus, resulting in a delay in isolating initial cases and contacts and the implementation of personal protective measures in healthcare institutions; as well as the super-spreading events by five index cases, including three with co-morbid conditions presenting with atypical clinical manifestations of SARS. Key public health measures were directed at prevention and control within the community (contact tracing and home quarantine) and hospitals (surveillance and infection control practices), and the prevention of imported and exported cases through entry and exit screening of travellers.

For the first time in modern history, contact tracing and quarantine was reintroduced as a major public health tool. Singapore's experience with SARS heralded a significant change in the nation's approach and attitude towards defence against diseases spread from person-to-person, and better equipped us with the capabilities to carry out subsequent contingency planning and preparedness against a novel influenza pandemic. The SARS outbreak had a major impact on many non-health sectors including education, tourism, transport, foreign affairs, national development and the economy. Tourism

Figure 1: Chain of transmission of 238 probable cases of SARS from an imported case to 3 hospitals, 1 nursing home, 1 social group and 1 wholesale market in Singapore, March-May 2003



plunged arising from travel cancellations to Singapore. Hotel occupancy was at record lows. Businesses that were reliant on tourism were hard hit. Strenuous efforts were made to communicate the outbreak situation in Singapore and the progress made in its control. A large number of persons had to be quarantined for up to 10 days. As there was not enough quarantine capacity, a decision was made to quarantine residents in their own homes. Tourists and other short-term travellers who were close contacts of SARS cases were quarantined in government chalets. Emergency plans were made to convert unused HDB blocks as quarantine centres. Schools were also closed for two weeks to address parental concerns about their children contracting SARS in schools. Temperature taking and temperature screening became commonplace throughout Singapore. It was thus realised that an infectious disease outbreak could potentially have wide-ranging impact across many sectors of the country. A Whole-of-Government response was therefore needed. The coordination across government agencies was led by the Ministry of Home Affairs.

Singapore was declared free from SARS by the World Health Organization (WHO) on 31 May 2003.



Mask-fitting for healthcare workers during the outbreak of SARS

AVIAN INFLUENZA

The problem of avian influenza A (H5N1) was first reported in Hong Kong in 1997 with 18 human cases, including six deaths. There was a high level of concern around the world, including in Singapore, over influenza A (H5N1) developing the ability to transmit efficiently between people and causing a severe influenza pandemic with high mortality. Influenza pandemic preparedness planning began in earnest in Singapore in 2004. Planning was done from a Whole-of-Government perspective with the Ministry of Home Affairs coordinating.

MOH provided professional public health inputs to other agencies and published the first version of its influenza pandemic preparedness and response plan in 2006. As part of influenza pandemic preparedness, MOH established a stockpile of the antiviral oseltamivir, sufficient to treat one-quarter of the population. A smaller quantity of zanamivir was later added in 2009 to the national stockpile. An agreement was signed with Commonwealth Serum Laboratories of Australia to provide Singapore with influenza pandemic vaccine after Australia. Due to the on-going threat from influenza A (H5N1), a quantity of the H5N1 vaccine was also stockpiled when it became available and evidence was shown of the vaccine's ability to offer cross-protection against drifted strains of the influenza A (H5N1) virus.

Avian influenza transmission continues to simmer in countries such as Cambodia, China, Egypt and Indonesia. The current assessment is that human cases of avian influenza occur as isolated cases in a sporadic manner with no sustained human-to-human transmission observed. The risk of a pandemic caused by H5N1 remains low, but vigilance against the disease must be maintained. There have been no cases of avian influenza reported in Singapore to date. Nonetheless, Singapore's national influenza pandemic preparedness and response plan was fine-tuned through the conduct of several large-scale table-top and live exercises. The national plan was also published in January 2009. When the influenza A (H1N1) pandemic broke out in April 2009, Singapore was ready.

INFLUENZA A (H1N1-2009) PANDEMIC

2009 marked the arrival of the first influenza pandemic of the 21st century. The World Health Organisation (WHO) declared an influenza pandemic caused by a new Influenza A (H1N1-2009) virus on 11 June 2009. However, the WHO sounded the alert arising from reports of infections caused by a novel influenza virus in Mexico and the United States on 24 April 2009. Singapore's first imported pandemic influenza case was detected on 26 May 2009 – one month after WHO's announcement of

the novel virus outbreak. Three weeks later, the first local pandemic influenza case was encountered. This case was followed by many other locally transmitted cases which constituted the first wave of the outbreak in Singapore (Fig. 2).

Five large clusters, ranging from 13 to 116 cases, were detected in June in a polytechnic, a university, a nightclub, a church and three military camps. By 9 July 2009, there were 1,301 laboratory-confirmed cases of pandemic H1N1-2009 influenza. By this stage, containment measures had already given way to mitigation measures as community transmission was becoming widespread. A notable exception where strict containment measures were successfully maintained throughout was within the Asian Youth Games, which was held from 29 June to 7 July 2009. Such measures enabled the Games to run without any major disruption due to influenza outbreaks. By the end of September 2009, it was estimated that at least 270,000 persons had been infected with the pandemic H1N1-2009 influenza. The peak weekly number of cases occurred during 26 July - 1 August when an estimated 45,000 cases were seen in polyclinics and general practitioner (GP) clinics. The H1N1-2009 influenza pandemic in Singapore occurred from mid-June to August 2009, lasting about 10 weeks. Cases affected mainly young adults, youths and children. The severity of the pandemic H1N1-2009 influenza was mild in terms of hospitalisation, severe illness and mortality, with rates per 100,000 cases estimated at 600, 34 and 6.7 between mid-July and September 2009, respectively. The pandemic H1N1-2009 influenza virus continued to circulate in the community at low levels after the end of the outbreak. The control measures employed during the pandemic focused at (a) reducing morbidity and



Pandemic vaccines against influenza A (H1N1) became available in Singapore in early November 2009

mortality through appropriate treatment of influenza cases and (b) slowing the spread of influenza to reduce the surge on healthcare.

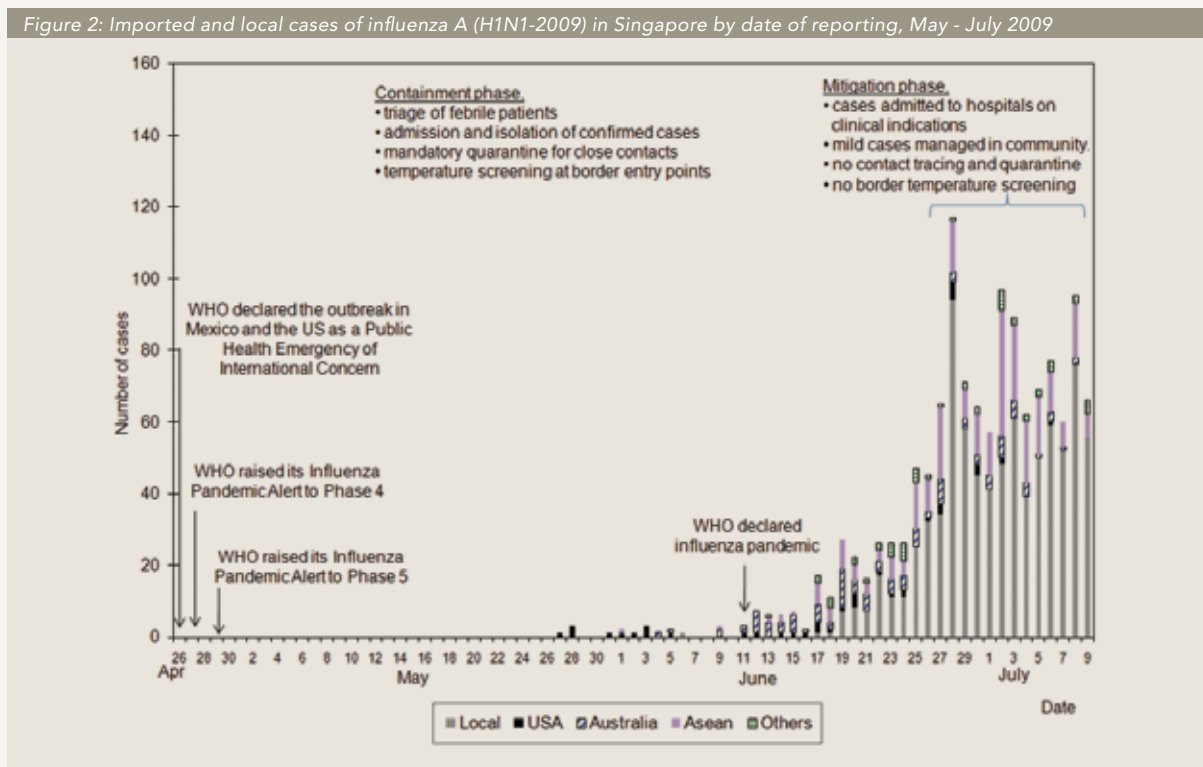
Containment measures were initially applied through active screening of persons with influenza-like illness symptoms at the borders and in the Emergency Departments of acute public hospitals. Patients were screened with RT-PCR testing for the pandemic virus and patients with the infection were isolated in the hospitals. Contact tracing was carried out and close contacts were either quarantined in their homes or in government chalets. However, isolation and quarantine capacity quickly became an issue and with evidence of sustained transmission of the virus in the community, such measures were gradually stepped down. Influenza Pandemic Preparedness clinics were set up among polyclinics and selected GP clinics to provide medical treatment in the community. Antiviral treatment with oseltamivir (Tamiflu) was recommended to persons at higher risk of developing complications e.g. pregnant women and persons with chronic diseases.

Singapore's National Influenza Pandemic Response Plan had been built around a colour-coded DORSCON (Disease Outbreak Response Condition) framework. The alert and response phases would escalate from Yellow to Orange and then to Red with increasing spread of the pandemic. A severe pandemic had been assumed and social distancing measures such as closure of all schools and cancellation of mass events are among the response measures. Essential personnel would also be

given antiviral prophylaxis for six weeks. When WHO first alerted Singapore on 24 April 2009, the DORSCON status was moved to Yellow Alert. It was then moved to Orange Alert a few days later when WHO escalated its Pandemic Alert from Phase 4 to Phase 5 as the pandemic spread further. However, it was quickly recognised that the influenza pandemic was mild and social distancing measures to be implemented during DORSCON Orange and Red should not be implemented. The decision was taken to not follow the DORSCON framework strictly and the alert status was moved back to Yellow Alert. Antiviral prophylaxis was thus also not dispensed to essential personnel. However, schools carried out selective classroom closures based on the occurrence of a number of cases within those classes throughout July 2009 and scaled back progressively the following month as the pandemic passed its peak in Singapore.

Pandemic vaccines against influenza A (H1N1) became available in Singapore in early November 2009. Singapore was the first country in South-east Asia to offer pandemic vaccination. In view of the availability of effective vaccines against the infection, and the observation that the global pandemic influenza H1N1-2009 activity had peaked in most areas and declined, Singapore stepped down its control measures to baseline level (DORSCON Green) on 12 February 2010.

The influenza H1N1-2009 outbreak provided an opportunity for the National Influenza Pandemic Preparedness and Response Plan, which was developed after our experience with SARS, to be tested. It



revealed the strengths and weaknesses of the current influenza pandemic alert and response system, and also provided us with valuable outbreak experience on key areas including pandemic vaccine procurement and distribution, risk communication, and response logistics.

Vector-borne Outbreaks Response

DENGUE

Among the endemic communicable diseases of public health importance, dengue has re-emerged since the late 1980s with outbreaks occurring more frequently and greater intensity. The largest ever recorded outbreak of 14,006 cases, including 27 deaths was reported in 2005. An international Expert Committee on Dengue was appointed by the Minister for Health to advise the Ministry on the control measures to be taken to tackle the outbreak. Factors contributing to this resurgence included low herd immunity of the population and a change in the predominant dengue virus (DENV) serotype from DENV-2 to DENV-1. There was no evidence from gene sequencing of the dengue viruses that the outbreak was precipitated by the introduction of a new virulent strain. A dengue seroprevalence study based on residual blood samples obtained during the 2004 National Health Survey which was representative of the resident population aged 18-74 years found that overall, 61.6% of the adult population had ever been infected with dengue. For youths aged 18-24 years, only 17.2% were seropositive. Another outbreak of 8,826 cases, including 24 deaths, occurred in 2007 when the overall *Aedes* premises index was 0.68%. The median age was 37 years. The predominant dengue serotype was DENV-2, which re-emerged with a clade replacement in early 2007. A seroprevalence survey carried out among children aged 1-17 years between 2008 and 2010 found that the seroprevalence of dengue to be only 10.4%. This suggested that children (below 18 years) in Singapore were highly susceptible to dengue.

In the absence of a vaccine, larval source reduction remains the mainstay of dengue control. An Inter-agency Task Force was formed in September 2005 to enhance the communication and coordination on dengue control efforts among various agencies. Since then, the mosquito control regimes of the various government agencies have been strengthened. The National Environment Agency (NEA) was also provided with additional resources to significantly increase its operational manpower to conduct inspections and enforcement action against mosquito breeding. Such



Active case detection, including mass blood screening, was conducted during the outbreak of Chikungunya fever

intensified actions against vector breeding resulted in no major outbreaks of dengue between 2008 and 2012. In addition, virological surveillance, through laboratory tests, is also routinely carried out for dengue virus serotypes to determine the predominant circulating strain, so as to rapidly detect any switch in dengue serotype that could forewarn us of an impending outbreak.

CHIKUNGUNYA FEVER

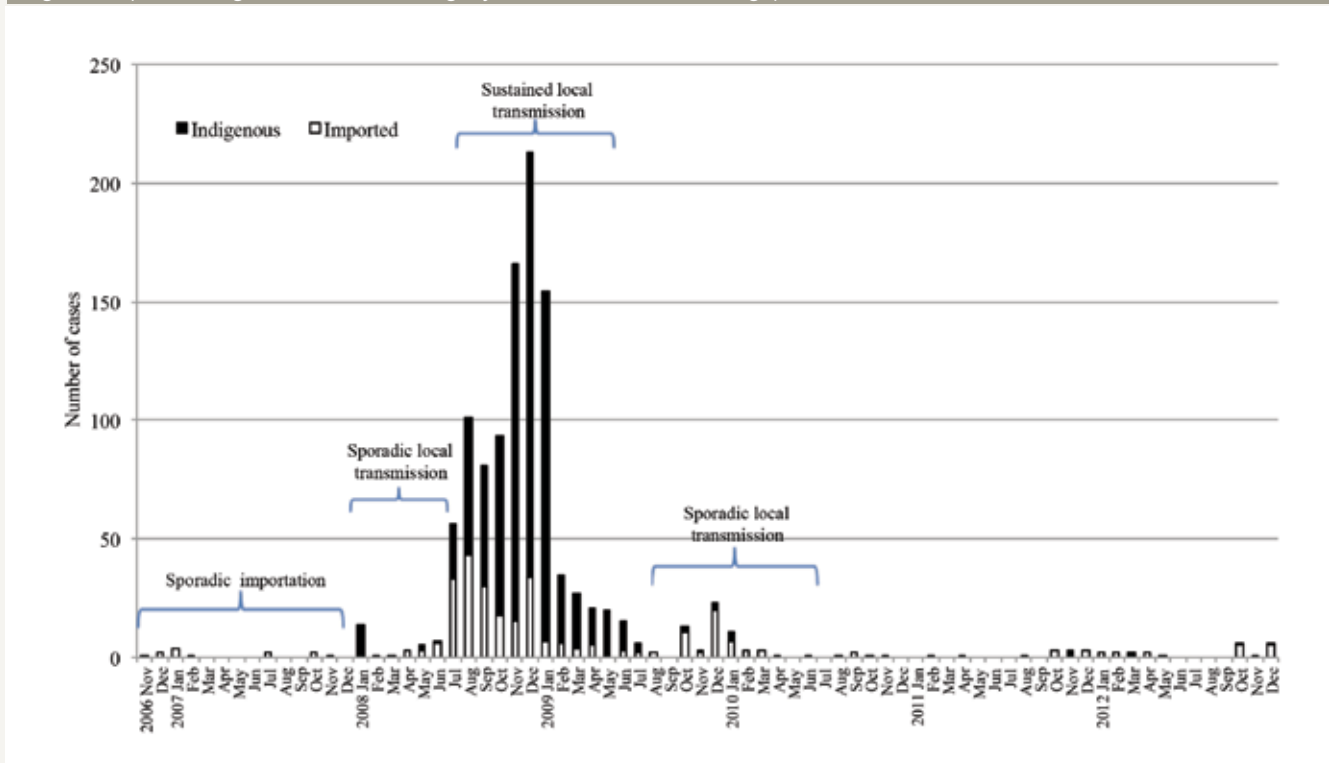
The first imported case of chikungunya fever was confirmed on 6 November 2006. In view of reports of regional resurgence in India, Sri Lanka and Southeast Asian countries, Singapore took a pre-emptive approach to prevent the introduction of the disease into the country. A laboratory-based surveillance system was set up whereby blood samples which tested negative for dengue were also routinely tested for chikungunya. The medical community was alerted of the disease situation in the region and advised to consider chikungunya as a differential diagnosis for dengue. Chikungunya fever became a legally notifiable disease on 19 December 2008.

The first local transmission occurred in an urban area (Little India) where a cluster of 13 cases was reported in the first 2 months of 2008. Despite the rapid containment of this localised transmission, in which *Aedes aegypti* was the primary vector, clusters of locally-acquired cases began to erupt island-wide throughout 2008 and 2009 (Fig. 3). Two large outbreaks occurred in the northwestern industrial areas of Singapore in which the predominant vector was *Aedes albopictus* (Kranji Way, 42 cases, 14 July 2008 to 3 September 2008 and Sungei Kadut, 61 cases, 3 August 2008 to 18 January 2009). Genetic studies of the chikungunya virus showed that its rapid spread in Singapore was caused by the introduction of a mutant strain of the virus (A226V) with *Aedes albopictus* as the primary vector.

Control measures targeted at this vector finally brought the outbreak under control. With a small number of cases continuing to be reported in 2010-2012, a high level of vigilance is maintained to prevent the virus from being entrenched in Singapore.

A total of 1,132 cases comprising 308 (27.2%) imported cases and 824 (72.8%) indigenous cases were reported between 2008 and 2012. The main sources of importation were India and Malaysia. Among the locally acquired cases, foreign workers constituted the population with the highest risk of infection.

Figure 3: Epidemiological trends of chikungunya virus transmission in Singapore, 2006-2012.

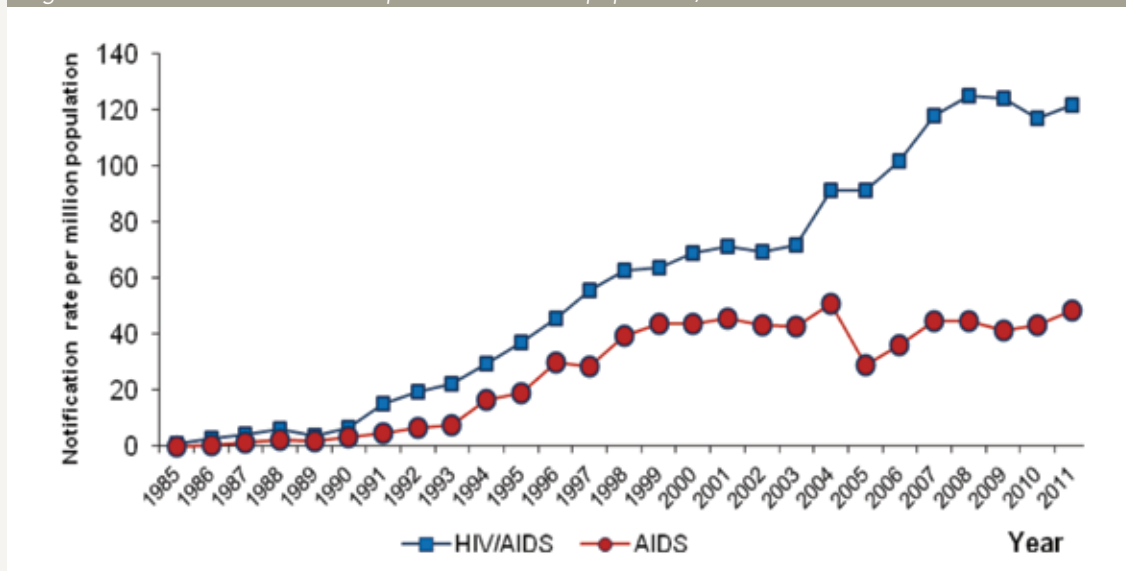


National Disease Control Programme Enhancements

The Communicable Diseases Division oversees two major national infectious disease control programmes for HIV/AIDS and tuberculosis (TB). These programmes have collectively made a positive impact on the public health landscape of Singapore and mitigated the burden of these diseases on the general population. In the last ten years, we have made various enhancements to improve upon the programmes to address challenges and changes in the disease situations.



Figure 4: HIV and AIDS notifications per million resident population, 1985-2011



HIV AND AIDS

The first case of HIV infection in Singapore was reported in 1985, followed by notification of the first case of AIDS in September 1986. The number of reported HIV/AIDS cases among Singapore residents continued to increase and reached a peak in 2008 with a notification rate of 125.2 per million population (Fig. 4).

Singapore's multi-pronged National HIV/AIDS Control Programme comprises education of the general public and high-risk groups, protection of the national blood supply through screening of blood and blood products, management of cases and contact tracing, epidemiological surveillance, scaling up the prevention and control of sexually-transmitted infections (STIs), and legislation. To strengthen the National HIV prevention and control programme, MOH undertook a series of initiatives in the last decade to enhance the prevention and control of HIV and AIDS in Singapore. Firstly, the national leadership on HIV and AIDS has been enhanced via the formation of a new National HIV and AIDS Policy Committee, comprising representatives from seven ministries (Health; Defence; Home Affairs; then Community, Youth and Sports; Manpower; Education; then Information, Communications and the Arts), the Communicable Disease Centre (CDC), the National Skin Centre, the Health Promotion Board (HPB), the AIDS Business Alliance and Action for AIDS (AfA). The Committee provides guidance on policy matters related to HIV/AIDS, including public health, legal, ethical, social and economic issues, and coordinates a broad-based multi-sectoral approach to the prevention and control of HIV/AIDS in Singapore.

Secondly, testing initiatives have been rolled out in a bid to encourage more individuals to come forward to be tested via different channels.

- a) Since December 2004, antenatal HIV screening has been included in the routine antenatal screening package, offered to all pregnant women on an opt-out basis. The take-up rate for antenatal HIV screening in public hospitals and polyclinics was approximately 99% in 2010. With this initiative, we are able to detect HIV-positive mothers early and offer them preventive treatment to minimise vertical transmission to their children. Between 2005 and 2011, there were two HIV-positive babies born to positive mothers, out of a total of 82 HIV positive mothers detected through antenatal screening. Both these mothers had sought pregnancy care late, and therefore were only diagnosed to be HIV-positive at a later stage of their pregnancy.
- b) In June 2006, MOH approved two GP clinics to offer anonymous HIV testing. MOH subsequently expanded anonymous HIV testing to four additional GP clinics on 1 November 2008. In 2011, a total of 9,370 anonymous HIV tests were carried out at the seven test sites, of which 184 (2.0%) were found reactive.
- c) In August 2007, MOH allowed HIV screening to be carried out in medical clinics using rapid HIV test kits. This is to further reduce material barriers to HIV testing and to encourage individuals to get tested with primary care providers.

d) In 2008, MOH worked with acute public sector hospitals to implement voluntary opt-out HIV screening for hospital inpatients aged 21 years and above. The objective of this programme is to give inpatients an opportunity to have HIV screening done as part of the routine medical care they receive during their stay in hospitals. Such screening will facilitate earlier detection of HIV infection, which improves health outcomes. The majority of persons who are aware of their HIV infections also substantially reduce sexual behaviours that might transmit HIV, thus helping to control the spread of HIV. In 2011, a total of 34,758 patients were screened as part of this programme. Of these, 34 (0.10%) tested positive.

Thirdly, the Communicable Diseases Division, MOH, established the National Public Health Unit in September 2008 to integrate functions related to national HIV surveillance, maintenance of the National HIV Registry, epidemiological analysis, and contact tracing and partner notification under one roof, with the objective of bringing about greater efficiencies and enhancing our effectiveness in carrying out these functions. Finally, to reduce financial barriers to seeking treatment, MOH extended Medifund assistance to needy Singaporeans who required HIV treatment (including HIV medications), in direct response to Singaporeans who voiced difficulties in managing the cost of their HIV treatment.

Because of changing HIV-AIDS transmission trends in our community, a comprehensive review of the national control programme was initiated in 2012. Specific areas include surveillance, education, community engagement, testing, treatment and support, contact tracing, and legislation and enforcement.

TUBERCULOSIS

Singapore has had marked success in reducing the overall national TB incidence from over 300 cases per 100,000 resident population in the 1960s to about 41 cases per 100,000 resident population in 2011 (see Fig 5 for trends in TB incidence among Singapore residents).

The national TB control programme underwent several enhancements since its inception in 1957. Most recently, in 1997, the national TB control programme was enhanced to become the Singapore TB Elimination Programme (STEP). STEP consisted of an epidemiological component (surveillance system comprising the revamped National Tuberculosis Notification Registry, the treatment surveillance module and the registry for contact investigation), and the Tuberculosis Control Unit (TBCU), which is the clinical arm of STEP and serves as the national centre for contact investigation, preventive therapy, the management of tuberculosis patients and the training and education of health care workers and the public.

The TB control strategies employed by STEP emphasize the promotion of directly observed therapy (DOT) as the treatment delivery mode of choice for tuberculosis patients; the implementation of a National Treatment Surveillance Registry to monitor treatment progress and outcomes for all tuberculosis cases; and a national policy of preventive therapy for recently infected close contacts of infectious tuberculosis patients.

Under STEP, the penetration of DOT increased to approximately 80% of patients managed by TBCU, and more than 50% nationwide, from less than 10% prior to 2007. STEP conducts systematic surveillance for close monitoring of treatment progress for every TB patient being treated until an outcome is achieved. This ensures that TB treatment standards are maintained in Singapore, and any discrepancies in treatment or diagnoses are promptly addressed by MOH. Patients who are not compliant with treatment are followed

Figure 5: Incidence rate of TB among Singapore residents, 1960-2011



up closely to ensure that their public health risk is mitigated. The national programme also provides continuing education to the medical community and the public to raise awareness of TB as a public health problem. The importance of treatment completion was reinforced through the tracing of treatment defaulters to ensure that they were brought back into the treatment programme.

A comprehensive review of STEP was undertaken in 2012, and a series of measures will be introduced in the coming year to strengthen the national TB control programme for greater effectiveness, as well as to adequately address the evolving patterns of TB transmission in our community and the emerging threat of multi-drug resistant TB.

Capability Building to Meet Public Health Threats

In the aftermath of the SARS outbreak, MOH re-organised its public health functions as part of capacity building to meet future public health threats. The Communicable Diseases Branch in the Epidemiology & Disease Control Division was established as a division with Surveillance and Policy branches. Outbreak investigations were carried out by a Disease Control Branch within a Current Operations Division. Together with the Operations Control Division (responsible for scenario planning and planning of emergency exercises) and the Resource Management Division (responsible for the procurement and management of national stockpiles and strategic supplies), the four divisions formed the Operations Group of MOH. The Operations Group mandate was to address acute public health threats from within and outside Singapore. In 2010, the Operations Group was merged with the Epidemiology & Disease Control Division and re-named the Public Health Group.

The Public Health Group's mandate covers the whole breadth of public health threats, including from risk factors like smoking and obesity which contribute to the development of major non-communicable diseases like coronary heart disease and stroke. MOH's surveillance capability was also enhanced through the establishment and development of the Risk Analysis (later renamed Public Health Intelligence) Branch in 2007. This Branch conducts systematic horizon scanning to identify public health threats outside Singapore. Rapid risk assessment is conducted on perceived threats. If the risk is significant, measures can be implemented to mitigate those risks.

The National Public Health Laboratory (NPHL) was established in 2007 to respond to new and emerging diseases like SARS, avian influenza and the threat of the next pandemic. The purpose was to use the best possible science to address new threats, and develop capabilities to detect and investigate infectious agents

of public health concern. The NPHL started work in late 2007; the laboratory facility at the Communicable Disease Centre 2 (CDC2), Tan Tock Seng Hospital (TTSH), started operations in April 2009, and a second site at the SingHealth research facilities on Outram campus started operating in September 2010. Laboratory investigations encompassed bacteria and virus culture and typing, molecular detection, sequencing and malaria identification. NPHL responded to the pandemic H1N1 influenza of 2009 and coordinated the laboratory response with hospital and research laboratories. NPHL also supported outbreak investigations like the outbreak of salmonellosis traced to a well-known confectionary in 2007, chikungunya virus outbreak in 2008 and the Geylang Serai *Vibrio parahaemolyticus* outbreak in 2009. On top of these, NPHL also provides ongoing surveillance of salmonella serotypes and pneumococcal serotypes. In line with its public health mandate, NPHL was appointed the WHO National Influenza Centre (NIC) in September 2009, and took on the functions of the National Malaria Reference Centre in April 2010. NPHL's strategic directions for the near future include establishment of electron microscopy facilities, HIV molecular epidemiology, detection of bio-threat agents and discovery of novel pathogens.

To build a cadre of field specialists who can support the public health mission, a Singapore Field Epidemiology Training Programme (S-FETP) was formalised by MOH in 2010. Administered by the Communicable Diseases Division and modelled after the US Centers for Disease Control and Prevention's Epidemic Intelligence Service, courses are conducted biannually. The first cohort comprising ten trainees graduated in July 2012, and a second run is under way. S-FETP is a founding member of the regional ASEAN+3 Field Epidemiology Training Network and has successfully gained recognition into the global network of field epidemiology training programmes (better known as TEPHINET).

Conclusion

Singapore's communicable diseases control landscape has undergone a systematic shift arising from pandemic threats as well as other novel and emerging diseases. Safeguarding the health of its population requires far-sighted policies and adaptable public health practices. MOH must continue to respond robustly to new challenges in global health security, ecological change, and lifestyle trends.

FACTS YOU SHOULD KNOW ABOUT SEVERE ACUTE RESPIRATORY SYNDROME SARS

Everyone today is worried about SARS, and whether they could be affected by it. The Ministry of Health has taken extra precautionary steps, beyond WHO's recommended measures, to minimise the spread of SARS. It is unlikely that you or your loved ones can contract SARS in Singapore, particularly if you had not travelled to the affected countries or had not come into contact with a SARS patient.

What are the symptoms of SARS?

- Sudden onset of high fever ($>38^{\circ}$ Celsius)
- Dry cough
- Chills and shivering
- Muscle aches
- Breathing difficulties

What is SARS and what causes it?

- A new type of atypical pneumonia that affects the lungs.
- Caused by a virus which is yet to be determined.

How is SARS spread?

- Through droplets spread when an infected person coughs or sneezes and droplets are spread to a nearby contact.
- A small number of individuals with SARS who are very sick can be very infectious when they develop SARS symptoms.

How fast can SARS spread?

- From the cases so far, it appears that SARS becomes infectious only after the infected person develops symptoms, first of which is usually the sudden onset of high fever.
- A person is not infectious during the incubation period which is about 3 to 7 days, but for some, it may be up to 10 days.

What you can do

1. Avoid our travel advisers not to travel to Hong Kong, Singapore, Province, Beijing, Taiwan, Korea and Toronto.
2. Seek immediate medical attention at Tan Tock Seng Hospital, if you develop the symptoms, and have travelled to the affected countries or are in contact of persons diagnosed with SARS.
3. Be responsible. If you are unwell, wear a face mask to protect those around you. Do not go to work or school. See a doctor immediately.
4. Observe personal hygiene: cover your mouth with tissue when you cough or sneeze, and wash your hands with soap and water.
5. Build up your body's immunity by having proper diet, adequate rest and exercise.

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Lines of Defence

Unlike an epidemic, where most cases are seen in the general population, SARS is still limited in its spread. The majority of SARS cases here are still confined to family members, friends and close contacts of SARS patients, and hospital staff. There is no evidence at present of the spread of SARS in the general community.

- Tighter health screening procedures for passengers arriving at Changi Airport from affected countries.
- All suspected and SARS patients are isolated and treated at Tan Tock Seng Hospital and the Communicable Disease Centre (CDC).
- Enhanced protective measures (masks, gloves, gowns) for hospital staff at Tan Tock Seng Hospital and CDC to protect everybody.
- All A&E departments, patients who may have SARS are seen separately from other patients.
- Those who have close family contact with people diagnosed with SARS are quarantined at home.

PROTECTING YOU

For public enquiries, call Ministry of Health Helpline: 1800-2254 122 • Log on: www.moh.gov.sg Ministry of Health

Public education during the SARS outbreak in 2003.

Chapter 3

Surveillance and Control of

Chronic Diseases and Cancers

“ As our population ages, we expect to see more of the elderly having not just one or two, but several chronic diseases at the same time. They might be managed concurrently by a few specialists in the hospitals. The key to reducing the number of years spent in disability is prevention, early detection and treatment, as well as sustained lifestyle changes. ”

Professor K. Satku,
Family Physicians Convocation, 2006



Surveillance and Control of Chronic Diseases and Cancers

by: A/Prof Derrick Heng and Dr Lyn James

In Singapore, the surveillance of chronic diseases, cancer and other non-communicable diseases is based on information from epidemiological surveys, disease registries, burden of disease studies, and hospital admissions. The information obtained from surveillance

allows for disease trend monitoring, highlights areas for action, and provides early warning of future public health problems. It is also a valuable source of data for monitoring clinical quality, outcome measures, and public health research.

Epidemiological Surveys

The National Health Survey (NHS) and National Health Surveillance Survey (NHSS) are major cross-sectional surveys of a random sample of free-dwelling resident population of Singapore conducted by the Ministry of Health (MOH). The NHS began in 1992 while the NHSS started in 2001. Both are conducted every six years (and 3 years apart from each other). The main objective of the NHS and the NHSS is to monitor the health of the Singapore population in the areas of:

- Chronic disease conditions such as diabetes, hypertension and high blood cholesterol;
- Behavioural risk factors such as physical activity, obesity, cigarette smoking and alcohol consumption; and
- Preventive health behaviour such as health screening practices.

The Health Behaviour Surveillance of Singapore (HBSS), which started in 2010, focuses on monitoring health behaviours such as smoking, physical activity, fruits and vegetable consumption, as well as health screening

practices. Unlike NHS or NHSS (which consists of cross-sectional surveys), HBSS employs an ongoing monitoring system that collects, analyses and interprets health data which are essential for planning, implementing and evaluating health promotion activities. The National Nutrition Survey (NNS), which started in 1993, monitors Singaporeans' nutrient intake including energy, total

fats, carbohydrates and proteins, and the adequacy of intake of various food groups. The Students' Health Survey, first started in 2006, takes a targeted approach by assessing the different health behaviours among secondary school students. These three surveys are conducted by the Health Promotion Board (HPB).

Disease Registries

The National Registry of Diseases Office (NRDO) was started in 2001 to centrally manage information collection on diseases which are of public concern in Singapore viz cancer, acute myocardial infarction (AMI), stroke and end-stage renal disease (ESRD). The Singapore Cancer Registry was originally sited in the National University of Singapore and the ESRD Registry at Singapore General Hospital. Both registries were transferred to the NRDO in 2001. The Stroke Registry was established as a new registry in 2002. The AMI Registry was transferred from the

Singapore Cardiac Databank (SCDB) to the NRDO in 2007. In 2007, the National Registry of Diseases (NRD) Act came into effect, enabling the NRDO Office to access medical information while safeguarding privacy concerns. In 2009, the Donor Care Registry (DCR) for liver and kidney donors was established under the NRD Act to monitor living donor outcomes and post donation complications. In 2011, the National Trauma Registry (NTR) was established; this was followed by the acquisition of the National Birth Defects Registry (NBDR) by NRDO from KKH in 2012.

National Disease Burden Study

The national burden of disease study is a comprehensive assessment of the health status of Singapore residents using a health gap measure known as disability-adjusted life years (DALYs). It quantifies the "burden of disease" in relation to mortality and ill-health for over 130 specific disease conditions and causes of injuries. The study allows MOH to identify and prioritise key diseases, supports rational resource allocation and provides a

basis for projecting health trends at the national level. The summary measures of health derived from the study can also be used as baselines for assessing improvements in the health of the population and the performance of our healthcare system. The last study was conducted in 2008 for reference year 2007 and an update is underway using 2010 data.

Health Promotion Programmes

Singapore, like much of the developed world, faces a rising threat of non-communicable diseases (NCDs). This trend is largely driven by an ageing population and unhealthy lifestyles such as poor dietary habits, physical inactivity, and tobacco use. Given the prevailing dominance of chronic diseases, public health programmes focusing on the primary, secondary and tertiary prevention of NCDs such as diabetes, cardiovascular diseases and cancer have assumed importance. As lifestyle diseases became more prominent, programmes that encourage the adoption and maintenance of healthy lifestyle habits, including having a healthy diet, regular physical activity, and leading a smoke-free lifestyle, have also been established.

MOH views health promotion and preventive health services as key strategies to reduce NCDs and improve the overall health of Singaporeans. In 2001, the HPB was established as a statutory board under the Health Promotion Board Act, with the mandate to help

Singapore residents attain optimal health through its health promotion and disease prevention programmes. HPB participates in the formulation of policies and creates the necessary conditions that are conducive to the promotion of good health and healthy lifestyles. The Board does these by addressing the four priority areas, Obesity, Tobacco Control, Mental Wellbeing, and Health Screening and Follow Up, through its three strategic thrusts: making healthy lifestyle the default, making options for healthy lifestyle accessible and pervasive, and creating a social movement for healthy living.

NATIONAL HEALTHY LIFESTYLE CAMPAIGN

The National Healthy Lifestyle Campaign (NHLC) is an annual campaign organised by HPB to promote a healthy lifestyle among Singaporeans. First launched by then Prime Minister Goh Chok Tong in 1992, NHLC is supported by media campaigns, activities, public forums, talks and carnivals, and features a health theme each year, depending on the focus of the priority health

condition and target audience. New initiatives launched at NHLC each year are aligned to the health theme for the year. For example, the theme for NHLC 2008 was healthy youths. In the same year, the “Breathe” branding was launched to encompass youth-related health issues as well as youth-centric events. A web portal was also set up to reach out and engage youths with health articles, events, activities and resources.

Since 2009, the theme shifted to obesity prevention as obesity emerged as one of the top lifestyle associated risk factors in Singapore that leads to various health complications. Thus, for example, new smartphone applications were launched to keep up with the changing times. And in 2012, at the 20th anniversary of NHLC, HPB rolled out the Healthy Shopper programme to help Singaporeans make the healthier choice in food and ingredients when grocery shopping. Other initiatives such as the “healthyMEtv” and the “Healthy Lifestyle Index” were also launched to provide individuals with greater insight on how they can stay active and maintain a healthy weight.

NATIONAL TOBACCO CONTROL PROGRAMME

HPB is the national coordinating agency for tobacco control in Singapore. Under its National Tobacco Control Programme (NTCP), HPB takes a comprehensive approach to address the prevalence of smoking by coupling tobacco legislation with public education efforts, cessation services (such as QuitLine) and partnerships. However, although the smoking rate has fallen from 18.3% in 1992 to 12.5% in 2004, it has increased to 14.3% in 2010. More alarmingly is the rise in prevalence among young adults. While traditional top-down policies, in tandem with awareness and cessation programmes have been successful in lowering smoking prevalence over the last few decades, more innovative strategies focusing on specific groups are required to achieve the long-term goal of normalising smoke-free living and lowering the smoking prevalence.

Examples of such innovative strategies include the formation of strategic partnerships between HPB and the uniformed groups (such as the Singapore Armed Forces) to provide smoking cessation programmes and peer support groups for full-time National Servicemen to quit smoking since a large proportion of smokers are men. As young adults are avid consumers of new media, HPB implemented the I Quit Movement in 2011, which took an innovative approach by bringing together the creation of pervasive quit services and touch points (communities, workplaces, healthcare and virtual platforms such as Facebook) and the celebration of ex-smokers as triumphant heroes. To further address social norms, HPB kicked off the Blue Ribbon Movement

in 2012, where markets and food centres voluntarily removed their demarcated smoking zones in support of a smoke-free environment.

HPB also plays a critical role in recommending taxation and legislative strategies in Singapore, as taxation and legislation have proven to be effective ways to curb tobacco supply. The tobacco tax has risen regularly since 1987, and Singapore has one of the highest tax incidences in the world for cigarettes, at about 65 – 69% of retail price of a packet of cigarette (inclusive of GST). The Tobacco (Control of Advertisement and Sale) Act was tightened in 2010, such that new and emerging forms of tobacco products and misleading labelling terms were banned.

In 2012, Singapore gained recognition worldwide as a leader in tobacco control when we hosted the 15th World Conference on Tobacco or Health (WCTOH). As host, Singapore shared its experiences on graphic health warnings, smoke-free bans as well as grassroots movement and support structures to encourage smokers to quit the habit.

WORKPLACE HEALTH PROMOTION (WHP)

With three out of five adult Singapore residents included in the workforce, the workplace plays an integral role in motivating and empowering individuals to adopt healthy lifestyle habits. Since 2001, HPB has been providing co-funding, via the Workplace Health Promotion (WHP) Grant, and expertise (such as training, consultancy, and support services) to companies which are keen to start and sustain their WHP programmes.

With the changing health status of our population, HPB is putting extra focus on priority health conditions such as obesity, chronic disease management, and reinforcing positive practices via smoking cessation and mental health promotion. HPB strengthened the funding support for companies to implement WHP programmes through an increase of the WHP Grant from \$10,000 to \$15,000 per application, which includes an additional mental health component of \$5,000. Part of the WHP Grant requires companies to run activities or programmes that address priority health conditions, such as facilitating the access to weight management programmes for their overweight or obese employees.

In 2012, HPB celebrated the 11th year of the Singapore HEALTH (Helping Employees Achieve Lifetime Health) Award (SHA), which recognises organisations and individuals who have gone the extra mile in promoting workplace health. The number of award recipients had tripled by 2010 from 1999, when it was first started, and in 2012, a record number of 446 companies received the awards.

NUTRITION PROGRAMME

HPB's strategies to tackle obesity prevalence in Singapore are to ensure the quality of food nutrition and promote awareness of the right proportion of food intake through the supply and demand of the food industry. The widely recognised Healthy Choice Symbol (HCS) embodies these strategies. Nutrition labelling not only provides information at point-of-purchase, but also creates an incentive for food manufacturers to introduce healthier alternatives. To further incentivise manufacturers to address gaps in the food industry, the Symbol has been differentiated to carry claims such as "Higher in whole-grains", "No trans fat" and "Lower in sodium". Today, about 3,000 products have been certified with HCS from over 80 categories, and demand for HCS products has also been growing steadily throughout the years, accounting for about 50% of sales in key food product categories. In addition, HPB launched the FINEST (Functional, Innovative, Nutritious, Effective, Science-based, and Tasty) Food Programme in 2011 to equip local food manufacturers with knowledge and skills to develop healthier, functional food products.

Another of HPB's strategies against obesity is to move upstream to target the young, as it is at this critical juncture when their eating preferences are developing. In this respect, HPB introduced The Health Promoting School Canteen (HPSC) Programme whereby participating schools are required to comply with healthier food service guidelines and serve Healthy Set Meals which incorporate the appropriate proportions of food from the four food groups. HPB is also planning to enhance measures that will restrict advertising for food and drink products which are high in fat, sugar or salt to children.

The proportion of residents eating out at least four times a week at hawker centres, food courts, and

coffee shops increased from 49% in 2004 to 60% in 2010, and seven out of ten persons exceeded their calorie requirements. Thus, HPB launched the Healthier Hawker Programme in 2011, which, in recent years, has shifted focus from getting the public to ask hawkers for "less oil", "less salt", "more vegetables" to getting hawkers to use healthier ingredients (such as healthier oil with less saturated fat, whole-grain noodles, brown rice, and lower sodium salt) by default. HPB is also working with centralised kitchens to supply healthier ingredients to workplace canteens, coffee shops, and even household "tingkat" meals. This will further widen the outreach of healthier food options in the country.

DIABETES

Diabetes mellitus is the main risk factor for the development of cardiovascular diseases. In Singapore, diabetes prevalence has risen from 9.9% in 2004 to 12.1% in 2010. HPB's approach toward addressing the increase in diabetes prevalence includes public education and promoting public awareness of the disease, as well as encouraging the uptake and follow up of health screening for chronic diseases. To increase the awareness of diabetes, HPB has launched diabetes education programmes, and supported Voluntary Welfare Organisations (VWOs), such as the Diabetic Society of Singapore and TOUCH Diabetes Support, to champion diabetes awareness activities on World Diabetes Day since 2001.

To increase the knowledge and skills for appropriate management of diabetes, HPB launched a pre-diabetes intervention programme in 2009 to prevent or reduce the risk of progression to Type 2 diabetes. The community-based programme comprises individual counselling sessions, tips on making changes to one's lifestyle practices and referrals to community-based physical activity and nutrition programmes.

With the aim of detecting diabetes early, Singaporeans aged 40 years and older are encouraged to get screened for diabetes and hypertension through the Integrated Screening Programme (ISP), and if required, to follow up at Chronic Disease Management Programme (CDMP) GP clinics. Screening and follow up also help prevent the progression of end stage renal disease. To complement efforts to improve early detection and follow-up, HPB conducts the Nurse Educator Programme where trained Nurse Educators empower and educate individuals with chronic diseases on the knowledge and skills to better manage their chronic conditions through a series of interactive workshops.

HPB also adopts a targeted approach in reducing diabetes among the at-risk groups. For example, as the



HPB introduced the Health Promoting School Canteen (HPSC) Programme to tackle obesity upstream

Malay community is susceptible to diabetes and other chronic diseases due to ethnic diet and lifestyle, HPB piloted a one-year pilot programme, SIHAT 360°, at mosques in the South West and offered health screening and intervention programmes for individuals diagnosed with chronic diseases.

MENTAL WELLBEING

HPB spearheaded nation-wide efforts to promote mental wellbeing across the lifecycle as a crucial part of good health, with emphasis on strengthening and building one's mental resilience. For the children and the youths, HPB rolled out the Healthy Mind, Healthy Community programme in 2012 to boost parental mental literacy and promoted ways for them to impart knowledge to their children on how to build positive self-esteem and cope with life's challenges. A peer support group, called the Youth Support Youth (YSY) Programme, and the Bounce Back Stronger Youth Online Kit were launched to provide youths with the support and resources to build mental resilience.

At the workplace, the approach to increase employee mental wellbeing investment has evolved from solely skills education (2008), to establishing employee support services for a conducive work environment (2011). With effect from 2012, a larger grant (of \$5000 from the initial \$2000) will be made available for workplaces to build mental resilience and wellbeing in employees. The "Treasure Your Mind" education programme has also been enhanced (now renamed as "Working Minds") to better address current mental health-related issues at the workplace. In addition, an online portal was set up to give working adults access to self-assessment tools and self-help resources.

With the aging population in Singapore, dementia will become a major health concern. In this light, HPB enhanced the preventive mental health programme for the elderly (previously known as "Nurture Your Mind";



HPB enhanced the preventive mental health programme to help the elderly stay mentally active while engaging in positive social interaction

now "Mental First Aid") to include a cognitive stimulation component to help the elderly stay mentally active while engaging in positive social interaction. This programme, which comprises both psycho-social education and cognitive "training", intends to reduce the risk of dementia and depression among the elderly.

As the population ages the number of family caregivers is also on the rise. To address the issue of caregiver stress, burnout and depression, HPB has developed a resource pack for beginner caregivers and an e-learning courseware on HPB's website (www.hpb.gov.sg) for caregiver self care in 2012. These resources provide information and skills to manage psycho-emotional challenges with caregiving.

Besides dementia, other major mental health conditions that are prevalent in Singapore are major depression and anxiety disorders. HPB, in collaboration with community stakeholders such as the Institute of Mental Health (IMH), Singapore Association for Mental Health (SAMH), Alzheimer's Disease Association (ADA) and Silver Ribbon Singapore (SRS) have conducted public education campaigns and community programmes to raise awareness of these conditions to facilitate early detection, encourage help-seeking behaviour and promote social inclusion.

HEALTH SCREENING (FOR CHRONIC DISEASES AND CANCERS)

A key strategy in the government's approach to reducing the prevalence of chronic diseases is through the early detection of risk factors or pre-disease states.

The Check Your Health programme began in 2000 to encourage Singaporeans aged 50 years and above to be screened for early detection of hypertension, diabetes and high blood cholesterol. Since 2008, the scope for health screening has been widened to cover not only diabetes, hypertension, high blood cholesterol, but also selected cancers for Singaporeans aged 40 years and above under the one-stop ISP. Conventionally, HPB's screening programmes have been disease-focused, but the ISP adopts a person-centric approach to screening, where integrated invitation letters (combining relevant information on screening for chronic diseases and selected cancers) are sent to the eligible population. HPB is also working closely with primary care partners such as CDMP GPs and polyclinics to ramp up evidence-based screening, and provide targeted screening especially to residents who have yet to be screened.

MOH also published clinical practice guidelines on cancer screening (2010) and functional screening for the elderly in 2010. The guidelines for screening for cardiovascular

disease and its associated risk factors was published in 2011. The Screening Test Review Committee of the Academy of Medicine Singapore (AMS) also released its first guidelines on screening tests to provide expert opinion on the recommended screening tests for the early detection of disease.

Breast cancer is the most frequent cancer among Singaporean females. The breast screening programme (BreastScreen Singapore) was launched in 2002 and is one of the key screening programmes under the auspices of HPB. The programme encourages women aged 50 years and above to undergo mammographic screening. Between 2002 and 2012, more than 497,000 mammograms were carried out. Of these, 1,578 cases of breast cancer were detected through BreastScreen Singapore.

The cervical cancer screening programme (CervicalScreen Singapore) was initiated in 2004 to encourage women aged between 25 and 69 years to undergo regular Pap smear screening for cervical cancer. Between 2004 and 2012, over 178,300 Pap smears were carried out for women aged 25 and above. Of these, 826 cases of cervical cancer were detected through CervicalScreen Singapore.

The National Colorectal Cancer Screening Programme was launched in 2011 to encourage Singaporeans aged 50 years and older to go for colorectal cancer screening annually using the 2-day Faecal Immunochemical Test (FIT). Between 2011 and 2012, there were 2,521 participants who collected the FIT kits. Of those who collected, 1,607 individuals returned the kits and 99 of these tested positive.



The Check Your Health programme encourages Singaporeans aged 50 years and above to be screened for chronic diseases, including high blood pressure

Disease Management Programmes for Non-Communicable Diseases

In 2006, MOH initiated a comprehensive Chronic Disease Management Programme (CDMP) to improve care of chronic diseases through greater primary care engagement and supporting enablers. To date, ten chronic diseases have been included in the CDMP, namely diabetes mellitus, hypertension, lipid disorders, stroke, asthma, chronic obstructive pulmonary disease (COPD), schizophrenia, major depression, dementia, and bipolar disorder. The use of Medisave will defray part of the outpatient cost for patients with these chronic diseases and encourage them to work with their doctors to actively manage their diseases, through regular monitoring, appropriate medical treatment and lifestyle changes.

In 2008, to espouse chronic disease patients and promote the importance of a healthy lifestyle, the nurse educator programme was launched. The programme deployed nurse educators in the community to support the health education of patients seen at private general practitioner clinics. Since the launch, talks on chronic disease management had been provided for community groups and workplaces, where participants were taught the facts of their condition and how to make lifestyle changes to improve their health.

To provide convenient and affordable healthcare for needy, elderly and disabled Singaporeans, MOH launched the Primary Care Partnership Scheme (PCPS) in 2007. The PCPS enabled needy patients to receive subsidised treatment at their general practitioners (GPs) and dental clinics near their home. In January 2012, enhancements were made to the eligibility criteria of the PCPS to enable more Singaporeans to seek early treatment for their chronic conditions and it was renamed as the Community Health Assist Scheme (CHAS).

Good clinical management of patients with established risk factors for chronic diseases is fundamental to preventing or delaying disease progression. Between 2001 and 2012, MOH published clinical practice guidelines on cervical cancer (2003), anxiety disorder (2003), obesity (2004), breast and colorectal cancer (2004), depression (2004, updated 2012), heart failure (2004), hypertension (2005), lipid disorders (2006), diabetes mellitus (2006), COPD (2006), glomerulonephritis (2007), dementia (2007), osteoporosis (2009), stroke (2009), and schizophrenia & bipolar disorder (2011).

Chapter 4

Health Services Planning, Delivery and Development

“ Advances such as these help us to find new ways to care for our patients, but also force us amongst others to re-examine our existing role and our core competencies in the provision of new medical services. ”

Professor K. Satku,
Launch of the 2006 Guidelines on Cardiac CT, 2006



Health Services Planning, Delivery and Development

by: A/Prof Lee Chien Earn and Dr Lee Heow Yong

Ensuring Appropriate Services for an Evolving Population

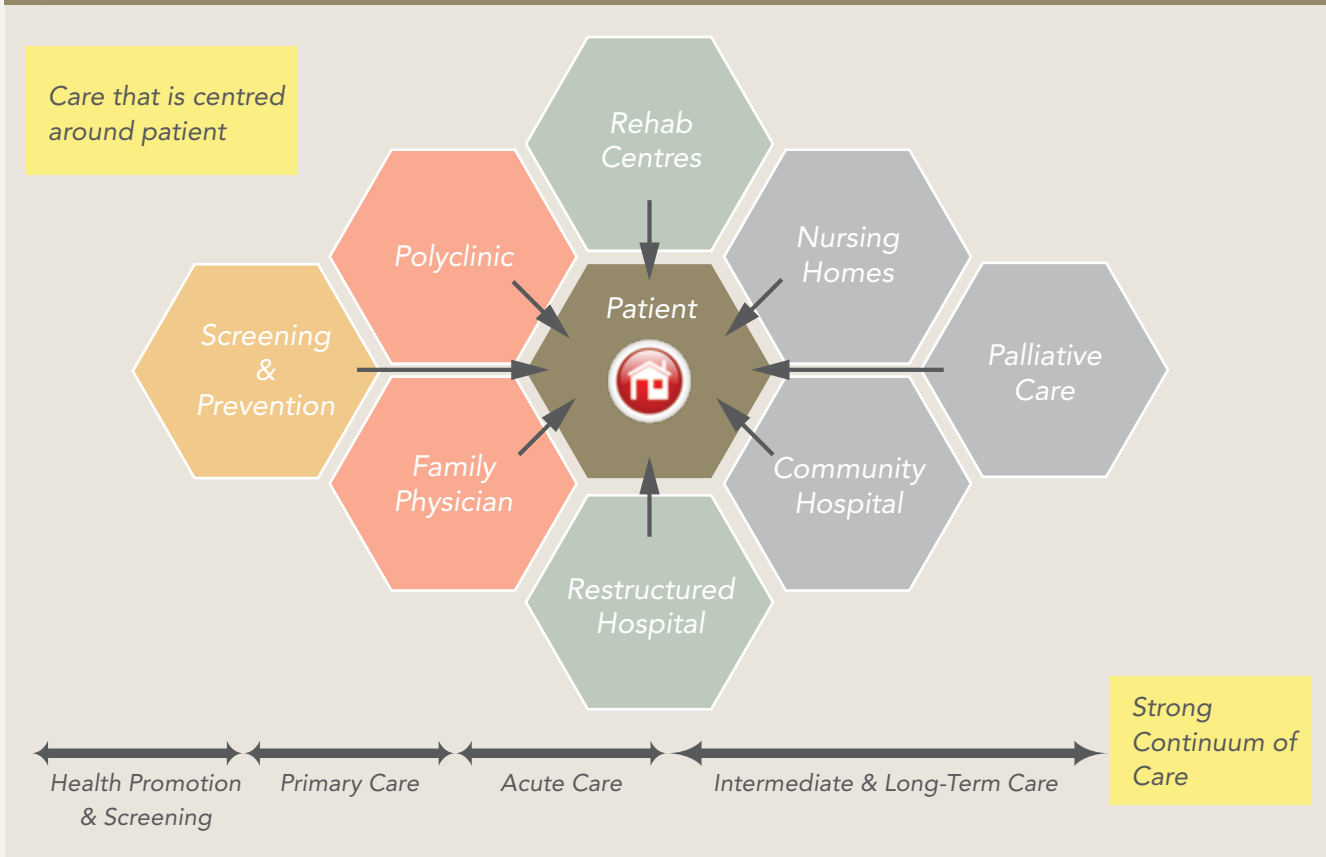
Singapore, like most other developed nations, is facing multiple challenges, including an ageing population and a shift in disease profile brought about by increasing chronic disease prevalence and lifestyle changes. A more holistic view, including innovations in healthcare, is needed to maintain good access to care as well as the quality of healthcare services. At the same time, we need to manage resources and costs to ensure that healthcare remains affordable for the patient and sustainable for the nation.

The Ministry's goal is to seamlessly integrate the different components of healthcare (i.e. health promotion and prevention, primary care, acute care, intermediate and long-term care) to provide high-quality, patient-centric care to the public at the appropriate setting. This is particularly important for the elderly who often have multiple care needs and require a longer time to recover.

Given the strong capabilities of our public hospitals, healthcare in Singapore has historically been specialist-based and centred around acute care. However, while we need to continue to enhance the capabilities and capacities of our acute hospitals, we also need to intensify our efforts to develop other sectors. With the increasing complexity and chronicity of diseases, no single institution can fully meet the needs of the patient. To avoid fragmentation of care, we need to move from a silo to systems-based care.

We are moving towards a team-based model of care, which will be built on strong primary care and patient education. The interface between the different components of care would be strengthened to ensure that care across the entire continuum meets patient needs and is cost-effective (refer to Fig. 1).

Figure 1: Model of patient care



Reorganisation of Healthcare Services to Enable Integrated Care

One key thrust of care integration is the reorganisation of our healthcare delivery system. A key milestone in this process was the reorganisation of public sector institutions into two vertically integrated clusters. In the words of former Minister for Health, Mr Lim Hng Kiang:

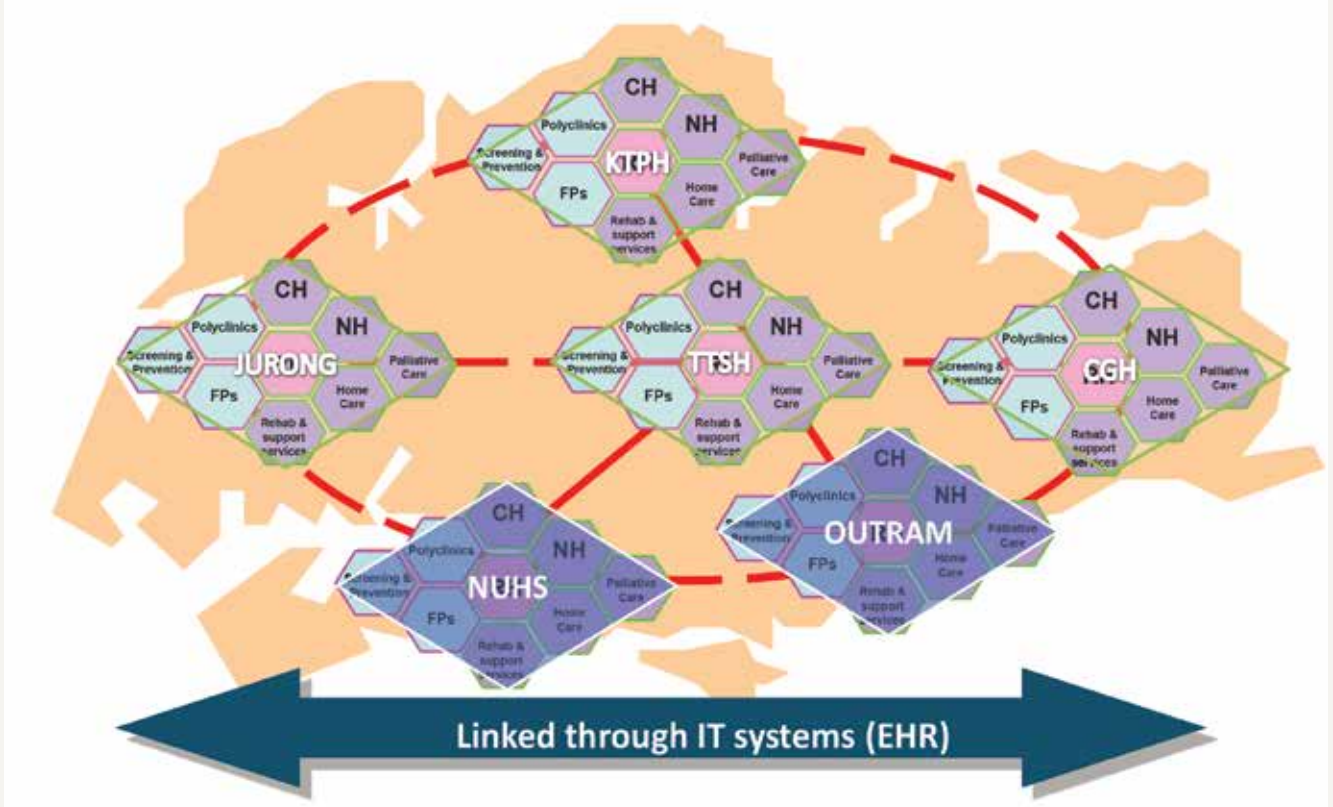
“The latest turning point in our healthcare system is to integrate our hospitals and polyclinics into two clusters. The traditional approach of developing hospitals and primary care clinics as individual entities results in the fragmentation of patient-care. To do better, patient care has to be coordinated across the whole continuum. This is the main reason why we decided to go for clustering.”

The next key milestone involved the reorganisation of healthcare services into Regional Health Systems (RHS).

The aim of the RHS is to bring together the public, private and people sectors to deliver patient-centric, seamless care for their respective populations within a specific geographical region. Each RHS will be anchored by an acute hospital working in close partnership

with other healthcare providers, such as general practitioners, polyclinics, community hospitals, nursing homes, day care centres and home care providers (refer to Fig.2). Working partnerships and integrated clinical pathways across settings will ensure continuity of care. The Eastern Health Alliance which was launched on 18 November 2011 is an example of an RHS model that brings the Ministry closer to this vision of patient-centric and seamless care. Working in concert as a network of partners in the east region, members of the Alliance, i.e. Changi General Hospital (CGH), The Salvation Army Peacehaven Nursing Home, SingHealth polyclinics and St. Andrew’s Community Hospital (SACH), provide a comprehensive range of services to their patients and ensure that the patient’s needs are met at different stages of the health journey. To support these efforts, the Agency for Integrated Care (AIC) has been expanded significantly since its setup in 2008 to facilitate discharge planning from the hospitals, help patients navigate the healthcare system and strengthen the capabilities of the primary care and long-term care sectors.

Figure 2 : Reorganisation of healthcare services - regional health system



The Primary Care Sector

STRENGTHENING MANAGEMENT OF CHRONIC DISEASES

Our polyclinics serve as a one-stop-centre for chronic disease management. The Comprehensive Chronic Care Programme (CCCP) was piloted in 2000 to improve the management of diabetes, hypertension and high cholesterol using a structured protocol delivered through a team-based approach. The Ministry rolled out the Medisave for chronic disease management programme (CDMP) in 2006, in an effort to engage the private general practitioner (GP) sector to improve chronic disease management and also increase the affordability of life-long chronic disease treatment for patients. With this scheme, patients were allowed to withdraw up to \$300 from their own or immediate family member's Medisave account for outpatient treatment of chronic diseases. The CDMP introduced into the GP sector evidence-based chronic disease management protocols and electronic clinical data submission. The CDMP clinical outcomes were published in annual occasional papers, which served to highlight clinical performance of the service providers. Starting with diabetes mellitus in October 2006, this scheme was gradually extended to cover ten chronic conditions (diabetes mellitus, hypertension, lipid disorders, stroke, asthma, chronic obstructive pulmonary disorder, schizophrenia, major

depression, bipolar disorder and dementia). The Medisave withdrawal limit for CDMP was increased from \$300 to \$400 on 1 January 2012 to further reduce out-of-pocket payment for chronic disease treatment.

In tandem, the Primary Care Partnership Scheme (PCPS) which started in 2000 and originally covered acute conditions and basic dental care, has been expanded to include chronic diseases – diabetes, hypertension and lipid disorder – in 2009. Today, the chronic conditions covered under the PCPS are aligned with the CDMP and include the same ten conditions. This extension to chronic disease is the first step in making portable subsidies available, to enable needy elderly and disabled Singaporeans to seek treatment at a conveniently located private primary care provider. PCPS, together with CDMP is part of a wider strategy to empower and engage private primary care providers.

In 2012, the PCPS was renamed the Community Health Assist Scheme (CHAS) and was enhanced so that Singaporeans could manage their chronic diseases earlier and avoid complications. These enhancements include lowering the qualifying age for PCPS from 65 to 40 years old and raising the income criteria from \$800 to \$1500 per capita monthly household income to

benefit middle-low income Singaporeans. Depending on their income levels, patients can also claim up to \$80 per visit or \$480 per annum for their chronic conditions (raised from previous \$60 per visit and \$360 per annum).

We envisage that the new developments in primary care will be instrumental in tackling the increasing burden of chronic diseases and improving healthcare for all Singaporeans. CHAS, in particular, will be an important enabler for shifting patients away from the overburdened public primary care institutions, and is key to the Primary Care Masterplan.

THE PRIMARY CARE MASTERPLAN

In 2011, the Ministry co-developed the Primary Care Masterplan with various stakeholders to cater to the needs of a growing and ageing population. The current structure of the primary care sector makes it difficult to scale capacity to meet the upcoming surge in chronic diseases. The public sector adopts a multidisciplinary team-based approach to chronic disease management. However, it currently serves about 45% of chronic care demand on 14% of total primary care manpower¹.

Although workload in the private primary care sector is lower than that in the public sector², the private sector practice models may not be suited for the delivery of good quality chronic care. GPs in solo practices do not have allied health support; clinics with multiple GPs on-site also do not adopt a team-based approach to chronic disease management. The core ideas behind the Masterplan were to:

- a) Leverage private sector primary care capacity to manage chronic diseases through the use of portable subsidies, and;
- b) Improve outcomes from chronic diseases by restructuring private sector primary care around a

¹ Primary Care Survey 2010

² 48 patients per day for polyclinic doctors compared to 30 for GPs, Primary Care Survey 2010

team-based, multi-disciplinary approach. To meet these goals, MOH developed two new models for primary care services: Family Medicine Clinics (FMCs) and Community Health Centres (CHCs).

The FMC model integrates family physicians (FPs) and allied health services into a one-stop multi-doctor, team-based care centre – differing significantly from the current solo GP model. This allows the FMCs to build on the services that GPs already offer and provide services such as nurse counselling, diabetic foot screening, basic laboratory diagnostics, etc. The FMC will focus on chronic disease management and provide a range of services similar to that seen at the polyclinic setting, and at the same time deliver personalised care.

The FMCs would be staffed and operated by GPs, but with public sector support. This would provide stronger links with the restructured hospitals and facilitate right-siting of existing patients from specialist outpatient clinics to FMCs.

Some GPs might prefer to continue their solo practices. However, solo GPs lack the support services such as Diabetic Retinopathy Photography and Diabetic Foot Screening to provide optimal chronic disease care to patients. GPs might have to refer more complex chronic patients to the polyclinics instead of treating them at their own clinics.

The intent of CHCs was to enhance the ability of solo-GPs to manage chronic conditions by providing them with allied health services support. This will help GPs manage patients with more complex chronic conditions. Given the projected increase in chronic disease burden, the CHCs will complement the FMCs, and together, enable chronic diseases to be better managed in the community.

The Acute Sector

BUILDING NEW RESTRUCTURED HOSPITALS

In the acute sector, we recognise that with a growing and ageing population, the demand for new hospital beds has risen and will continue to rise. New community hospitals that are developed will be co-located with acute hospitals to provide convenient access to step-down care services for Singaporeans.

In 2001, plans were announced that a new hospital in the west would be built to replace Alexandra Hospital.

However, the plans were changed in 2004 because the need for a new hospital in the north was greater. The northern general hospital was built in Yishun. This hospital with 571 new beds has been named Khoo Teck Puat Hospital (KTPH), in acknowledgement of the \$125 million donation made by the late philanthropist's family towards the building and funding of the hospital.

The official opening of KTPH on 15 November 2010 marked the beginning of an integrated healthcare

hub in the north of Singapore. KTPH was designed with the patient's needs in mind. For example, there are improved safety features such as the absence of protruding sinks or cupboards to reduce the risk of patients falling and hurting themselves. It has also incorporated environmentally-friendly features, and as a result uses 30% less energy than other similar hospitals.

In the west, the upcoming Ng Teng Fong General Hospital (NTFGH) will be the anchor regional hospital of the western regional health system led by JurongHealth. The 700-bed acute hospital will be twinned with a 403-

bed community hospital to provide holistic integrated care. Slated to open in 2014, these two hospitals will be an integral part of the Jurong Lakeside District Masterplan which offers access to public transport services and retail/entertainment hubs.

A new integrated regional hospital and community hospital at Sengkang is slated to be complete by 2018. This will help relieve the high demand for hospital services in the northeast region, currently served by Tan Tock Seng Hospital (TTSH), KTPH and CGH (refer to Figure 3).



Figure 3: Locations of existing, new and upcoming hospitals.

LEVELS OF MEDICAL CAPABILITY

The Ministry developed a Level of Medical Capabilities (LMC) framework in 2000 to regulate the development of medical capabilities in public healthcare institutions and avoid duplication of expensive medical capabilities which would inflate healthcare costs. As our public healthcare institutions developed their clinical capabilities and expertise, more services were approved by the Ministry and offered to the public through a rigorous evaluation framework. Major examples include the provision of adult liver transplant services at Singapore General Hospital (SGH) since 2004, medical oncology services at KK Women's & Children's Hospital (KKH) since 2005, and chronic peritoneal dialysis services at Alexandra Hospital (AH) since 2009. Other recent examples include frameworks

to better manage chronic diseases, and new services for mental well-being and treatment of mental illness.

The Levels of Medical Capability (LMC) Manual define

- Level 1 services which most hospitals are expected to provide to ensure adequate and appropriate care for the majority of medical and surgical cases presented to them; and
- Level 2 services which require specialised high-end expensive technology and medical/ surgical expertise for a smaller subset of patients, and which, for reasons of patient safety, care quality, and cost-effectiveness, are best limited to a few centres. Level 2 services are mostly provided at the national centres and tertiary hospitals.

The Intermediate and Long-term Care Sector

DEVELOPING CLOSER WORKING RELATIONSHIPS WITH COMMUNITY HOSPITALS

In addition to increasing capacity and developing capabilities to meet the growing healthcare needs of our ageing population, the Ministry has also been making efforts to improve the integration of care across settings.

Since 2009, the Ministry has facilitated partnerships between acute hospitals and community hospitals. This has seen the establishment of joint clinical governance arrangements and operational processes, for example, between TTSH and Ren Ci Community Hospital, as well as CGH and SACH. This has also strengthened the community hospital's (CH's) ability to deliver sub-acute care. Integration will be taken a step further for the new community hospitals sited next to KTPH and the upcoming NTFGH, beginning with infrastructure and service planning. The close partnerships will enable the delivery of seamless care at the interface between acute and community hospitals.

GROWING REHABILITATION AND NURSING HOME CAPACITY

Compared to other countries, Singapore's high-density population and housing estates provide a suitable environment to develop day facilities as a mode of service delivery in the community. Day rehabilitation services in the community have grown in the past 10 years, from eight subvented centres in 2001 to 38 in 2012. The Ministry has appointed AIC to work with the providers to raise the clinical standard of community-based rehabilitation care. We will involve more skilled therapists in the delivery of care and establish individual care plans and improve outcome monitoring to help ensure patients receive the care they need. To support the higher cost which comes with better treatment, the Ministry also increased the subvention rates and allowed Medisave use for patients who receive rehabilitation at day rehabilitation centres.

MOH will continue to work with our partners in the social sector on a new framework for day facilities which integrates both health and social day services to address the needs of the patients holistically, and expand the number of such centres as key community nodes for care delivery. The aim is to facilitate integration and provide a flexible infrastructure for day services to address the needs of the elderly and support ageing-in-place.

HOME NURSING SERVICES AND NURSING HOMES

MOH also intends to develop home-based care within the next decade. This is to provide a serious alternative

care option to institutionalised care. This is in line with the Ministry's philosophy of strengthening the sector to help caregivers care longer, and not replace the care givers. In 2010, the Home Nursing Foundation (HNF) started a pilot project with TTSH to ramp up its services. HNF now has nurses in TTSH to link up with patients who are about to be discharged to ensure a smooth handover for patients who are likely to require home healthcare. Once the patient is home, HNF coordinates with other providers to meet the patient's care needs in the community. There are now over 350 active patients under their care. This programme will progressively be expanded to other regions and providers.

MOH also intends to expand the capacity and improve the standard of care in nursing homes (NHs) to meet the needs of an ageing population. We anticipate that a combination of home-based care and community centre-based care will encourage patients who have mild to moderate functional impairment to be cared for in the community for as long as possible. At some point, however, we recognise that some elderly frail patients will need institutionalised care. Hence, the Ministry is also strengthening the NH sector by increasing capacity, enhancing capabilities and improving standards and governance.

The NH capacity has expanded by about 60% since 2000. Currently, there are about 9,300 nursing home beds in Singapore. The Ministry plans to increase capacity to meet rising national demand, and site new NHs in the community to facilitate family visitations, community bonding and part-time employment of locals.

The Ministry also assists providers to upgrade their skills through organising training programmes and conferences to enhance their capabilities [i.e. providing funding through Health Manpower Development Programme (HMDP-ILTC)]. The Ministry will continue to increase staffing and capabilities to keep pace with infrastructure capacity expansion and capability development. For longer-term sustainability, we are also studying how to increase local participation in the long-term care workforce and better utilise volunteers in care delivery.

The care delivered in NHs today is largely custodial in nature. Our expectation of the role of NHs in the future goes beyond custodial care. We envisage at least some NHs to play a role in meeting the needs of seniors with moderate impairment who require a few months of residential rehabilitation before being discharged home

or to a day rehabilitation centre. The intention is to plug an existing service gap between the more intensive rehabilitation provided at the CHs and custodial care provided by existing NHs.

The Ministry established a Framework for Integrated Healthcare for Elderly in 2001 in part to reduce variability and ensure a reasonable baseline quality of nursing care and service delivery. The framework helped lay the ground work for the development of the National Standards of Nursing Home Care.

Community Care: Improving Care for Mental Illness

THE NATIONAL MENTAL HEALTH BLUEPRINT

The Ministry developed a National Mental Health Blueprint and Policy for Singapore in 2006. We reviewed the entire spectrum of mental wellness and disease and considered how best to support the population at large, to preserve mental wellbeing and promote mental resilience. The Blueprint addressed the need for early detection and intervention to minimise the need for institutional care of the mentally ill. It also addressed the need to help patients recovering from mental illness, highlighting the need for care within the community, support and rehabilitation to prevent relapse, and reintegration within society so that patients can continue to lead purposeful lives.

Broadly, the key focus areas were to:

- a) Build up resilience to mental illness through population-based strategies to promote general mental health;
- b) Pilot community mental health teams to build up a community-based network of support services to ensure early detection and

treatment of those who develop mental illness within the community setting;

- c) Improve mental health manpower; and
- d) Develop a monitoring and evaluation system to support programme development and policy formulation in the area of mental health.

The vision is to move away from a largely acute illness-centred, institutionalisation-based healthcare delivery system towards a community-based model of psychiatric care. As we progressively de-stigmatise mental illness, more will come forward for treatment. Services would need to be developed and reorganised so that most patients can receive treatment near their homes. These services also need to be affordable, comprehensive and accessible. Accordingly, community-based psychiatric services and capabilities will need to be enhanced. This includes providing more rehabilitation services in the community and increasing accessibility to care, in line with de-institutionalisation of care. The ultimate aim is to successfully treat mentally ill patients and help them reintegrate into society, so that they can lead purposeful and economically productive lives.

End of Life Care: Deepening Capabilities and Understanding

The Ministry is strengthening end-of-life care not only to continue to provide quality care, but also to preserve the dignity of the dying and terminally ill.

NATIONAL PALLIATIVE CARE STRATEGY

In its inaugural Quality of Death report, the Economist Intelligence Unit was of the view that Singapore should articulate its plans for developing the palliative care sector in a formal national strategy for palliative care. The Ministry is working with the Lien Centre for Palliative Care under Duke-NUS to formulate our strategy together with the palliative care community. This includes detailing the palliative care needs in Singapore, conducting an evidence review of palliative care interventions, analysing the sector strengths and weaknesses, and making recommendations on the organisation of palliative care services in Singapore.

ADVANCE CARE PLANNING

Advance care planning (ACP) is integral to good end-of-life care. It is a voluntary process through which a patient, in consultation with healthcare providers and loved ones, plans for his future medical care in the event he becomes incapable of making his own decision towards the end of his life. ACP minimises crisis decision-making, which often leads to inappropriate hospital admissions, emergency department attendances and aggressive medical treatment that are not in line with the patient's personal goals and values.

A national ACP Steering Committee was set up in 2010 to work closely with MOH, AIC and the various restructured hospitals to scale up our ACP efforts across the healthcare continuum. This five-year project focuses on the following three strategic thrusts: (a) increasing

ACP awareness within the healthcare community and the public; (b) ramping up training and increasing the pool of trained ACP facilitators; and (c) building and strengthening systems to support intra- and inter-institution ACP implementation, including information technology development. Every restructured hospital should have an ACP programme in place by the end of this five-year project.

Project CARE (Care At the end of life for Residents of Elderly Homes) was initiated in 2008 to improve end-

of-life care for nursing home residents. The three-year pilot programme was funded by the Ministry and led by TTSH, in partnership with seven nursing homes located within TTSH's catchment area, supported by Dover Park Hospice and AIC. Under the pilot, patients, families and healthcare professionals participate in ACP discussions to facilitate decision-making on the patient's end-of-life and treatment preferences. Healthcare professionals from the nursing homes also undergo palliative care training with Dover Park Hospice.

Integrated Care Pathways

Integrated Care Pathways (ICPs) are multi-disciplinary outlines of care to help patients with specific conditions move progressively through the healthcare system. They aim to deliver consistent high quality services by defining desired outcomes clearly to providers. Since their introduction in the UK and US in the 1990s, care pathways have been increasingly used to improve the continuity and coordination of care across different disciplines and settings.

In 2009, MOH appointed a Working Committee to define and map out the key elements of care from prevention to palliation for five disease-specific care pathways, namely chronic obstructive pulmonary disease (COPD), diabetes, heart failure, hip fracture and

stroke. Five disease-specific ICP workgroups comprising senior clinicians were formed to work with the Working Committee to identify and develop the key elements of care within the pathways based on available evidence.

Since 2012, MOH has worked with several restructured hospitals to implement the five ICPs. JurongHealth has, for example, successfully pioneered the COPD ICP while a multi-site implementation involving restructured and community hospitals, as well as other providers in the community where appropriate, is being planned for the Stroke and Hip Fracture ICPs. MOH is also working to develop a robust performance monitoring framework to track the success of the ICPs as well as highlight areas for further improvement.

Human Organ Transplantation

The two legislations governing organ donation in Singapore were first introduced decades ago - the Medical (Therapy, Education and Research) Act (MTERA) was enacted in 1972 while the Human Organ Transplant Act (HOTA) was enacted in 1987. However, it was only during the last decade that the HOTA (the majority of organ transplantations are carried out under the ambit of HOTA) and several implemented initiatives made a major impact on the organ donation framework in Singapore. Some key changes made to HOTA over the years included expanding the list of organs covered under the Act beyond kidneys (2004); inclusion of the Muslim community (2008); and removing the age cap for deceased donors (2009).

2007 was a particularly eventful year for organ donation as following extensive consultations with Islamic leaders and in-depth engagement with the Muslim community, the Fatwa Committee from the Majlis Ugama Islam Singapura (MUIS) issued a religious decree allowing Muslims to be included in the HOTA.

Alongside the legislative amendments, Singapore continued to achieve clinical excellence in organ donation and transplant. During the last decade, more than 1,000 kidney transplants, 1,000 cornea transplants, 140 liver transplants and 50 heart transplants were carried out. In 2009, Asia's first combined heart-liver transplant for a patient suffering from familial amyloid polyneuropathy was successfully carried out in Singapore. The same year saw the first donation by a donor who was over the age of 60 (as a direct result of the 2009 HOTA amendments), as well as the first dual kidney transplant surgery which was successful. In addition, the first kidney transplant procedure involving ABO-incompatible pairs in 2009 was a milestone in Singapore's organ transplantation programme. In 2010, the first successful combined liver-kidney transplant was carried out for a patient in his teens who suffered from primary hyperoxaluria, a rare genetic disorder. More recently in 2012, Singapore's first simultaneous pancreas-kidney transplant was carried out.

REGULATION OF LIVING DONOR ORGAN TRANSPLANTS

With the rise in both the international and local awareness of living donor transplantations, the Ministry recognised the need to protect the interest of living donors, as well as to ensure that there was no organ trading. Public consultation carried out in 2003 showed strong support for regulation of living donor organ transplantation. Thus in 2004, the HOTA was amended to regulate living donor kidney and liver transplants. The amendments provided for the appointment of hospital Transplant Ethics Committees (TECs) which had to authorise all living donor organ transplants.

In order to give its written authorisation for a living donor transplantation, the TEC had to be satisfied that two major professional and ethical concerns were adequately addressed. Firstly, the donor must have thoroughly understood the nature and consequence of the medical procedures and given his or her full informed consent. Secondly, there must not have been any emotional coercion or financial inducement to donate an organ. In addition, the TEC had to consider and account for evolving societal/ethical norms and public interests.

In 2009, the HOTA was further amended to allow for paired-donor matching, and to permit the reimbursement of donation-related costs and expenses - such as for short- or long-term medical care or insurance protection - as well as for loss of earnings, which might be reasonably incurred by living organ donors as a result of their donation. This amendment did not mean that organ trading was condoned or legalised. In fact, penalties were raised to more effectively deter organ trading. The aim of the amendment was to allow patients to defray or reimburse the costs or expenses which their donors might incur, to ensure that donors did not suffer financially as a result of their altruistic

acts. This was based on the ethical principles of equity and fairness, which demanded that the welfare of both recipients and donors are protected.

ENSURING ETHICAL LIVING DONOR TRANSPLANTATION

Acknowledging that the assessment of applications for living donor organ transplants were now more complex, the Ministry issued the MOH Guidelines for Ethical Living Donor Organ Transplantation 2009 in order to provide further clarity and guidance to the TECs. Additionally, while the TECs continued to be appointed by the hospitals, the three-member committee now had to comprise one person each from the hospital-associated panel of physicians, the national panel of independent physicians and the national panel of laypersons.

ENSURING DONOR WELFARE

The kidney live donor support fund was launched by the National Kidney Foundation in 2009 to assist recipients who were unable to pay for their donors' transplant expenses. The scheme was made available for needy patients who were referred by the restructured hospitals. A living donor registry was also established under the National Registry of Disease Act to track the long-term clinical outcomes of the donors.

ADVISORY COMMITTEE ON TRANSPLANTATION AND ORGAN TRANSPLANT IMPROVEMENT PROGRAMME

Ongoing efforts include the setting up of the Advisory Committee on Transplantation which provides advice to MOH on matters relating to organ and tissue transplantation and the Organ Transplant Improvement Programme which improves overall organ retrieval rates by ensuring that all potential organ donors from public and private sector hospitals are identified in an ethical and timely manner.

Health Services Development Programme

In 2000, MOH established the Health Services Development Programme (HSDP) as a funding platform for new services to be piloted and introduced in Singapore. The objective of the HSDP is to enable the development of new health services and medical capabilities through the funding of three categories of projects on a pilot basis:

- a) New cutting-edge medical technology, which requires a period of evaluation;
- b) Advanced and costly treatments, which are well-established but costly and will be offered on

a subsidised basis to patients who have a good likelihood of benefitting from the treatment; and

- c) Major augmentations of existing management capability for key diseases.

For example, two pilot parallel programmes "Newborn Hearing Screening & Intervention Programme" and "National Cochlear Implant Programme" were funded under HSDP in 2001. Late diagnosis of congenital hearing impairment can result in significant delays in speech and language development. The "Newborn Hearing Screening & Intervention Programme" was set

up in KKH, SGH and NUH and the polyclinics to improve the early detection of hearing impairment in babies in Singapore. Patients who had failed the screening were referred for follow-up by Ear, Nose and Throat (ENT) doctors for the necessary clinical intervention, including cochlear implant surgery in cases of profound hearing loss. Those who subsequently underwent cochlear implant surgery in restructured hospitals received financial support through the “National Cochlear Implant Programme”. By the conclusion of these pilot programmes in 2005, 36,095 newborns had been screened, 220 newborns referred to ENT for follow-up, and 53 children received subsidised cochlear implants. Since then, a screening rate of over 99% has been achieved in the restructured hospitals. Newborn hearing screening has also been offered to all newborns in private hospitals with a good uptake rate of about 90%. Newborns who have not undergone hearing screening at birth are screened at the polyclinics during their post-natal check-ups.

Another service which was introduced in Singapore through HSDP was the Childhood Development Programme (CDP) in 2001. The CDP provides diagnostic and early intervention services for children with developmental problems, including learning disabilities, so as to correct and minimise the impact of these dysfunctions. After the child development experts in KKH and NUH diagnose the condition and formulate the appropriate management and therapy plan, the paediatric patients undergo therapy services at community-based clinics, run by KKH and NUH. Through these efforts, as well as the determination of patients and their families, many have risen above their developmental difficulties. Some have progressed to secure places at Singapore’s tertiary institutions and contribute actively during National Service. The CDP complements the Enabling Masterplan, a national roadmap to chart the direction for the disability sector in Singapore, to help such patients and their families.

Drugs and Therapeutics

PHARMACOECONOMICS AND DRUG UTILISATION UNIT

The Pharmacoeconomics and Drug Utilisation Unit (PEDU) was established in 2001 to provide the Drug Advisory Committee (DAC) with technical and secretarial support. The key role of the DAC is to serve as a specialised committee to MOH to make recommendations on the suitability of drug preparations for inclusion for Government subsidies, and on rational prescribing and use of drugs. The establishment of PEDU incorporated regular health technology assessments as an integral part of the drug evaluation process, which strengthened the robustness of MOH’s drug subsidy decision-making process.

The main output of PEDU is the Standard Drugs List (SDL). The SDL is an internal funding arrangement between the MOH and public healthcare providers to alleviate the cost burden to patients by subsidising drugs that are commonly used for treatments in Singapore. The SDL, through PEDU and DAC’s efforts, is continually revised to ensure that the drug preparations listed remain clinically current and cost-effective.

There were several key milestones between 2007 and 2011 for the drug subsidy framework. PEDU undertook the SDL Gap Analysis Project in 2007 to understand drug usage in the public sector and identify crucial non-SDL drugs which should be considered for subsidy. Other gaps in the SDL framework were identified, giving rise, for example, to the establishment of the National Antimicrobial Taskforce (to monitor antimicrobial resistance and promote rational use of antimicrobials) in 2010, and the introduction of the Medication Assistance Fund (MAF) and MAF Plus schemes in 2010 and 2011, respectively.

MEDICATION ASSISTANCE FUND

As the SDL framework provides broad untargeted subsidies to patients, many costly innovative drugs are not included in the SDL. In August 2010, the MAF scheme was implemented in the RH/Is to provide means-tested subsidies for costly drugs. Drugs included in the MAF are based on specific clinical conditions (e.g. cancer, osteoporosis, COPD, hepatitis, dialysis/kidney failure and psychiatric conditions), for which they have been assessed to be cost-effective. The targeted nature of MAF means that subsidies can be disbursed on a more sustainable basis. Since then, much needed financial relief has been provided for this group of patients.

MEDICATION ASSISTANCE FUND PLUS

The MAF Plus scheme was implemented in Oct 2011 as an expansion of the MAF scheme. Before the expansion, access to drug subsidies was through the SDL and MAF framework. Over time, MOH recognised that there were patients at the fringes with rare conditions or who required rare drugs, which were not surfaced centrally for the DAC's consideration. MAF Plus enabled subsidy provision to be decentralised and considered at the RH/I level on a case-by-case basis, according to financial and clinical guidelines provided by MOH. Through MAF Plus, patients benefit from the greater flexibility, and RH/Is are better able to address drug affordability issues faced by their patients.

ACKNOWLEDGEMENTS

Dr Alan Ong

Dr Lee Wei Liang

Mr Mah Kwok Kin

Ms Tay Yi Pei

Ms Tan Yan Lin

Ms Melissa Tan

Chapter

5

Healthcare Standards and Clinical Quality Improvement

“ It is what the individual clinician, hospital and healthcare system can offer to a patient that he or she is in need of, that defines clinical excellence...all players in a healthcare system must understand and be sensitive to what exactly are the medical needs of the patient in order to deliver clinically excellent care. ”

Professor K. Satku,
6th Clinical Quality Improvement Conference, 2009



Healthcare Standards and Clinical Quality Improvement

by: Dr Voo Yau Onn and Dr Lim Eng Kok

Clinical excellence, while often defined from a national perspective by measures such as life expectancy and health-adjusted life-years may be interpreted differently depending on one's role in the healthcare industry. For example, a healthcare administrator may have a very different view from a specialist in a large hospital. Regardless, clinical excellence should ultimately be about providing care that results in the best outcomes for patients. All patients should have access to appropriate medical treatment delivered in a timely manner and not be subjected to avoidable harm or injury.

With the restructuring of the healthcare institutions, the enactment of the Private Hospitals & Medical Clinics (PHMC) Act in 1991 ensures that public healthcare institutions continue to enhance their quality assurance programmes. However, new challenges have emerged given the complexity of healthcare and as disease patterns continue to evolve. For example, care is now delivered by groups of professionals working on

different aspects of the clinical problem, potentially over prolonged periods. The performance of a single healthcare professional, or for that matter, a single healthcare institution, is no longer the only factor affecting clinical outcomes.

To ensure that patients continue to have the best possible long-term outcomes, we adopted a multi-pronged, systems approach which comprises four key strategies:

- a) Defining clinical standards through the National Standards for Healthcare Framework
- b) Development of performance measurement as a basis for quality improvement
- c) Assuring care through the National Quality Assurance Framework
- d) Promotion of sustained quality improvement

Defining Clinical Standards through the National Standards for Healthcare Framework

Prior to 2008, MOH worked with the Academy of Medicine and other professional bodies and societies to develop local Clinical Practice Guidelines (CPGs). These were evidence-based guideline documents which aimed to standardise and reduce variation in local practices.

In April 2008, the concept was extended to the restructured hospitals and institutions (RH/Is). MOH developed and implemented the National Standards for Healthcare (NSHC) framework in all RH/Is with the primary objective of ensuring that healthcare is appropriate to the patient's needs, and is based on current evidence and clinical knowledge. The NSHC spells out the Ministry's expectations in seven key domains:

- Accessible Care
- Appropriate Care
- Patient-Centred Care
- Safe Care
- Learning Institution
- Physical Environment and Amenities
- Public Health (including Emergency Preparedness)

Each domain of care stipulates a priority aspect of care that should be met by the healthcare institution. Each domain, in turn, comprises three dimensions:

- Objectives: Rationale – “why” – the reason for having each domain
- Standards: Description – “what” – the requirements for each domain

- Indicators: Quantifiable measurable elements – “how” – the way to know if a hospital has achieved the standard

The relationship between objectives, standards and indicators is illustrated in Figure 1 through an example of an existing standard under the “Accessible Care” domain.

The NSHC was implemented through Healthcare Performance Offices (HPOs) which are funded by MOH and sited within each RH/I to measure performance against standards, and to drive quality improvement initiatives. While NSHC standards are based on evidence and best practices, they need to be adapted to Singapore's unique healthcare system design and constraints. This is done jointly between MOH and the RH/Is. Continuous engagement not only strengthened the quality and practicality of the NSHC standards and indicators, it also allowed the NSHC to become accepted as a reference standard which should be met.

Following the success of NSHC at the RH/Is, the NSHC was introduced in Community Hospitals in December 2010 and Private Hospitals in September 2011. Moving forward, we will explore expanding the NSHC framework into the primary and long-term care sectors.

It would not be possible for all aspects of clinical care to be detailed in the NSHC, even then, the NSHC is a ‘living’ document that will evolve as medicine advances and new evidence emerges.

Figure 1: Accessible care – objectives, standards and indicators

Domain 1: Accessibility		
Sub-domain 1: Timely Care		
Objective	Standards	Indicators
<p><i>Patients should be able to access care without unnecessary delay at every stage of the care delivery process.</i></p>	<p>1. A Patient Acuity Category Scale 1 (P1) patient should be attended by a doctor immediately.</p> <p>2. A P2 patient should be attended by a doctor within 20 minutes (median), 60 minutes (95th percentile).</p>	<p>1. Proportion of P1 patients seen immediately at the emergency department after triage.</p> <p>2. Waiting time at emergency department (to consultation for P2 patients).</p>

Development of Performance Measurement as a Basis for Quality Improvement

In conjunction with the NSHC strategy to define clinical standards, the RH/Is adopted the use of performance measurement to chart progress in clinical quality and patient safety.

It is easy to go overboard with performance measurement. The wisdom is to know what to measure and how much. Starting with standards in the NSHC framework, performance measurement against specific standards helped Healthcare Institutions (HCIs) in identifying areas of concern, allowing the prioritisation of quality improvement (QI) efforts, planning and resource allocations to meet national objectives.

Indicators were chosen not just for suitability for quality improvement but also for feasibility. Resources required to collect the performance data is always a major consideration. For example, the preference was to select suitable measures that could be collected through electronic back-end systems, without inundating healthcare professionals. Electronic collection is also more efficient and expedient when it comes to data comparisons and benchmarking.

Where data cannot be pulled electronically, MOH funded Healthcare Performance Officers in each RH/I to establish baseline data via self-assessment audits for relevant standards and performance measures. These measures will then be monitored over time to drive quality improvement.

ADVANCES IN PERFORMANCE MEASUREMENT

One of the biggest challenges in performance measurement is the standardisation of measures and data collection methods. This is because comparability and benchmarkability is critical. Since 2008, HPOs meet four times a year at Focus Group Discussions organised by MOH to discuss differences in clinical process design and workflow. Emerging from these discussions was the understanding of what drives performance in each of the NSHC standards. The understanding is then translated into refinements in clinical performance indicator definitions. Technical manuals for indicators related to NSHC are then published to guide RH/Is in data collection. Where possible, electronic data sources were developed and cleaned up to supply the data.

On average, it takes about three years for any new indicator to be standardised and implemented. Once meaningful data can be collected, the data can then form a powerful base for driving quality improvement. For example, data is shared at HPO council meetings held twice a year where institutions showcase their improvement initiatives. HPO Council Meetings also assist in the spread and scaling up of good quality improvement practices.

Feedback from HPOs indicated by the performance data presentations at HPO Council Meetings provides RH/Is with useful feedback that they could bring back to their own Clinical Department Chiefs. This data, in turn, helps the chiefs to work on identifying gaps and improvement opportunities. Post-intervention, new data is then collected to inform whether quality improvement strategies have been successful. The entire process becomes a systematic way of tackling gaps in healthcare service delivery.

PUBLIC HOSPITAL SCORECARD & PERFORMANCE REPORTS

MOH also introduced the 'Public Hospital Scorecard' to measure institutional performance. The scorecard comprises a holistic set of indicators covering both the clinical quality perspective (i.e. process, output and outcomes of care) and the patient perspective (i.e. patient satisfaction); with the selection of indicators leveraging on internationally-accepted indicators and definitions where possible, to facilitate benchmarking. Examples include the Center for Medicare and Medicaid Services (CMS)-Joint Commission for Accreditation of Healthcare Organisation (JCAHO) aligned measures for acute myocardial infarction and stroke.

Since 2009, MOH has been publishing the 'Public Hospital Performance Report' annually to review clinical performance across RH/Is. The report leverages on the indicators on the public hospital scorecard, and through the use of a common set of indicators, enables cross-comparison of performance across these institutions, thus providing the impetus for continuous improvement. MOH has also published local benchmarking studies through MOH information papers for areas such as ventilator-associated pneumonia, methicillin-resistant *Staphylococcus aureus* (MRSA), laser-assisted *in situ* keratomileusis (LASIK) and heart surgeries.

NATIONAL HEALTH SYSTEM SCORECARD & INTERNATIONAL BENCHMARKING

In addition, to benchmark Singapore against other Organisation for Economic Cooperation and Development (OECD) countries and to understand how we fare against others, the Ministry has also taken part in the OECD Healthcare Quality Indicator Project and its related health data collections since 2009. At the national level, we have achieved very good results for the indicators overall, including for life expectancy, child mortality and other disease-specific death rates. However, we will need to track morbidity indicators in key disease areas such as heart disease, diabetes, mental disorders and cancer to match the top tier of OECD countries. For these indicators, we are currently about average, among the OECD countries (see Annex A for details).

To ensure comprehensive measurement throughout the healthcare system, the national-level National Health System Scorecard is cascaded to setting- and provider / specialty-level scorecards (see Figure 2 for an example of how the Scorecard cascades to the Public Hospital Scorecard for the acute hospital setting). The Scorecards leveraged extensively on the indicators developed under the OECD Healthcare Quality Indicator (HCQI) Project. This allows MOH to benchmark Singapore's performance with OECD countries on a 'like-for-like' basis, enabling us to identify areas where we are doing well, and where improvements are needed to close

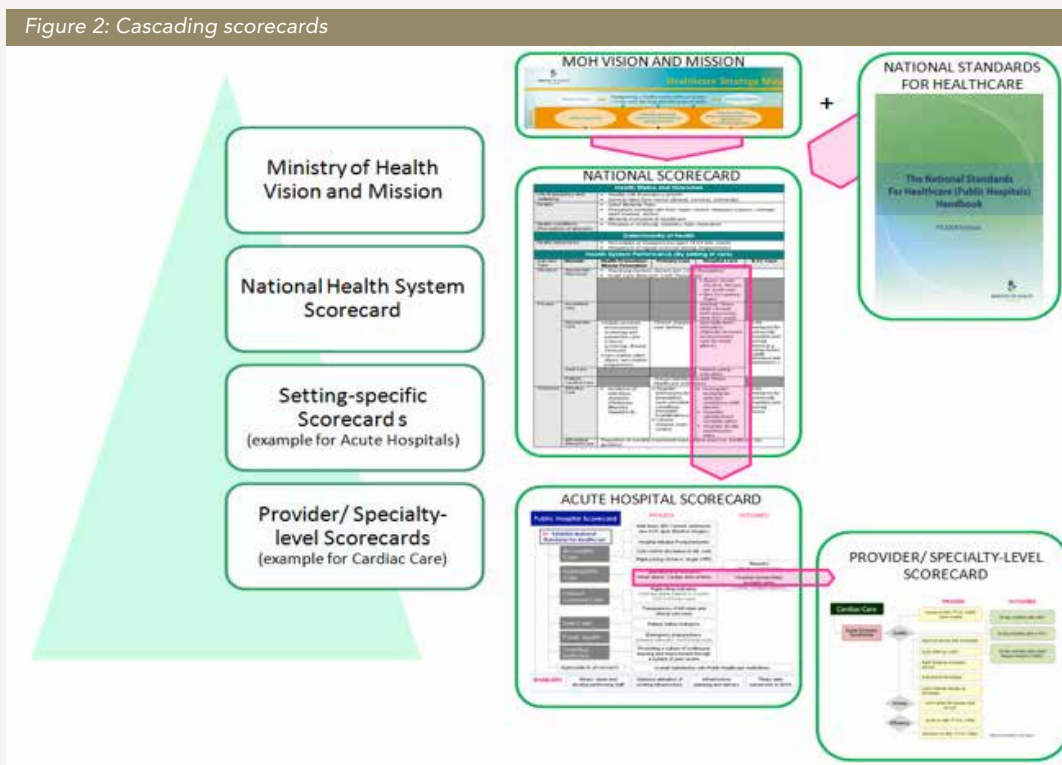
quality gaps. For example, the OECD HCQI's indicators on hospitalisations for ambulatory care sensitive conditions enabled us to monitor the national Chronic Disease Management Programme (which covered conditions such as Diabetes, Hypertension, Asthma, etc), to successfully reduce hospitalisations and to add possible conditions onto the Programme.

LEARNING POINTS

Performance measurement is a systematic and important tool to drive quality improvement. Since the introduction of the NSHC quality improvement framework and the Public Hospital Performance Report, the scale and focus on quality improvement has continued to expand.

Once an improvement opportunity is identified, a suitable clinical performance indicator would be developed through consensus to enable institutions to start monitoring baseline performance. This allows estimation of the severity of the gap. The challenge is in finding an appropriately balanced and meaningful indicator, taking into account scarce data collection resources.

The many collaborative focus group discussions strongly improve stakeholder buy-in to performance measurement and greatly help to smoothen the implementation process through ironing out the differences in understanding and kinks in the data collection system.



Assuring Care through the National Quality Assurance Framework

In 1999, the PHMC Act was strengthened to introduce more detailed requirements for quality assurance. The revised Act required a licensed hospital 'to monitor and evaluate the quality and appropriateness of the services provided and the practices and procedures carried out', and provided qualified privilege to members serving on their quality assurance committees such that they were not compelled to disclose their findings or recommendations in court, and their findings or recommendations were inadmissible as evidence that the service, practice or procedure was inappropriate or inadequate.

These key provisions in legislation enabled MOH to establish a national adverse event reporting system in 2002, the sentinel events reporting system. This mandatory reporting system has enabled the Ministry to facilitate on-going learning across hospitals from deaths or serious injuries in patients that are associated with errors occurring during the patient care process, through timely National Patient Safety Alerts and twice yearly sharing sessions among healthcare practitioners from the various institutions. The sharing sessions and alerts started in 2006 and 2008 respectively. These have resulted in systems improvements at the hospital level including addressing communication gaps that may increase the risk of errors and harm or injure patients.

Amendments to the PHMC Act and Regulations were further made in Jan 2011 to ensure that quality assurance coverage extends beyond hospitals to include community hospitals, polyclinics and other medical clinics that provide special care services. The previous 'Sentinel Events Review Guidelines' were superseded by the new 'Directives for Review of Serious Reportable

Events', which provide greater clarity on the definition of each reportable event and requirements to ensure that recommendations for improvement are implemented across all relevant parts of the institution. A new 'Directive for the Review of Mortality and Morbidity' that spelled out requirements for peer review of deaths and clinical incidents was added in January 2011. The quality assurance framework will be progressively enhanced through subsequent amendments to the directives.

Continuous quality improvement is dependent on institutions having a strong learning culture. The issuance of NQAF directives requires adequate categorisation of adverse events and to ensure appropriate review and implementation of review recommendations. HCIs are also required by these directives to document the review process and the recommendations. However, these cannot and do not replace the institutions' internal motivation for the pursuit of patient safety and quality improvement.

MOH plays both the roles of regulator, as well as facilitator, in ensuring appropriate quality improvement and learning systems. For example, while the directives are issued for compliance, and regulatory audits into institutional compliance with learning processes are intermittently conducted, the findings of quality assurance committees and their documentation are not subject to regulatory audit. Instead, MOH takes a non-regulatory "quality improvement" approach – through the Standards and Quality Improvement Division – which reviews these documents intermittently to ensure that institutions are indeed learning from adverse events and improving care processes.

Promoting Sustained Quality Improvement

HEALTHCARE PERFORMANCE OFFICES

MOH funded the establishment of HPOs in all restructured hospitals and national specialty centres. Each HPO comprises a chairperson, a deputy chairperson, head secretariat and two to three executives, who are hospital employees but whose salaries are reimbursed by the MOH. The roles of HPOs are to:

- a) Bridge existing gaps in performance measurement data collection
- b) Identify gaps and propose QI initiatives based on collected data
- c) Implement the appropriate QI initiatives to close gaps

Since the HPOs' inception in 2009, they have been methodically tackling gaps in their institutions and making systemic changes on the ground to improve their performances in implementing the NSHC. A noteworthy example was when National Skin Centre managed to achieve the strategic target of 100% new SOC patients being reviewed by a specialist at the first visit when these appointments were auto-routed by their electronic system to specialists. In another example, Singapore General Hospital was able to consistently maintain >95% patients receiving urgent surgery within 6 hours of the decision to operate through standardisation of practice and increasing resource. These initiatives, among others, have been shared at HPO Council Meetings.

HEALTHCARE QUALITY IMPROVEMENT AND INNOVATION FUNDS

The Healthcare Quality Improvement Fund (HQIF) was set up with a sum of \$1 million in 2005, to provide seed funding for public institutions to pilot-test patient safety and quality improvement projects that fall under the categories of patient care, patient safety, medical errors and hospital-acquired infection. In 2009, the HQIF was merged with the Health Innovation Fund and renamed the Healthcare Quality Improvement & Innovation Fund

(HQI2F). The funding cap for HQI2F projects was raised to \$100,000 per project per year for a maximum of two years. The resultant fund size increased to \$4 million annually and the fund was strategically aligned to drive QI and innovation in NSHC domain areas. In 2009, to spread and scale up good HQI2F programmes, MOH provided an additional \$4 million annually to start a new HQI2F+ fund to support nationally coordinated "top-down" initiatives. The aim was to complement "bottom-up" projects supported by HQI2F. In 2010, the fund was extended to the intermediate and long-term care sector through the Agency for Integrated Care.

Since inception, a total of 133 HQI2F projects costing \$11.1 million, have brought about noteworthy clinical quality improvements in our healthcare system. Good projects have been shared at HQI2F project presentation forums which are held twice a year since 2007. Award winning projects have been reported in the media, presented at international conferences and published in international journals. Two outstanding projects are highlighted below. The WHO High 5s Project is an example of a project that has been funded by HQI2F+ (see below).

Dr Amartya Mukherjee's project at the National University Hospital entitled 'Utilization of blood conservation device in management of critically ill patients requiring frequent blood sampling' was published in the Journal of Critical Care. A poster of the project was also presented at the Society of Critical Care Medicine's 39th Critical Care Congress in Florida, US, in 2010.

A project by Dr Asok Kurup from the Singapore General Hospital, 'Active surveillance testing and decontamination strategies in intensive care units to reduce methicillin-resistant *Staphylococcus aureus* infections', was published in the American Journal of Infection Control in 2010.

ANNUAL HEALTHCARE QUALITY IMPROVEMENT CONFERENCE

In 2002, together with Institute for Healthcare Improvement and the British Medical Journal, MOH organised the 2nd Asia Pacific Forum on Quality Improvement in Health Care. Following this, an annual clinical quality improvement week was launched in partnership with public hospital clusters that gradually grew into an Annual Healthcare Quality Improvement Conference with a National HQI Poster Competition.

The first conference started off as a half-day event in 2004. Over the years, it has become the platform to showcase Singapore's thought leadership in quality improvement, drawing international and local experts and participants. In 2010, the event was renamed the 'National Healthcare Quality Improvement Conference'

to reflect inclusion of all public and private sector healthcare institutions in Singapore, as well as a broader scope with tracks for workplace safety improvement, healthcare innovation and technology assessment. The National HQI Conference has become the local platform for quality improvement and patient safety. Participation rates have increased each year. The 2011 event drew more than 1,500 delegates with over 180 poster submissions.

NATIONAL & INTERNATIONAL QI COLLABORATIVES

Medication Safety: Prior to 2010, each public hospital had its own quality assurance committee dedicated to improving medication safety within the institution, while MOH provided additional support in terms of seed-funding through the HQI2F to further support institutional medication safety initiatives.

In 2010, MOH set up the first national collaborative to address medication safety – National Medication Safety Taskforce (NMST). The Taskforce comprises medication safety champions from public and private hospitals to enhance local QI collaboratives to improve medication safety in Singapore. An International Safe Medication Practices (ISMP) survey was conducted and based on the gaps identified, the NMST formulated a national medication safety strategy to systematically target gaps and conduct quality improvement. Experts from local HCIs collaborated to develop standards, guidelines and medication safety indicators to reduce variations in medication practice, improve safety, and track progress in gap closure. The taskforce will also establish baseline medication error rates and develop patient education materials on the proper identification of medicines and communication of drug allergy history.

Healthcare-Associated Infections & Infection Control: Over the years, MOH through the various HCIs have been monitoring rates of healthcare-associated infections (HAIs). HAI indicators included specific surgical site infections for hip surgery, as well as infections by specific organisms such as MRSA. HAI rates are benchmarked against national rates, as well as publicly available international rates from the National Healthcare Safety Network of the US Centers for Disease Prevention and Control and the UK Health Protection Agency. Hospitals were encouraged to use this information to evaluate infection control practices and conduct quality improvement.

In 2009, under the National Antimicrobial Taskforce (NAT), MOH established the Antimicrobial Resistance (AMR) Workgroup and the Infection Control Workgroup (ICWG) to further enhance safety against healthcare

associated infections. These inter-divisional and inter-disciplinary teams work in partnership with all public hospitals and the National Public Health Laboratory to recommend key strategies for surveillance against Multi-drug Resistant Organisms, monitor and review trends of antimicrobial resistant organisms at the hospitals and at national level, as well as improve coordination of infection control strategies at the national level. The taskforce and its workgroups also identify areas of research related to the control of antimicrobial resistance.

WHO High5s Project: Singapore is a participant of the 'Action on Patient Safety: High5s Project', a global project established in late 2006 through collaboration between the Commonwealth Fund, the World Health Organisation (WHO) World Alliance for Patient Safety and the WHO Collaborating Centre for Patient Safety. Singapore is the only Asian country participating in the High5s Project, together with Australia, Canada, France, USA, Germany, Trinidad & Tobago and the Netherlands. MOH is the lead technical agency co-coordinating the project, and works closely with the High5s network comprising project leads from RH/Is.

The High5s initiative aims to implement innovative, standardised operating protocols (SOPs) for five patient safety solutions over a five-year period, with data to be collected on prescribed indicators. Singapore started the High5s project with the correct site surgery SOP in 2009. Since then, with the support of MOH, Singapore hospitals made significant changes in their surgical safety culture and workflow in operating theatres. Data submission to WHO began in Jan 2011 and Singapore became the first country amongst participating countries to achieve full implementation of the SOP in the major operating theatres of all public hospitals.

Transparency of Healthcare Charges

Prior to 2003, there was a lack of comparative information on hospital prices and outcomes. Hospitals were reluctant to provide pricing or bill estimates due to the complexity of healthcare -- hospital charges could vary greatly depending on the length of stay, the complications encountered, the choice of treatment and medicines prescribed. This information asymmetry not only prevented patients from comparing prices, but also prevented the hospitals from comparing costs among themselves, and as a result, blunted the drive to increase operational efficiencies.

In a move to increase transparency between patient and provider, the Ministry started publishing the hospital bill sizes for 70 common conditions (70Cs) on its website in 2003. Commencing with 28 conditions, the number of conditions increased to 50 in Nov 2003 and then to 70 in Dec 2003. The published data was based on comparative casemix-adjusted⁹ information on hospital bill sizes for common medical conditions/ procedures, which addressed concerns regarding making 'apple-to-apple' comparisons. The bill sizes featured (50th and 90th percentiles) were the actual bills (after subsidy) paid by the patient upon discharge and covered all treatment, investigations and care undertaken during the patient's

stay in hospital. The published figures also included the volume of cases and the average length of stay (see Figure 4 for example based on 'Normal Delivery').

The initiative expanded to include the private hospitals in 2003, starting with an initial publication of 10 medical conditions. The Ministry worked with the private hospitals to expand their publication to the full list of 70 conditions by 1 Jan 2011. This was supported by amendments to the Medisave regulations which made the submission of basic billing statistics a requirement for the participating hospitals in return for Medisave accreditation.

This initiative leveraged on market forces to help constrain costs and via competition, drove hospitals to improve their operating efficiency while continuing to provide good quality care to their patients. Streamlining of processes, reduction of wastage and sourcing of

cheaper inputs quickly took place, and resulted in significant reductions in hospital bills. According to a study by Wong C.Y. et al⁴, the mean, median and 90th percentile bill sizes for B2 class wards fell by 4.1%, 8.0% and 8.0% respectively. The corresponding declines for C class wards were 9.6%, 10.1% and 11.4%. The study concluded that "the act of publishing bill sizes has led to less information asymmetry among providers, thereby facilitating more competitive behaviour among hospitals and lower bill sizes".

While competition results in the lowering of prices, it is possible that excessive competition may cause skimping of services and lead to the lowering of the quality of care. With this in mind, quality assessment measures like internal and external audits, as well as monitoring of re-admission rates were put in place to minimise such effects.

³ Casemix adjusted information is based on a clinical classification system known as Diagnosis Related Groups (DRGs), through which hospital episodes are grouped into clinically-similar groups which utilise comparable amounts of resources and are adjusted for severity and other factors which impact their length of stay.

⁴ Wong CY, Wu E, Wong TY. Examining the effect of publishing of bill sizes to reduce information asymmetry on healthcare costs. Singapore Medical Journal 2007; 48(1):16.

Figure 4: Screenshot of bill size website for condition 'Normal Delivery'



Conclusion

As we look back at these achievements, we are cognisant of the significant challenges posed by our growing and greying population, and of the need to move from an episodic to a continuum of care approach. System changes are currently being looked into which will allow for better integration of care.

We will continue to leverage on the close collaboration and partnership among the various stakeholders – the Ministry, clusters, institutions and professional bodies – to make this happen, and look forward to bringing healthcare in Singapore to new levels of excellence in the new decade.

ACKNOWLEDGEMENTS

Adj A/Prof Serena Koh

Dr Ng Yeuk Fan

Mr Peter Lee

Dr Aley Moolayil

Ms Denise Lee

Ms Katherine Soh

Ms Helen Goh

Ms Theng Hui Hwen

Ms Evie Ching

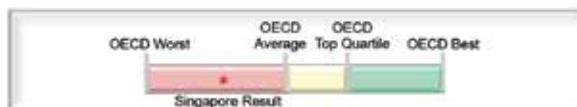
Annex A - Benchmarking Singapore's mortality and morbidity indicators against OECD countries

Summary at a Glance 2009

Source:
 1. OECD Health Data 2010;
 2. OECD Health at a Glance 2011;
 3. MOH Health Facts 2010;
 4. WHO Global Health Observatory 2010

Singapore's results adjusted to OECD population.

Singapore¹ (2009)



Singapore² vs OECD

HEALTH STATUS	Desired direction	Singapore ¹ (2009)	Singapore (*) vs OECD countries	OECD Average	OECD Top Quartile	OECD Best
Life expectancy at birth, total population	↑	81.4		79.5	81.0	83.0 (Spain)
Life expectancy at birth, male	↑	79.0		76.1	78.3	79.5 (Belgium)
Life expectancy at birth, female	↑	83.7		82.2	83.5	84.6 (Switzerland)
Life expectancy at 65, male	↑	17.9		17.2	18.2	19.0 (Austria)
Life expectancy at 65, female	↑	21.2		20.5	21.4	24.0 (Spain)
Infant mortality, per 1,000 live births	↓	2.2		4.4	2.8	1.8 (Iceland)
Maternal mortality, per 100,000 live births	↓	0		9.1	3.7	0 (Iceland)
HEALTH WORKFORCE						
Practising physicians, per 1,000 population	↓	1.7		3.1	2.6	0.2 (Indonesia)
Practising nurses, per 1,000 population	↓	5.4		8.4	6.6	0.5 (Oman)
HEALTH EXPENDITURE						
Total health expenditure per capita, USD PPP	↓	1,559		3,233	2,165	99 (Indonesia)
Total health expenditure as a share of GDP	↓	4.1		9.6	8.4	2.4 (Indonesia)

Notes:
¹ Singapore results based on crude rates; ² Singapore results adjusted to OECD population;
 * 2010 data

CARE FOR CHRONIC CONDITIONS	Desired direction					
Asthma hospital admission rates	↓	73.8		51.8	30.1	15.1 (Portugal)
Chronic Obstructive Pulmonary Disease (COPD) hospital admission rates	↓	123.1		198.0	136.8	71.0 (Portugal)
Uncontrolled diabetes hospital admission rates	↓	16.5		50.3	18.2	3.3 (Iceland)

CARDIOVASCULAR CARE	Desired direction					
In-hospital case-fatality rates within 30 days after admission for AMI	↓	9.3		5.4	3.8	2.3 (Denmark)
In-hospital case-fatality rates within 30 days after admission for ischaemic stroke	↓	4.9		5.2	3.1	1.8 (Iceland)
In-hospital case-fatality rates within 30 days after admission for haemorrhagic stroke	↓	17.9		19.0	14.0	6.5 (Poland)

CANCER CARE	Desired direction					
Cervical cancer screening	↑	47.9 ^A		61.1	72.6	85.9 (USA)
Cervical cancer mortality	↓	3.5		3.2	1.8	0.8 (Iceland)
Mammography screening	↑	39.6 ^A		62.2	72.8	84.4 (Finland)
Breast cancer mortality	↓	22.5		19.8	18.2	6.1 (Iceland)
Colorectal cancer mortality	↓	19.6		18.5	15.4	5.5 (Iceland)

^A 2010 data

Chapter

6

Promoting Medical and Health Services Research

“ This journey from question to innovation to implementation is an arduous and rigorous one and deservedly so. We owe it to our patients to ensure that the care they receive will benefit them. ”

Professor K. Satku,
National Healthcare Group Annual Scientific Congress, 2004



Promoting Medical and Health Services Research

by: A/Prof Tan Say Beng

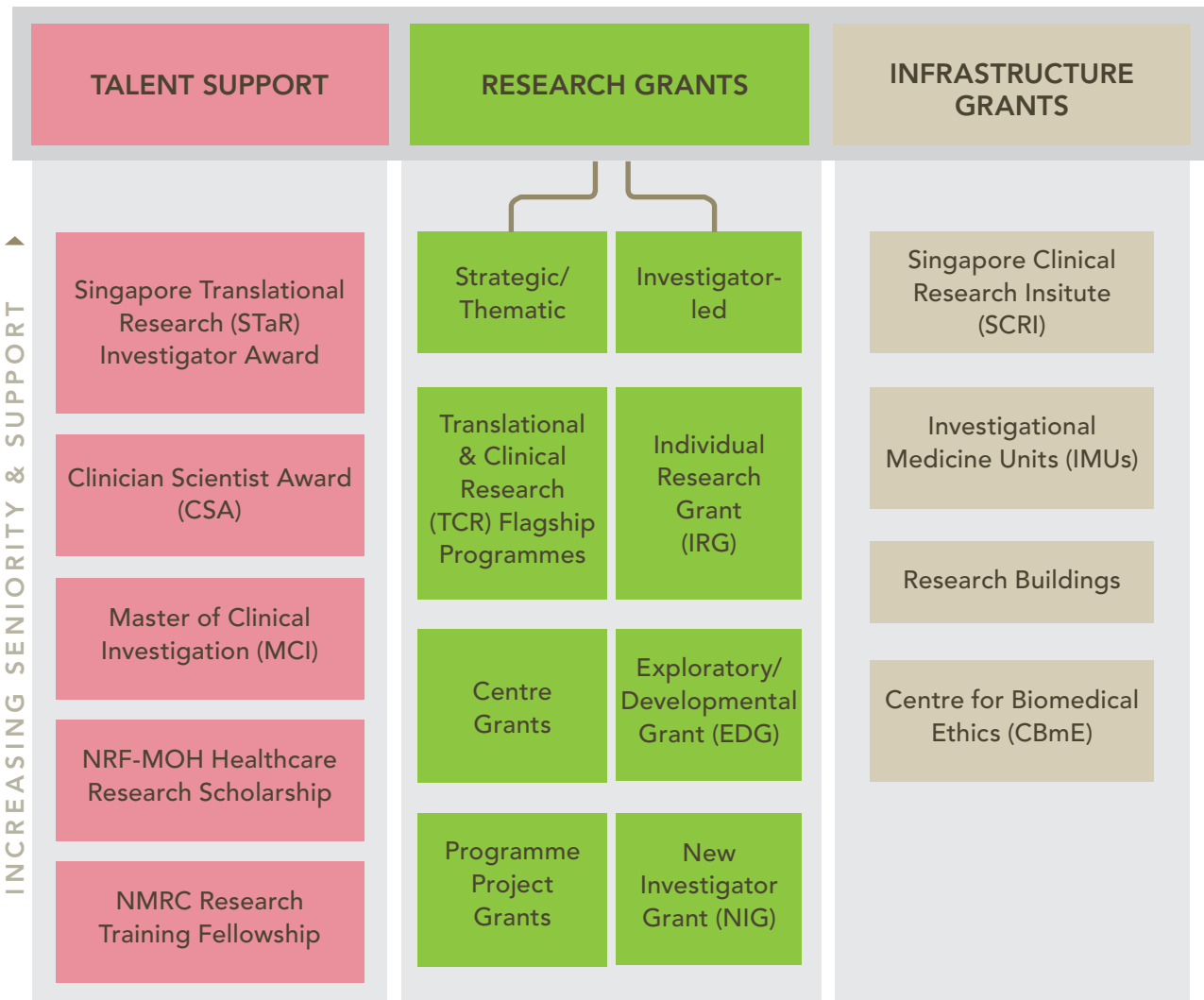
The National Medical Research Council (NMRC) was established in 1994 as part of the Ministry of Health (MOH) with the mission of promoting excellence in translational and clinical research (TCR), nurturing a vibrant research community of clinicians and scientists in Singapore, and enhancing knowledge exchange to improve human health. The NMRC oversees the development and advancement of translational and clinical research in Singapore, and seeks to achieve its mission through: providing competitive research funds to publicly funded healthcare research institutions, awarding competitive research funds for programmes and projects, supporting the development of core clinical research infrastructure, developing clinician scientists through awards and fellowships, and fostering interactions and knowledge exchange among researchers – ultimately reducing the time needed to translate knowledge from bench to bedside.

In 2006, the MOH established a new mandate to support TCR in areas where Singapore was identified to have great potential. Henceforth, NMRC's role became ever more important in leading, promoting, coordinating and funding TCR in Singapore. NMRC-funded research has led to inter-disciplinary partnerships and international collaborations, helping to boost the role played by Singapore's biomedical sector on the global stage.

NMRC launched a series of strategic programmes and initiatives to further develop Singapore's TCR capabilities according to its mission of promoting excellence in TCR, nurturing a vibrant research community and promoting knowledge translation. Figure 1 shows the grants offered from 2006 till 2010.

Figure 1: Overview of NMRC Grant Support Framework

NMRC GRANT SUPPORT FRAMEWORK (2006-2010)



Promoting Excellence in Translation Clinical Research

Since its inception, NMRC has been promoting excellence in TCR by offering competitive research grants such as the Individual Research Grants. The competitive nature of the grants helps build up research capacity and capability in Singapore by funding research with the best science, and also ensures that funds are put to the best possible use. However, it was recognised that more needed to be done to bring together the best complementary research strengths in the clinical institutions, universities and research institutes to address research questions with clinical relevance,

including focusing on diseases of strategic importance, at a scale capable of yielding findings that would be of interest to industry.

The National Research Foundation (NRF), through the NMRC, provided S\$125m in block funding for five TCR Flagship Programmes from 2006 to 2010. These programmes involved research in the areas of neuroscience, gastric cancer, eye diseases, infectious diseases and metabolic disorders; which were highly relevant to the healthcare challenges Singapore

faces. The TCR Flagship Programmes reflect a truly collaborative effort between clinicians and basic scientists across various research and healthcare institutions in Singapore.

Some highlights of the programmes included the Gastric Cancer programme which detected early gastric cancer in 17 people, while also contributing new knowledge that potentially impacted the detection and treatment for this type of cancer. Another key success is the development of the world's first robotic flexible endoscopy system called Master and Slave Transluminal Endoscopic Robot (MASTER). Patients benefited from less pain and a faster recovery from this no-scar surgery.

The Eye programme has resulted in the development of a "made in Singapore" product, the Tan EndoGlide, which is the first donor insertion device approved by the Food and Drug Administration (FDA). It is a disposable device used in the transplantation of the cornea. Another key outcome is the establishment of ReLEx (Refractive Lenticule Extraction) SMILE (Small Incision Lenticule Extraction) as an alternative surgical procedure to LASIK (Laser Assisted *in-situ* Keratomileusis). Unlike LASIK, which uses two lasers and vaporises the corneal

tissue to correct vision, ReLEx SMILE uses only one laser for the entire procedure and removes only an inner lens-shaped piece of cornea which corresponds to the patient's myopia and/or astigmatism, through a keyhole incision in the cornea. Moving ahead, the research team patented a technology involving the cryopreservation of the refractive lenticule, with focus on re-implanting into the cornea. If successful, the surgical procedure could become "reversible", and hence, add safety and confidence to the patient. This technology (through A*STAR's Exploit Technologies) is currently licensed to a new spin-off company, Lenticor.

Other programmes have also made good progress. Although still in its early days, the team working on the metabolic programme, which was the latest programme to be awarded in 2008, has managed to build up a birth cohort study named GUSTO (Growing Up in Singapore Towards Healthy Outcomes). This is Singapore's largest and most comprehensive birth cohort studying the impact of mothers' diet and lifestyle during pregnancy on their babies' growth after birth. The cohort study has attracted interest from clinician experts and researchers from around the world, as well as the nutrition industry.

Building a Dynamic Research Community

Clinician-scientists play a crucial role in bench-to-bedside research. They provide not only the critical intellectual inputs for TCR programmes, but also knowledge and innovation to support the academic community, biomedical companies and pharmaceutical research and development programmes. Through its Human Capital Awards and Talent Development Programmes, NMRC offers comprehensive support to clinician scientists at every stage of their career, ranging from fellowship and scholarship programmes, sponsoring budding clinician scientists for local or overseas training, and prestigious awards to support excellent TCR researchers.

TALENT DEVELOPMENT PROGRAMMES

Developing a pipeline of clinician scientists is vital to ensure the continuing success and growth of TCR in Singapore. The NRF-MOH Healthcare Research Scholarship (PhD and MCI) was launched to provide support for young clinicians to develop further research capabilities and to act as a first step for them to pursue a career in research. In addition, the NMRC Research Training Fellowship aims to provide doctors with the training necessary to become clinician-scientists. This can include overseas research training or pursuing

a graduate degree in research at a local or overseas institution. The award is available to medical doctors and dental surgeons registered with the Singapore Medical Council or Singapore Dental Board, as well as allied health professionals and biostatisticians who support TCR. Recipients of the fellowship receive salary and tuition fees for local graduate degree programmes, or allowances and other benefits in line with the host institution's policies for overseas research attachments.

HUMAN CAPITAL AWARDS

Recognising the achievements of clinician scientists who had devoted time and effort to TCR, MOH launched the Clinician Scientist Award (CSA), Singapore Translational Research (STaR) Investigator Award, Transition Award and Clinician Investigator Salary Support Programme to provide salary and research grant support to such individuals.

The Singapore Translational Research (STaR) Investigator Award, started in 2008, is a prestigious award which recognises and supports investigators with outstanding qualifications and track records in TCR. The STaR award includes funding for the researcher's salary, an annual budget for research support and a one-time start up grant.

The Clinician Scientist Award (CSA) was rolled out in 2007 to provide adequate salary and funding support for selected outstanding clinician-scientists who possessed a consistent record of excellence in research, to enable them to carry out internationally competitive and influential TCR. The award which is funded by the National Research Foundation (NRF) and administered by NMRC, consists of two categories: Senior Investigator (SI) and Investigator (INV). The former caters to senior doctors who are already actively involved in highly productive research and hold at least one peer-reviewed active research grant. They will be funded for a period of five years under the scheme. The latter category caters to younger doctors with the potential of becoming independent investigators and who wish to develop a career in TCR.

Launched in September 2011, the **Transition Award** provides research funding and salary support for budding clinician scientists who have just completed formal research training. This award is designed to help them build up their research capabilities by facilitating their transition to a stable, independent research position, which in turn will enhance their ability to successfully obtain independent research support. The Transition Award is non-renewable as awardees are encouraged to apply for national-level independent research grants after obtaining this award.

RECOGNITION FOR THE MEDICAL COMMUNITY IN SINGAPORE

In order to recognise the research work of clinicians and clinician-scientists, and support advancements which improve patient safety and quality of care, the NMRC was involved in initiating a series of Ministry-level awards called the National Medical Excellence Awards (NMEA) in 2008. The awards provide the opportunity to celebrate the contributions of individuals and teams in the area of clinical and research excellence, who will be excellent role models for the younger generation of clinicians and clinician researchers. The Minister for Health is the patron for the award.

The NMEA platform currently has six award categories. They are:

- National Outstanding Clinician Mentor Award (started in 2008)
- National Outstanding Clinician Award (started in 2008)
- National Outstanding Clinician Scientist Award (started in 2008)
- National Medical Excellence Team Award (started in 2008)
- National Outstanding Clinical Quality Activist Award (started in 2010)
- National Outstanding Clinical Educator Award (started in 2011)

Creating a Positive Research Environment

To ensure clinician scientists are able to work in conducive research environments, funding support in the form of Block Grants were awarded to institutions to further the development of their research capabilities and expertise. They were divided into two categories—Institutional Block Grants (IBGs) and Enabling Grants (EGs) and were provided on an annual basis without a formal peer review process. The focus of IBGs was on developing core manpower and research facilities in restructured hospitals and public research institutions. EGs, on the other hand, aimed to nurture a research culture through grants for clinical trials and pilot studies.

NMRC replaced the IBGs/EGs with the Centre Grants (CG) in 2009 with the aim of allowing for greater accountability for the funding. The CG funding mechanism was referenced closely to the National Institutes of Health's (NIH's) Centre Grant funding scheme and encompassed a competitive peer-reviewed process.

Centre Grants (CGs) are institution-centric grants intended to support a research programme in which a team of investigators works on a clearly defined central theme of mutual scientific interest. Encouraging a stable, long-term institutional focus on a complex set of problems, CGs foster collaborative and mission-driven environments that bring together multidisciplinary teams with the diverse expertise needed to capture and rapidly translate new and emerging ideas into clinical benefits. This team approach stimulates scientific creativity and speeds up new developments in ways that would not have been possible with individual investigators working in relative isolation.

Over the past ten years, Singapore has become home to a growing population of leading clinician-scientists and researchers, both local and foreign. The country continues to actively invest in its infrastructure to continue its development as a leading regional and global hub for the Biomedical Sciences. To promote the

development of world-class facilities to support cutting-edge medical research, NMRC funds various projects through its infrastructure grants programme. These include infrastructure grants for two research buildings

and two investigational medicine units at the National University Health System and SingHealth clusters, the Singapore Clinical Research Institute and the Centre for Biomedical Ethics.

Translating Knowledge from Bench to Bedside

As part of Singapore's efforts to strengthen TCR capabilities, MOH has increasingly emphasised the role of health services research (HSR) in policy and practice. HSR has a relatively short history in Singapore. Although HSR work had quietly existed in one form or another for many years (e.g. supporting hospital or service planning via operational research in institutional settings), it was only in recent years that formal organisational structures were set up to support and develop HSR activities locally.

HSR COMPETITIVE RESEARCH GRANT

A new HSR Competitive Research Grant was implemented in 2009 and was endorsed under Phase 2 of the Biomedical Sciences initiative as one of the areas of health research to be supported. The HSR Grant provides funding of up to \$1 million per project for research on the factors (e.g. social, financial system, organisational structure and processes, health technologies and personal behaviours) that affect the effectiveness of the health care delivery system, access to healthcare, health outcomes and quality of life. The HSR Grant is a major step towards enabling the HSR sector in Singapore, and addresses the lack of a dedicated funding enabler to support researchers interested in HSR work.

To ensure a more focused approach towards funding HSR studies, a list of Strategic Areas and Yearly Themes is published to prioritise and highlight research areas of national importance. This list is updated regularly to capture emerging issues and updates in national priorities. Although research proposals are not restricted only to these themes, such an approach encourages greater alignment to national priorities with higher

potential for translation of findings into policy and implementation. Research proposals that are selected will be matched to the relevant policy division in MOH, so that the policy division can guide or provide inputs to the research team, where necessary, to further increase the relevance of the research for policy considerations.

A HSR New Investigator Grant was also launched on November 2012 to build research capability among new HSR investigators. Unique features of the HSR New Investigator Grant include an expedited review process and the requirement of the investigators to have an experienced mentor. The inaugural grant call received 18 applications from new researchers.

As of December 2012, there have been seven rounds of Grant Calls, and a total of 162 proposals have been received. Twenty-three have been shortlisted for award consideration. Annex A lists some examples of selected proposals and the strategic areas that they contribute to.

DIRECTION GOING FORWARD

With the key enablers for health research being progressively put in place over the last decade, a firm foundation has been laid for moving health research in Singapore to greater heights. The next phase requires MOH to better coordinate the various health research grants awarded by the Ministry and to more proactively reap the rewards of these research studies by aggressively promoting the translation and application of research knowledge into policy formulation and implementation.

Annex A – Examples of selected proposals under the HSR Competitive Research Grant

S/ No.	Title of project	Institution of principal investigator	Strategic area/ yearly theme	Contribution to health policy and practice
1.	Can digital technology be in the frontline battle for obesity: a multi-platform assessment of the role of digital technology in the communication of health information and health education of young Singaporeans	NTU	Public health/ Strategies in preventing and management of obesity	Study seeks to understand the intervention techniques which increase young people's internalisation of anti-obesity messages. This contributes to health communication strategies and policies. Interventions found to be effective can be put in place at suitable channels (homes, schools, hospitals etc).
2.	There is nothing more practical than a good theory: using the theory of planned behaviour to develop and evaluate an intervention to increase physical activity participation during leisure time among young Singaporeans	NTU	Public health	Study seeks to understand theory-based interventions to promote physical activity behaviour among young people in Singapore. If validated, the theory of planned behaviour provides a systematic psychological approach to developing and evaluating health promotion messaging
3.	Breast screening and ductal carcinoma in situ (DCIS) – an overdiagnosis?	SGH	Public health	Study seeks to understand DCIS diagnosis, and whether the screening results in over-diagnosis and hence over-treatment. Results from study would be useful for developing breast screening policies and treatment protocols for DCIS-diagnosed women.
4.	Cardiac arrest and resuscitation epidemiology in Singapore: comparison of outcomes with Implementation of systems status plan (CARE IV)	SGH	Care transition/ ED services (including pre-hospital emergency care)	Study seeks to understand the impact of implementing a pilot systems status plan on the response times and survival outcomes for emergency medical services for patients with cardiac arrest (and other subgroups). If successful, the study will help to improve efficiency in deployment of ambulances, leading to improvement in ambulance response times and clinical outcomes for cardiac arrest and other critical conditions.
5.	The health, social and financial effects of care-giving among primary caregivers of elderly stroke patients in the first post- stroke year: a prospective cohort study	NUS	Chronic disease management/ Improving care integration for stroke	Study seeks to assess the health, social, and financial effects of care on stroke patient caregivers from stroke onset to one year post-stroke. The study would illuminate the extent of care-giving burden, and contribute to policy formulation for developing interventions to alleviate caregiver burden, extend care at home, and reduce premature institutionalisation of stroke patients.

S/ No.	Title of project	Institution of principal investigator	Strategic area/ yearly theme	Contribution to health policy and practice
6.	A human factors analysis on handover in the hospital - how can the critical information of patient be transferred effectively and efficiently during the shift change?	NTU	Patient safety	Study seeks to increase patient safety by reducing the errors committed during clinical handover of shifts by doctors, through proto-typing an electronic handover system. If successful, the study can improve clinical handover process and contribute to design guidelines for handover systems.
7.	Cost-effectiveness of home-based medication reviews in reducing health services utilisation and drug-related problems and improving health-related quality of life among multi-ethnic elderly Singaporeans.	NTU	Patient safety/ Medication safety	Study seeks to increase patient medication safety by understanding the role of community pharmacists in addressing this gap in the health delivery system. If successful, the study can provide a model for closer collaboration between GPs and community pharmacists, and illuminate insights on home-based medication reviews for policy consideration.
8.	Colonoscopy quality and safety in public hospitals in Singapore	NUH	Patient safety	Study seeks to evaluate the quality and safety of colonoscopy procedures in Singapore through the use of automated IT processes. Findings from the study will help inform policies and practice to improve patient safety.
9.	Evidence based postoperative monitoring stratification protocol - use of the surgical risk score (SRS) to enhance monitoring capabilities	NUH	Patient safety	Study seeks to develop an evidence-based postoperative monitoring stratification protocol to help improve resource allocation based on patient status. If successful, patient safety and postoperative outcomes can be improved with appropriate matching of intensity of monitoring to anticipated recovery progress.

Chapter

7

Healthcare Manpower Standards and Development

“ The challenge for the profession is to stay abreast of new developments, and to maintain competency and currency so that we may offer the most appropriate care for our patients. ”

Professor K. Satku,
3rd Mt. Alvernia Hospital Medical Conference, 2008



Healthcare Manpower Standards and Development

by: Dr Lau Hong Choon and A/Prof Mabel Yap

Key Milestones in the Medical Profession

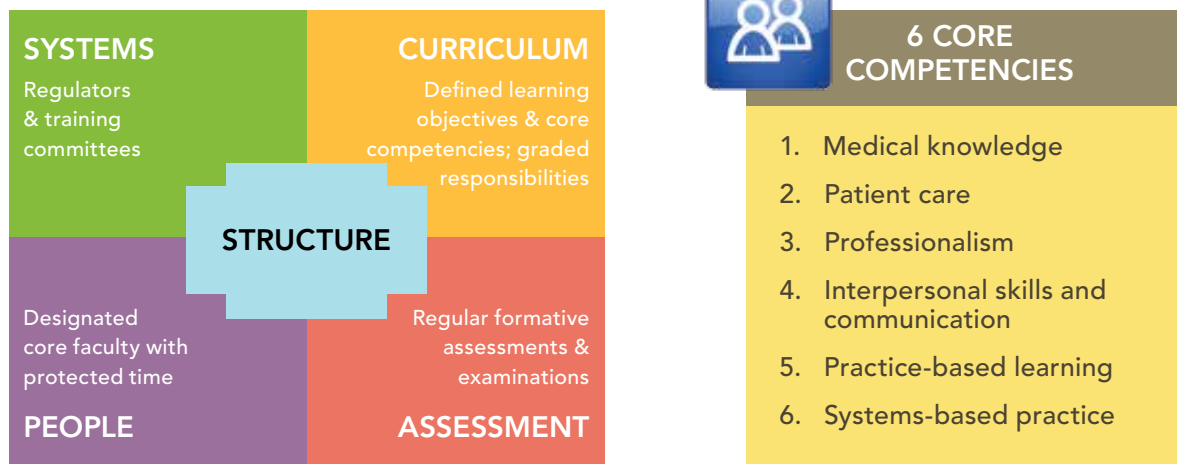
MEDICAL RESIDENCIES

Quality graduate medical education is critical for producing first-rate clinicians. In 2006, a review led to a transformation from the traditional UK-style apprenticeship system of training to a more structured US-style residency in collaboration with the Accreditation Council of Graduate Medical Education – International (ACGME-I). Our healthcare institutions responded swiftly to the changes with the formation of three Sponsoring Institutions (SIs).

The key features of residency encompassing the six core competencies of training are (Figure 1):

- a) Curriculum:
Clearly defined competency- based curriculum
- b) Assessment:
Regular formative assessment of residents
- c) People:
Dedicated time for faculty and residents
- d) Systems:
Rigorous accreditation of training programmes

Figure 1: Medical residency – structured formative training



There was a shift to a structured competency-based system with clear learning objectives and formative assessments. Learning experiences based on the curriculum and regular panel assessments of the six competencies grade each resident's progression and enable progressive responsibilities and attainment of core competencies at each stage of learning. It was noted that the examination system was a cause of delay in doctors' progression and attrition from training; the new regular formative evaluations helped residents identify gaps in learning and advance along the required competency trajectory.

Supporting structures were put in place. Funding¹ provided allowed clinicians who were designated as core faculty to have protected time to plan, teach and carry out their residency-related duties. Residents were also allocated protected time for learning. Faculty development and training was started and encouraged -- this led to a paradigm shift with the growth of educational careers and advancement among the SIs.

The previous system of training committees functioning on a national level without strong oversight at the institutions was replaced. Clear institutional structures (such as regulators, training committees and training offices with Designated Institutional Officials, Programme Directors and Programme Coordinators) were set up to address what is needed for sustainable and successful teaching. While national level Residency Advisory Committees (RACs) continued to provide guidance on the development and training of the specialty, individual SIs developed organisational

structures to ensure the delivery of quality graduate medical education.

In response to growing concerns regarding the feasibility of the residency system, many engagement sessions were held with clinicians, educators, medical students and young doctors entering the new training system to inform and clarify. There was also a need to assuage any anxiety arising from the systemic changes. By July 2010, seven Phase 1 specialties and their programmes were launched, followed by another seven Phase 2 specialties and their programmes the following year. The final Phase 3 senior residency specialties and their programmes will commence in 2013.

NEW MEDICAL EXAMINATIONS – COLLABORATION WITH THE AMERICAN BOARD OF MEDICAL SPECIALTIES

Specialist examinations entered into a new phase in Jan 2012 as MOH signed an agreement with the American Board of Medical Specialties (ABMS) to jointly develop postgraduate specialist examinations for Singapore. Specialist examinations for three specialties, namely internal medicine, paediatric medicine and pathology, will be ready by 2013. The new examinations will complement the residencies and the in-training examinations as part of the formative learning system. In collaborating with ABMS, the elements of assessments relevant to Singapore will be retained such that ultimately 20% of questions will be local and 80% international. Appointed examination workgroups from the relevant specialties are actively involved in this collaboration.

¹ \$120 million was secured to support this initiative over a period of five years. Key costs included funding to increase manpower and ensure protected teaching time, and consultancy charges in its genesis and administrative oversight. Outcome measures include training feedback from residents, fresh hires to backfill, and working schedules documenting the required hours spent on teaching.

CENTRALISATION OF DOCTORS

By 2008, cluster-based employment of doctors had presented its own set of problems. These included differences in case-mix resulting in diverse training quality, barriers to specialty training, and underutilisation of training capacity. It was decided that the employment of doctors should be under a single body, namely Ministry of Health Holdings (MOHH), with an oversight committee comprising members from all stakeholders to facilitate the implementation.

The centralised employment of House officers (HOs), Medical Officers (MOs) and Advanced Specialist Trainees (ASTs) by MOHH occurred in two phases in January 2010 (HOs, MOs and non-registrar ASTs) and May 2010 (all newly-appointed registrars). Engagement sessions were held with the respective stakeholders to address concerns with the centralised employment. The process was made as seamless as possible, with the creation of a single IT platform and the harmonisation of compensation, benefit packages and performance management frameworks across clusters. The central management of doctors continues to ensure streamlined allocation and fair distribution of resources nationwide.

Key Milestones in the Training and Development of Healthcare Professionals

DEVELOPMENTS IN THE TRAINING OF NURSES

Master of Nursing

In 2003, the Division of Graduate Medical Studies at the Yong Loo Lin School of Medicine, National University of Singapore (NUS), launched the 18-month Master of Nursing programme for the training of Advanced Practice Nurses (APNs). The programme was handed over to the Alice Lee Centre for Nursing Studies (ALCNS) in 2009, which by then had established a strong faculty to manage a spectrum of tertiary nursing education from Bachelors to PhD programmes. The course was subsequently extended to two years to enable reflection and assimilation of the intense academic requirements. Graduates were also required to complete their one-year internship and certification assessment to become APNs.

Bachelor of Nursing

The need for an undergraduate degree to develop nursing leaders was evaluated by a multi-agency Nursing Degree Workshop formed at the end of 2003. This culminated in the setting up of the Bachelor in Science (Nursing) programme at the ALCNS in 2006, a three-year pre-registration programme with an additional honours year for top students. The inaugural batch of 25 students was selected from the A-level cohort and subsequently opened to top diploma graduates to increase the intake to the current 100 students per year. It was designed as an outcome-focussed programme placing emphasis on clinical competency, research skills and leadership.



Nurses' Day Celebrations. High calibre nurse clinicians, educators, researchers and leaders are needed to take the profession to the next level.

To complement the supply of highly-trained nurses, the University of Manchester and Singapore Institute of Technology (SIT) established a partnership to offer a two-year full-time conversion nursing honours degree programme in 2011. The programme, with an initial intake of 48 students, focused on advancing professional competencies aligned with national health needs for long term and palliative care to develop a pipeline of nurse leaders for the healthcare system.

On the whole, there has been significant progress in advancing the education pathways for the nursing workforce in the last decade and we continue to strive to produce high calibre nurse clinicians, educators, researchers and leaders to take the profession to the next level.

ALLIED HEALTH PROFESSIONALS – FROM DIPLOMA TO DEGREES

Prior to the development of local training programmes, the majority of our allied health professionals (AHPs) were trained overseas. Although the professionals advocated a degree level programme, the urgency to train more such professionals in the 1990s led to the establishment of diploma programmes at Nanyang Polytechnic for four significant groups of Allied Health professionals. To ensure that applicants who were admitted were pitched at the right educational competencies, 'A' levels was required for entry into these programmes in Physiotherapy, Occupational Therapy, Diagnostic Radiography and Radiotherapy.

Although technical skills development was strong in the diploma programmes, competencies in critical analysis and research were more traditionally developed in universities and hence would be best delivered in a university programme. Various options were then considered and with MOE's establishment of the Singapore Institute of Technology (SIT), the Allied Health programmes could now connect to degree

programmes offered by reputable overseas universities for our local diploma graduates. Collaboration with Trinity College Dublin led to the launch of the first local degree upgrading programmes for Physiotherapists and Occupational Therapists in 2012. With SIT being the fifth publicly-funded University, we are now realising our goal of full local degree programmes for the AHPs.

HEALTH MANPOWER DEVELOPMENT PLAN (HMDP)

The Health Manpower Development Plan (HMDP)² which was introduced in 1980 has been strengthened to include mental health programmes, team-based programmes; funds were also provided for specific groups e.g. medical social workers (MSWs).

In FY2009, funds were also apportioned for team-based programmes to allow hospitals to award teams with relevant programme proposals which were aligned to their hospital objectives. Funding was provided to support the development of leaders and enhance professional skills required to meet national healthcare needs.

² The HMDP which was introduced in 1980 comprises two schemes. HMDP Fellowships are awarded to outstanding healthcare professionals (including doctors, dentists, nurses, pharmacists, allied health professionals) and administrative staff to pursue programmes at renowned overseas institutions. The HMDP Visiting Experts Scheme provides funds for overseas experts to be brought to Singapore to impart their skills and share their knowledge to help improve our local expertise in the respective disciplines. The schemes have helped health teams to meet and benchmark themselves against international standards and support new capability development in our healthcare system.

Specialisation

MEDICAL SPECIALISTS

Changes in Framework of Specialists Accreditation

The Specialists Accreditation Board (SAB) was established in 1998 under the Medical Registration Act (MRA) to accredit medical specialists in Singapore. In its initial years, SAB primarily dealt with locally trained doctors, with overseas trained counterparts reviewed on a case-by-case basis under broad guidelines drawn by appointed Specialists Training Committees (STCs).

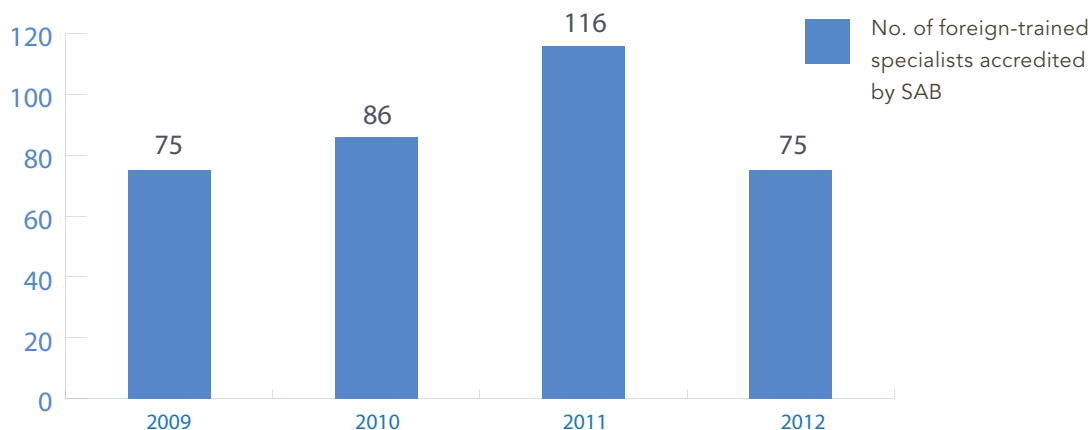
The first framework for accreditation was established by the SAB in Jan 2005 to recognise overseas-trained specialists from developed countries (e.g. the USA, UK, Australia, New Zealand and Canada). However, given the continuous demand of specialist care, we needed to consider expanding to encompass trained specialists from less well-known countries. The framework was revised in 2007, and again in 2009, to include EU-trained and highly experienced or renowned specialists

from Non-Traditional Sources (NTS). The expanded framework also introduced supervisory requirements and restrictions based on the training and scope of their practice as part of the specialist registration process. The MRA was amended in December 2010 to accommodate the changes in the framework of specialist accreditation, which also included changes to empower the SAB and Singapore Medical Council (SMC) to accredit and register these specialists in their subspecialty fields³. The number of new foreign trained specialists accredited per year since 2009 is depicted in Figure 2. The majority of these accredited specialists were trained in traditional countries such as UK, USA, Australia and New Zealand.

In 2012, SAB introduced dual accreditation in Internal Medicine with its related specialties, and in Hand Surgery with Orthopaedic/ Plastic Surgery. Fragmentation of care for patients had led the Specialists Accreditation Board to introduce dual accreditation and subspecialties.

³ In 2007, the first four subspecialties recognised - namely Sports Medicine, Palliative Medicine, Neonatology and Intensive Care Medicine - accepted their first trainees.

Figure 2: Number of foreign trained specialists accredited by SAB, 2009-2012



DENTAL SPECIALISTS

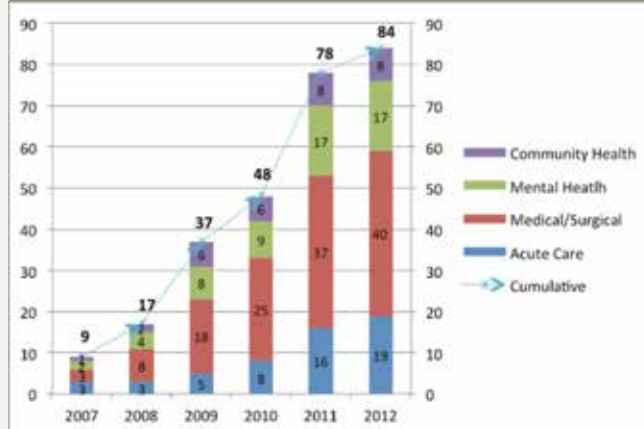
To enable the public to better identify the dental specialists in various areas of dentistry, the Dental Registration Act and Regulations were amended in 2008 to accommodate the establishment of the Dental Specialists Register. As of 2012, we have recognised seven dental specialties, namely Endodontics, Dental Public Health, Oral & Maxillofacial Surgery, Orthodontics, Paediatric Dentistry, Periodontology and Prosthodontics. Approximately 17% of registered dentists have registered as dental specialists, with the majority in the private sector.

To implement these changes, the Dental Specialist Accreditation Board (DSAB) was set up to review the specialty groups of the Dental Specialists Register, appoint the Dental Specialist Accreditation Committees (DSACs) for the various specialties, oversee their functions and approve the recommendations made by them.



Graduate teaching on orthodontics

Figure 3: Distribution of APNs in the four branches of nursing



ADVANCED PRACTICE NURSES

The Advanced Practice Nurse (APN) register and certification requirements were established through the Nurses & Midwives Act in 2006. APNs were certified in one of four specialised branches of nursing in acute care, medical/surgical, community care and mental health. A target was set in 2003 to develop 200 APNs by 2014 and we are on track, with 84 registered APNs (Figure 3), 51 undergoing internship and 49 undertaking the Master of Nursing programme.

APNs are highly-trained clinical nurses who are important to the healthcare team. Besides the hospital setting, they are also greatly valued in primary healthcare/polyclinics, Intermediate and Long-term Care (ILTC) institutions and palliative care settings.

The APN track was set up in 2008 and will build on the existing clinical career track which was established in 2001. To recognise the additional clinical responsibilities which APN undertook, restructured institutions followed though with APN allowance schemes in the same year.

PHARMACY SPECIALISTS

The journey towards specialisation for pharmacists began in 2002 when the former Singapore Pharmacy Board established a workgroup to define and set the criteria for pharmacy specialisation. Postgraduate pharmacy programmes were developed to build up the capability of clinical pharmacists in Singapore. In 2009, NUS started the Doctor in Pharmacy (PharmD) programme to train pharmacy practitioners in leadership qualities and advanced pharmacy expertise. Concurrently, pharmacy residency training programmes were developed, with Infectious Diseases and Oncology being the first two programmes locally.

To equip pharmacists with the right skills and advanced knowledge to meet healthcare needs, MOH set aside S\$7 million to fund scholarships from FY2008-12 for postgraduate education and to support specialist training. Experts from the American Society of Health-System Pharmacists (ASHP) and American College of Clinical Pharmacy (ACCP) were invited to share their expertise and assist with the development, implementation and future accreditation of the residency programmes.

The Specialists Accreditation Board for Pharmacy (PSAB) was also formally appointed by the Minister for Health in February 2012 to define specialties and to determine the requirements for specialist registration.



The Pharmacists' Pledge Affirmation Ceremony

Legislative Highlights

In line with changing patient's expectations, advances in medical sciences and the evolving role of healthcare professionals, legislation governing healthcare professionals must continually be reviewed in order to safeguard the interest of the public. Since 2001, the Ministry has introduced various amendments to a number of Acts governing the healthcare professionals. New Acts were also promulgated to address new challenges (Annex A). While MOH as a regulatory body has the prerogative to put in place various measures to ensure public safety, it has become increasingly evident that a robust consultative exercise involving relevant stakeholders must take place. Calls for transparency in regulatory proceedings and processes also reflect the sentiments of a better informed public.

AMENDMENTS TO THE MEDICAL REGISTRATION ACT

In 2003, various amendments were made to the Medical Registration Act (MRA) to ensure that doctors remained current in their medical knowledge and capable to carry out their roles as healthcare providers. These include mandatory participation in Continuing Medical Education (CME) activities in order to be granted a Practising Certificate and the provision for an Interim Orders Committee (IOC) under the SMC with the power to suspend or order a restricted registration for a doctor under investigation. It was also in 2003 when the list of medical schools recognised under the MRA was expanded from 24 to 71. By 2009, this number had risen to 160 schools and has remained so till the present time.

In 2010, key changes were made to the MRA including the strengthening of SMC's disciplinary proceedings and orders, as well as the formation of a Family Physicians Accreditation Board (FPAB) and the Register of Family Physicians. This was to raise the standard of Family Medicine practice in Singapore. The Register was formally established in 2011.

New provisions incorporated to strengthen disciplinary proceedings included the participation of individuals with experience in legal matters. Hence a senior legal officer, senior lawyer, former Supreme Court Judge or Judicial Commissioner, could be appointed to chair the disciplinary tribunals. This was in recognition of the increasing complexity of complaints against doctors. SMC Complaints Committees (CC) were allowed to appoint officers to investigate complaints and seize evidence, in addition to the exculpatory statements and medical records submitted by the doctor.

In addition to issuing letters of advice or warnings, the SMC CC can also order registered medical practitioners to undergo medical or psychiatric treatment, further training, or to take advice in relation to practice management. With the agreement of the doctor, SMC CC can deregister, suspend (for not more than 3 years), or place restrictions and conditions on the doctor's practice. SMC can also refer complaints for external mediation to facilitate resolution amongst the parties concerned.

AMENDMENTS TO THE DENTAL REGISTRATION ACT

Legislative amendments were made to the Dental Act to ensure that the laws continue to be relevant to the practice of dentistry today, by recognising and regulating the work of dental specialists and oral health therapists; and to enhance the role and processes of the Dental Council to enable it to perform its regulatory functions more effectively. The amendments also allowed for the introduction of compulsory continuing professional education so that the Council can raise and maintain professional standards of dental practice

To cope with the increasing demand for dental care, a new Register of Oral Health Therapists was also set up. Oral Health Therapists work in conjunction with dentists in providing dental care to the public and are categorised into Dental Hygienist, Dental Therapist and Dental Hygienist/Therapist based on the respective work/job scopes.

AMENDMENTS TO THE NURSES AND MIDWIVES ACT

The Nurses and Midwives Act was amended in 2005 (date of commencement in 2006). The amendment provided for the regulation and certification of Advanced Practice Nurses (APNs) to practise in extended nursing roles to manage patients with complex health problems.

One major change was providing for the Director of Medical Services (DMS) or his representative to be a member of the Board. This made way for SNB to have its first nurse to be appointed as its Chairman. Mrs Nellie Tang, a veteran nurse was formally appointed as Chairman in 2006.

Another change included increasing the range of disciplinary actions that the Board might take and the decriminalisation of certain minor offences. Prior to this, SNB did not have the power to impose fines for offences. In addition, the Board was empowered to prescribe conditions for the granting or renewal of

practising certificates. One of such provisions was to require continuing education as a condition for renewal of practising certificates, starting with the APNs, which was made mandatory at onset.

The Board was also granted powers to disclose information where relevant to prescribed persons requesting for information/data, such as other government bodies, institutions, organisations. Under the amendment, the Board was also given the flexibility to invest its funds in fixed deposits or other suitable investment portfolios.

AMENDMENTS TO THE PHARMACISTS REGISTRATION ACT

The Pharmacists Registration Act 2007 came into effect on 1 September 2008 and aimed to help raise the practice standards of pharmacists and to ensure that the laws remained relevant to the practice of pharmacy. The Singapore Pharmacy Council was established as a statutory board, with enhanced powers to enable it to perform its regulatory functions more effectively. To achieve economies of scale and better management, common services were amalgamated in the professional boards under the guidance of MOH.

The groundwork to prepare pharmacists for compulsory continuing professional education (CPE) was laid in advance through voluntary reporting of activities introduced in November 2005 and briefing sessions by the former Singapore Pharmacy Board. CPE guides were issued to pharmacists and CPE providers from 2006. A public consultation on the draft Pharmacists Registration Bill in June - July 2007 found that the majority of respondents, comprising pharmacists and the public was favourable to compulsory CPE.

Provisions for a separate register for specialist pharmacists and the registration of such specialists were put in place in 2007. The Specialists Accreditation Board for Pharmacy was appointed by the Minister for Health in February 2012 to define specialities and determine the requirements for specialist registration. Among others, the challenges of developing pharmacy specialisation were in identifying areas to be recognised as a specialty based on patient needs and not inadvertently fragmenting care, and developing a training framework to meet the specialist accreditation standards.

INTRODUCTION OF THE OPTOMETRISTS AND OPTICIANS ACT AND THE ALLIED HEALTH PROFESSIONS ACT

AHPs and optometrists were previously self-regulated through their professional bodies. However, as membership to these professional bodies was voluntary, these professions faced increasing challenges over self-regulation as their numbers grew, and when services provided extended beyond the traditional health care settings.

The Optometrists and Opticians Act and the Allied Health Professions Act were passed in Parliament in 2007 and 2011 respectively. The key impetus for the Ministry to move these Acts was to protect the interests of the public and provide assurance of the quality of care. The Ministry also had to consider the impact of regulation, whether it would adversely affect the cost and access to care, or impose unnecessary administrative and regulatory requirements on the professionals and the industry.

Statutory regulation raises the profile and recognises these professionals. At the same time, it will raise professional standards as registration will be mandatory. Since the Optometrists and Opticians Act was introduced, the optometrists and opticians have sought to upgrade and up-skill and offer better services to the public.

ACKNOWLEDGEMENTS

A/Prof Patrick Tseng

Dr Pauline Tan

Ms Lita Chew

Ms Elaine Teo

Annex A: Legislation and revised legislation governing healthcare professionals for the period 2001 – 2012

Date of commencement	Significant amendments
Medical Registration Act	
<p><u>3/4/1998</u> An Act to provide for the registration of medical practitioners and for matters concerned therewith.</p>	<p><u>1/12/2010</u> The Act was amended to address four key objectives: (a) to strengthen and streamline SMC's existing disciplinary processes to cope with the increase in the number and complexity of complaints and disciplinary proceedings; (b) to provide a wider range of orders and penalties which the SMC can impose, commensurate with the extent of a medical practitioner's wrongdoing and circumstances of the case; (c) to adopt a more nuanced approach to medical registration for both local and foreign-trained doctors; and (d) to set up a Register of Family Physicians.</p>
Nurses and Midwives Act	
<p><u>1/5/2000</u> The Act provides for the registration and enrolment of nurses, the registration of midwives and for matters connected therewith, and to repeal the Nurses and Midwives Act (Chapter 209 of the 1985 Revised Edition). It will enhance the regulatory role of the Singapore Nursing Board to allow it to discharge its functions more effectively and to ensure higher professional standards of conduct and practice.</p>	<p><u>1/4/2006</u> Legislative amendments establish a Register for Advanced Practice Nurses, so as to systematically develop the category of clinical nurses with a "Master in Nursing" degree, to contribute to our healthcare system. The Act includes provisions to regulate the certification, registration, professional ethics and conduct of Advanced Practice Nurses.</p>
Dental Registration Act	
<p><u>15/10/1999</u> An Act to provide for the registration of dentists and for matters connected therewith, and to repeal the Dentists Act (Chapter 76 of the 1985 Revised Edition). The Act also enhances the role of the Dental Council so that it can perform its functions more effectively and raise the standards of professional conduct and practice.</p>	<p><u>1/1/2008</u> The Act was updated to include the following new areas, including the introduction of compulsory Continuing Professional Education for dentists: a) Registration including Conditional and Temporary Registers to expand the regulation. b) A Register of Dental Specialists and the formation of the Dental Specialists Accreditation Board. c) An expanded list of recognised basic qualifications from 34 to 89, to include dental degrees of universities accredited by the Dental Associations of Canada and America. d) Changes to the disciplinary committee to include non-dentists as lay persons and a panel of Chairmen comprising senior dentists for the disciplinary committees. e) The setting up of the Interim Orders Committee (IOC), with the power to issue an interim suspension or other orders pending disciplinary proceedings.</p>

Date of commencement	Significant amendments
Dental Registration Act	
	<p>Further revisions were also made to the process to discipline errant dentists:</p> <ul style="list-style-type: none"> a) Empower a complaints committee to decide on its own motion to initiate an inquiry based on information received; b) Allow the Dental Council to direct that an inquiry be continued even if the complainant withdraws the complaint; c) Empower a disciplinary committee to refer information to the relevant authorities for further investigation if it believes that a criminal offence(s) has been committed; d) Increasing the maximum penalty to \$50,000; and e) Allow the Dental Council to compound offences⁴. <p>The Chief Dental Officer holds the position of Registrar of the Dental Council. Additional powers include the removing from the registers names of persons who had:</p> <ul style="list-style-type: none"> a) Not renewed their practising certificates for a continuous period of 5 years and who could not be contacted; or b) Shown sufficient reason for his name to be removed from the register.
Optometrists and Opticians Act (22/2/2008)	
An Act to provide for the registration of optometrists and opticians, to regulate their practices and to provide for purposes connected therewith. The Act repealed the Contact Lens Practitioners Act.	
Pharmacists Registration Act (1/9/2008)	
<p>An Act to repeal the Pharmacists Registration Act (Chapter 230 of the 1985 Revised Edition) and to re-enact it with amendments. The Act made provisions for the following:</p> <ul style="list-style-type: none"> a) Establishment of a new statutory board, the Singapore Pharmacy Council, with enhanced regulatory powers; b) Compulsory continuing professional education (CPE) for pharmacists; c) Establishment of the Pharmacy Specialists Accreditation Board and registration of specialist pharmacists; d) Introduction of conditional and temporary registration of pharmacists; e) Introduction of a more rigorous disciplinary proceedings framework; and f) Empowerment of the Singapore Pharmacy Council to prescribe compoundable offences and to compound such offences. 	
Allied Health Professions Act (Date the Act was passed in Parliament: 10/1/2011)	
The Act provides for the registration of prescribed allied health professionals for the protection of the health and safety of the public and for purposes connected therewith; and establishes a regulatory body, the Allied Health Professions Council, to register and regulate the allied health professionals, and prohibits false representation of these professionals.	

⁴ The Dental Council may, with Minister's approval, make regulations to prescribe the offences which may be compounded and, in its discretion, compound such (minor) offences.

Chapter

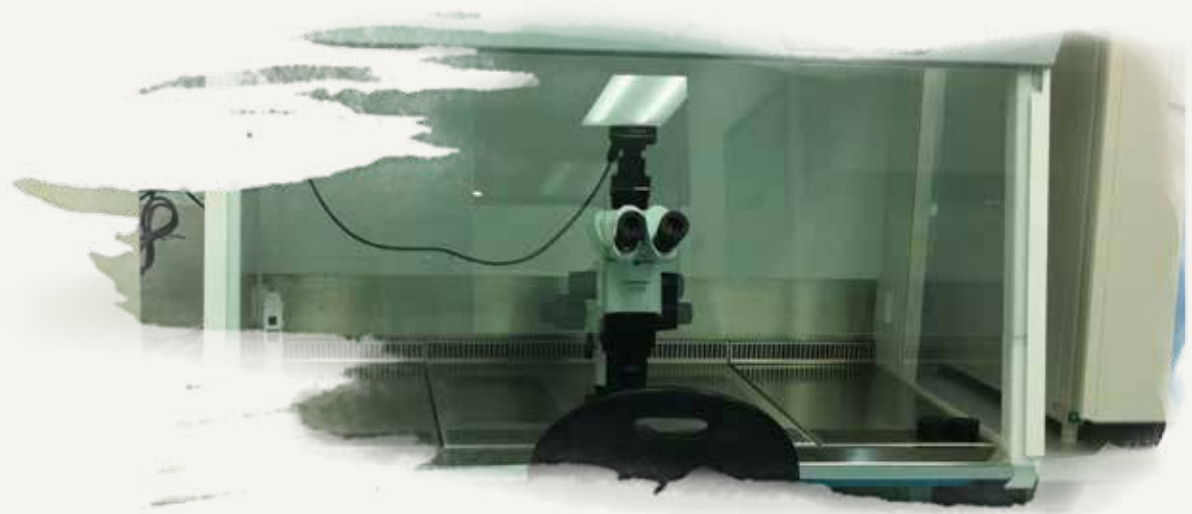
8

Health Regulation and Enforcement

“ As a regulator, MOH can build safeguards, incentives and disincentives into our health care system, but the good and honest professional never needs to fear the regulator. He never sees or feels the weight of the law. ”

Professor K. Satku,

The Singapore Medical Council Physician's Pledge Affirmation
Ceremony, 2006



Health Regulation and Enforcement

by: Dr Philomena Tong, Dr Harold Tan and Dr Arthur Chern

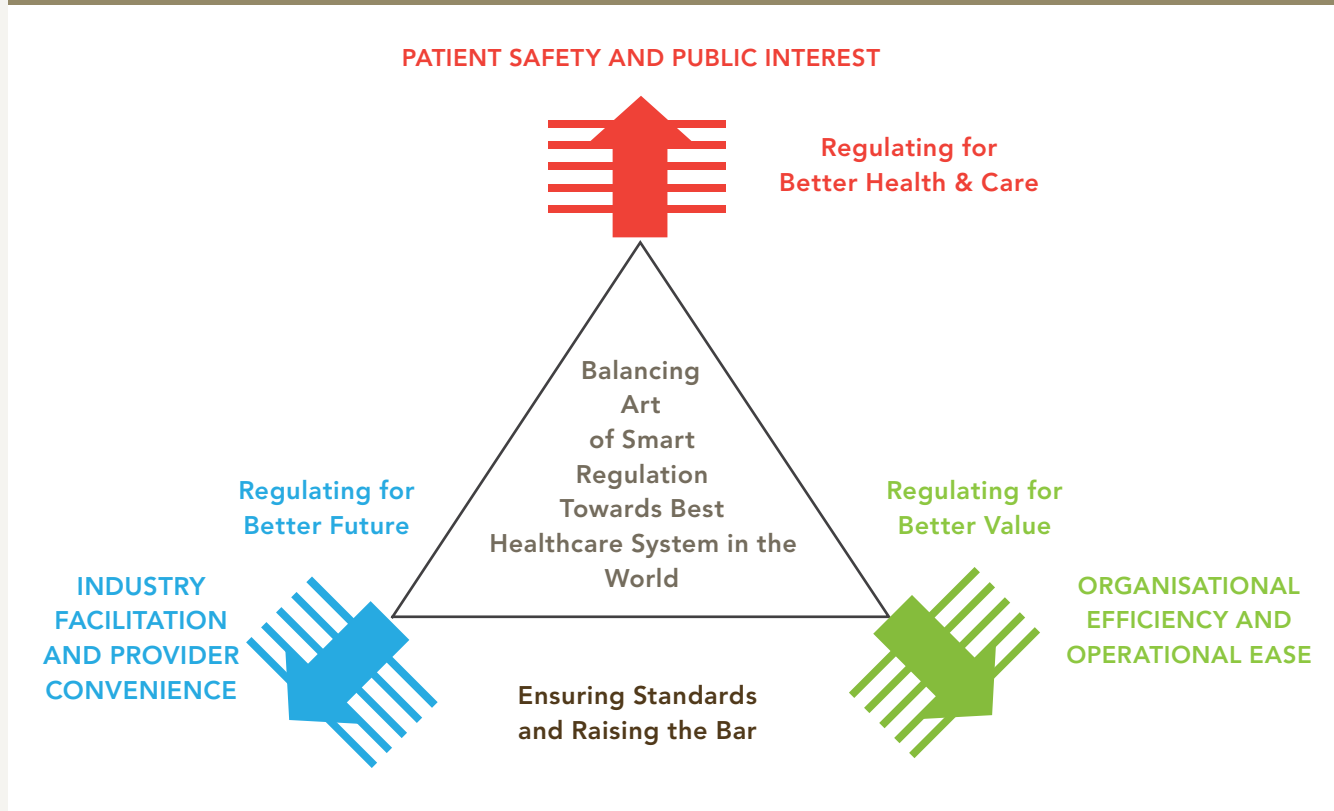
Similar to other developed countries, Singapore is experiencing a fast-changing healthcare landscape brought about by the continuing advancement of medical technology and services. Rapid advances in biomedical sciences and technology have resulted in the availability of a plethora of new treatments and methods of medical interventions. In order for the Ministry to meet this rising challenge, the regulatory framework must evolve to maintain care quality and high standards of patient safety

Evolution of Regulatory Philosophy

With the increasing complexity of the healthcare ecosystem, the evolution of the Ministry's regulatory approach has involved a fundamental shift in the role of the regulator as 'controller' to that of 'enabler'. Therefore, while health regulation continues to be

centred on ensuring patient safety and public interest, there is growing recognition by the Ministry that industry facilitation and organisational efficiency are also important strategic thrusts in its approach.

Figure 1. The 'regulatory triangle'



In achieving the delicate balancing illustrated by this 'regulatory triangle' (Fig. 1), the Ministry has looked beyond the traditionally legislative approach to regulation and over the years incorporated other regulatory tools to apply appropriate approaches to different issues to achieve optimal outcomes with the least resources. This has allowed the Ministry to be more agile and calibrated in its regulatory responses. Even where legislation remains the regulatory tool of choice, the Ministry's approach to the drafting and implementation of laws has evolved, such as through the use of 'umbrella' laws (e.g. the Health Products Act and National Registry of Diseases Act), which allow greater flexibility to introduce changes where necessary, especially in response to the changing healthcare landscape.

The Ministry has also embarked on another paradigm shift, moving away from regulating to set minimum standards and safety, and towards regulating to elevate quality and raise standards. More attention is also being given to the private sector to regulate the entire health system holistically. To guide and underpin these efforts, the Ministry will continue its work on developing a framework for 'smart regulation' through consistent risk analysis and management, and regulatory evaluation and monitoring. Smart regulation entails reducing the cost and burden of regulations and improving their quality by removing outdated or unnecessary aspects; and applying the appropriate tools for different issues through proactive and continual review of inputs from relevant sources and maintaining access to stakeholders for feedback.

Nursing Homes

Nursing homes are currently licensed every two years and subject to an inspection regime. Those which are not fully compliant with licensing terms and conditions could be inspected more frequently and licensed for shorter periods. Many nursing homes today suffer from nursing manpower and bed shortages. Most of these patients were discharged from acute hospitals but were unable to be nursed at home due to lack of family support and resources.

Despite the existing regulatory regime of licensing and inspections, the standards of nursing homes barely improved over the years. This was primarily due to the light-touch regulatory policy adopted by the Ministry. The problems of nursing homes were not limited to their physical environment. In 2010, the incident of patient abuse by nursing aides in Nightingale Nursing Home (NNH) came to light and highlighted the compromise in the standards of care of nursing home patients. A string of other issues such as medication mismanagement and poor care of tube-feeding patients further suggest that the problem in nursing homes was more serious than expected. The situation was made more complex by the saturation of nursing home beds, which rendered existing regulatory levers such as de-licensing threats futile.

The NNH incident and other emerging nursing home problems prompted the need to step-up monitoring of nursing homes. However, this was not possible given the lean regulatory resources. Furthermore, there was a need to manage public expectations of nursing home standards given the challenges faced by nursing home operators.

The Ministry decided to establish the Visitors Programme for Nursing Home. This programme taps on community resources to support the Ministry's role in safeguarding resident safety and improving standards. The Visitors would spend time talking to the residents and their family members to understand the living conditions and how the residents felt about the care received, as well as to observe the environment. It also serves as an additional safeguard against lapses in care or possible abuse. The Programme increases transparency of current nursing home standards as well as the regulatory process. Furthermore, the volunteers provide a fair and independent voice should there be a need to clarify any misconceptions of nursing care standards or the regulatory process.

The Visitors Programme is run on a voluntary basis and not intended to replace the existing regulatory

regime. However, all nursing homes are encouraged to participate in the programme. All nursing homes, regardless of whether they are participating in this programme will continue to be subjected to the licensing inspections and other relevant audits performed by the Ministry. To date, 41 out of 62 nursing homes have enrolled in the programme since its inception on 5 Apr 2012. The Ministry has mandated that poorly performing nursing homes such as Nightingale Nursing Home and Thian Leng Nursing Home participate in the programme, under the additional licensing terms and conditions imposed on them.

The volunteers who served as Nursing Homes Visitors were nominated by their Associations, Club, Grassroots and Professional Board from the public and private organisations such as Law Society of Singapore, Rotary Club of Singapore, Citizen's Consultative Councils (CCC), National Volunteer and Philanthropy Centre, College of Family Physician and Singapore Nurses Association. So far we have recruited 48 volunteer Nursing Home Visitors.

Prior to their visits to nursing homes, the Visitors are briefed on the purpose and expectations and to clarify any concerns. The briefings were held in nursing homes to familiarise them with the nursing home settings. The Visitors are scheduled to visit the nursing home in pairs or groups of three with a mix of lay persons and healthcare professionals (either a medical doctor or a registered nurse) in each team. The mixed backgrounds of Visitors enable the team to review the care provided from various perspectives. The team submits a group report to the Ministry after each visit.

Each visiting team is required to speak to at least 10 residents and /or their relatives, and each unannounced visit will last about two hours. So far the Visitors have highlighted concerns regarding food e.g. temperature and variety. The Visitors further observed that most of the care staff comprised foreigners who had difficulty communicating with the elderly residents.

It is too early to assess the impact of the Visitors Programme on the nursing home standards. A key issue is the saturation of nursing home services. If the demand continues to overwhelm supply, MOH's regulatory levers over the nursing homes will be limited. There is a need to subject nursing home operators (especially commercial for-profit providers) to commit to certain mandatory deliverables so as to maintain high nursing home quality. Besides licensing levers, one possible way to ensure compliance is to impose

security deposits on operators. These funds could be utilised should the operators be unforthcoming or uncooperative in implementing needed improvements

to their care standards. Part of the funds could also be used to provide for home-based care for residents who need to be decanted from a failing nursing home.

Assisted Reproduction Services



8 Cell stage human embryo (courtesy of Prof PC Wong, NUH IVF)

Assisted Reproduction (AR) technology is an artificial means of creating an embryo from sperm and egg in the laboratory, after which the embryo is implanted into the womb of the mother and carried to full-term pregnancy. The technology helps subfertile couples.

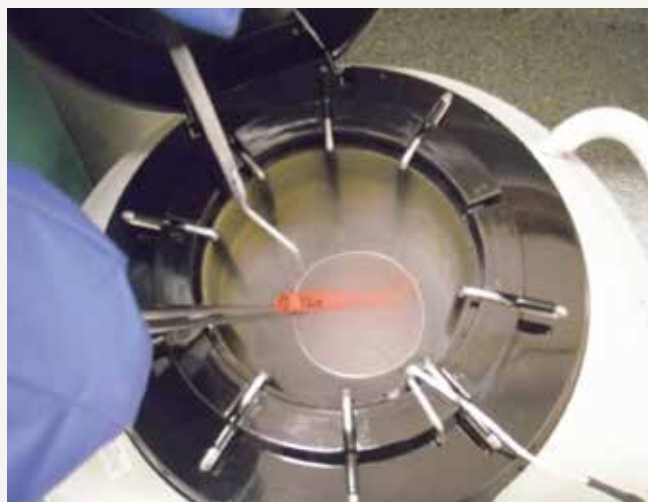
AR is regulated as a special care service under the second/third schedules of the Private Hospitals and Medical Clinics (PHMC) Regulations and requires approval for the special care services in addition to a medical clinic/hospital licence under the PHMC Act. The Directives for private healthcare institutions providing AR services were first issued by the Ministry in 1990. AR centres are inspected for compliance with the Directives before approval is given and biannually during the renewal of approval.

In November 2010, a mix-up in *in-vitro* fertilisation (IVF) in a private hospital was reported. The mix-up occurred as a result of procedural lapses and human error. The hospital was then suspended by the Ministry from initiating fresh AR cycles for a period of eight months.

The incident led to a review of the AR regulatory framework. On one hand, there was a need to maintain high standards, but on the other, there was a limit to the extent of regulation. It would not be possible to dictate, and mandate every step of the AR process, and ensure that these are enforced; there was also an element of human error that could occur during AR processes since many of the processes were not automated. As the number of local AR experts was limited, there was a need to leverage on expertise from other developed countries with more experience.

The Ministry subsequently required the hospital to complete an audit by an Australian certifying agency appointed by MOH before its suspension could be lifted. This was the key driver for subsequent changes, such as renovation of its existing facilities, revamp of its policies and processes and change of key personnel. The Ministry also reviewed the AR Directives and issued comprehensive new Licensing Terms and Conditions (LTCs) on AR services in April 2011. The requirement for external certification was extended to all other AR centres to ensure that AR standards in local centres were comparable with those overseas. The standards used are from the Australian Reproductive Technology Accreditation Committee (RTAC). This external certification is undertaken in addition to existing MOH inspections of the AR services.

The use of external certification is one way of raising the standards of local AR centres. However, this involves higher costs which may be transferred to patients. Neither external certification nor overly-prescriptive licensing conditions can completely eradicate the risk of future incidents due to human errors or momentary systemic lapses. It may be more practical to view AR errors as an inevitable reality – a trade-off for deviating from natural means of conception – and address such errors under a no-fault, quality assurance framework where hospitals and AR centres can undertake root cause analysis and implement corrective measures to continuously improve their processes without fear of being impeached by authorities or civil litigation.



Cryopreservation (courtesy of Prof PC Wong, NUH IVF)

Risk-Based Licensing Framework

Since the PHMC Act came into force in 1993, licences issued to healthcare institutions (HCIs) have been valid for a period of two years. This licensing framework, a “one-size-fits-all” regulatory approach, does not distinguish HCIs that require close regulatory monitoring from those that, on the basis of the nature of their operations and their compliance history, confer a lower risk to patients and therefore can be monitored less frequently.

To allow greater flexibility in its regulatory approach, the Ministry is moving towards risk-based licensing which aims to safeguard patient safety at a lower cost. It incentivises compliant licensees (good performers) as they would be given a longer licensing interval and would therefore have fewer inspection visits and incur lower licensing costs. It also allows resources to be focused more on the poor performers.

Under risk-based licensing, all HCIs are categorised into three categories – ‘high-risk’, ‘moderate-risk’ and ‘low-risk’ based on the nature of services they provide and the records of their prior compliance with licensing requirements. A demerit point system is used to quantify HCIs’ non-compliances (NCs) noted during inspection visits for risk assessment. The demerit points given to a NC are based on the severity of the NC (e.g. impact on patient safety) and whether the NC is a repeated offence.

HCIs assessed to be of low risk, such as medical clinics providing general medical services and all dental clinics with cumulative demerit points below a pre-determined threshold, will be given the option for a five-year licence. These clinics will be randomly audited within the five-year period to ensure that they remain compliant with the licensing requirements throughout the longer licensing period.

The ‘moderate-risk’ category or the ‘default category’ is catered for HCIs which are precluded from the five-year licensing period (e.g. all hospitals, nursing homes, laboratories, medical clinics providing special care/

specialised procedures). These HCIs will be eligible for a license of two years.

HCIs with services or practices carrying a high risk to patient safety will be issued a one-year licence. Medical clinics providing low evidence clinical services or with bad disciplinary records are included in this category.

Licensing fees have also been rationalised to better reflect the actual costs incurred in the licensing of HCIs with different risk levels. The ‘low-risk’ HCIs on a five-year license will incur less inspection cost and enjoy a lower average licensing fee per year. This will incentivise the ‘low-risk’ HCIs to remain compliant with the licensing requirements, and the ‘moderate-risk’ and ‘high-risk’ HCIs to improve on their compliance records.

The development and implementation of the risk-based licensing framework has demonstrated the need for the Ministry’s licensing system to stay abreast of the fast changing healthcare landscape and be responsive to the changing needs of the various stakeholders. The last decade has seen the total number of HCIs, which include hospitals, nursing homes, medical / dental clinics and laboratories, increase by 27%. The upward trend is likely to continue due to the growing and ageing population and the healthcare service providers’ efforts in meeting the demands of the different segments of the healthcare market. Migrating to a risk-based licensing framework is therefore one of the Ministry’s main strategic initiatives to address the increasing demand for licensing and inspection resources.

Moving forward, the challenge is to fine-tune the risk assessment process of the risk-based licensing framework so that more HCIs could be issued longer licence tenures without any compromise to patient safety and public interest. This will help optimise the resources required for licensing purposes and allow the Ministry to focus more attention on the emerging areas of regulatory concern.

Aesthetic Practices By Doctors

The practice of aesthetics among medical doctors has become increasingly prevalent over the last decade. Aesthetic practice involves procedures and/or medications prescribed by doctors to enhance a person's physical appearance rather than treat a medical condition. Unlike conventional plastic surgery, aesthetic practice often involves less invasive and less expensive modalities that could be provided in a general medical clinic setting. Examples of aesthetic practices include Botox injections, chemical peels and laser skin rejuvenation. This field of practice has not so far been regarded as a specialty or subspecialty.

As aesthetic practices flourish, several issues have surfaced. Firstly, increasing numbers of general practitioners and non-plastic surgeons have begun to practise aesthetics, even though the skills needed are not formally taught in medical schools or specialist training programmes. Such skills are usually picked up through short courses (usually lasting a few days) organised by commercial companies marketing the aesthetic devices/products. Hence, competency of practitioners and patient safety is an issue.

Secondly, certain aesthetic treatment modalities and equipment are unsubstantiated or supported by dubious scientific evidence. Unless doctors advise their patients appropriately, the public could be misled into believing that such services are part of mainstream medicine.

Thirdly, the increasing aesthetic practices brought with it a deluge of mass media advertisements with laudatory and soliciting claims made by aesthetic clinics. The advertisements medicalised traditional beauty services (e.g. spa, massage, facials); some beauty salons collaborated with doctors to help provide medical screening and justifications for beauty services. These developments adversely affected the dignity of the medical profession.

The Singapore Medical Council (SMC) Ethical Code and Ethical Guidelines (ECEG) advise doctors to offer treatments that benefit patients positively, to treat patients according to generally accepted methods, and not to offer patients management plans or remedies that are not generally accepted by the profession, except in the context of a formal and approved clinical trial. Under this regulatory regime, doctors who do not comply with the ECEG with respect to their aesthetic practices may potentially face disciplinary actions by the SMC. However, in the absence of specific guidelines on aesthetic practices, it was debatable whether aesthetic

practices, especially those with moderate scientific evidence, could be considered as "not generally accepted by the profession". Furthermore, there were no standards to guide doctors as to the level of competency required to perform each type of aesthetic procedure.

In 2008, the Ministry worked with the Academy of Medicine Singapore (AMS) and the College of Family Physicians Singapore (CFPS) to develop and implement the 'Guidelines on Aesthetic Practices for Doctors'. The guidelines were subsequently endorsed by the SMC and promulgated in 1 November 2008. The Aesthetic Practice Oversight Committee (APOC) was set up under the auspices of the SMC to regulate aesthetic practices by doctors. Essentially, the guidelines categorised aesthetic services into those that were evidence-based/generally acceptable to the profession ("List A") and those that were not ("List B"). Requisite qualifications and training requirements for performing various aesthetic procedures were also prescribed.

The practice of List A aesthetic procedures is largely self-regulated, and doctors are allowed to perform these procedures if they have fulfilled the requirements set out in the guidelines. Doctors who are found to be non-adherent to the requirements in relation to List A practices will be subject to disciplinary actions by SMC. However, List B aesthetic practices are regulated separately by the Ministry given the increasing popularity of low evidence-based aesthetic procedures since 2006. Specific licensing terms and conditions (LTCs) under the Private Hospitals and Medical Clinics (PHMC) Act were imposed on healthcare institutions offering such procedures. Since the implementation of the LTCs in November 2008, the Ministry conducted two rounds of audits at healthcare institutions offering List B aesthetic procedures, and noted that there was generally an improvement in the compliance with List B LTCs at the second round of audit.

With effect from 1 November 2008, the Ministry also put in place stringent LTCs to regulate the practice of liposuction, which is a form of high risk, invasive aesthetic procedure where fat is removed from a person's skin. Under this regulatory framework, the practice of liposuction is not protected under any specific medical specialty and the strict requirements apply across the board. As such, all doctors who wish to perform liposuction have to be accredited by the Accreditation Committee on Liposuction (ACL), adhere to common standards of practice and maintain the necessary competence in the interest of patient safety.

The Ministry, in conjunction with the ACL, further revised the LTCs in November 2010 to better safeguard patients' interests.

Despite the presence of the liposuction LTCs and 'Guidelines on Aesthetic Practices for Doctors', some doctors had continued to practise in breach of these rules, without giving due regard to patients' safety. In 2010, a patient died following liposuction by a general practitioner, who was found to have breached several of the liposuction LTCs. Although it was subsequently determined by the Coroner that the patient had died due to improper sedation administration and monitoring, the post-mortem findings revealed intestinal punctures due to liposuction. The case drew the public's attention to

the regulatory regime for liposuction, including critical comments on the adequacy of the regulatory framework.

Singapore may be one of the first countries to have introduced guidelines and rules to regulate aesthetic practice by doctors. The challenge in regulating this area stems from the reality that aesthetic practice is poorly defined, supported by clinical trial evidence and practised by medical practitioners of different specialties and training backgrounds with a strong commercial agenda. The lack of reference from a foreign jurisdiction compounded the challenge. Nonetheless, the introduction of new rules and guidelines has largely helped to manage and moderate its growth, and ensure that any potential adverse impact on patient safety is minimised.

Errant Prescribing

In Singapore, medical clinics provide both consultation and medication dispensing services, unlike in many developed western countries where such activities are separated. Licensees and practising doctors in local medical clinics therefore have full control over the charges and quantity of medications to be dispensed to patients. This system has served Singapore well, and patients enjoy the convenience of being seen by the doctor and receiving medications at the same facility. However, a small group of doctors abused this system and overprescribed certain medications, in particular potentially addictive drugs such as hypnotics.

The Guidelines for Prescribing Benzodiazepines was introduced in 2002 to guide medical practitioners who were not trained in psychiatry. This was to ensure that this class of potentially addictive drugs was prescribed under specific circumstances where the benefits of treatment clearly outweighed the risk of adverse effects. These guidelines were subsequently revised in 2008 to include a wider range of clinical conditions and patient groups for which benzodiazepines may be prescribed, along with more detailed guidance on tapering the dosages of benzodiazepines. The revised guidelines also provided a more stringent reference standard for assessing doctors' prescribing practices.

Over the last decade, about 6-7 doctors were disciplined by SMC each year for errant prescribing. Prior to the amendment of the Medical Registration Act which granted investigative powers to SMC to conduct its own investigations, cases of errant prescribing were primarily investigated by the Ministry. Some general practitioners continued to overprescribe hypnotics in spite of the Guidelines, leading to cases being referred to SMC for disciplinary action.

The Subutex crisis in 2006 is a reminder of how errant prescribing practices can escalate into a public health crisis. Subutex was first registered by the Ministry's then National Pharmaceutical Administration [forerunner of the Centre for Drug Administration (CDA), Health Sciences Authority] in 2000 as a substitution treatment for opiate-dependent drug abusers. However, in late 2003, local reports of Subutex abuse began to surface. It was reported that Subutex had become a "legal drug of abuse", being injected by addicts as part of a cocktail (with other drugs such as benzodiazepines). This was supported by reports on the health and social harms associated with the abuse of Subutex. After closely monitoring the situation, the Ministry introduced several regulatory measures in October 2005. These included professional education through the 'Clinical Practice Guidelines on the Treatment of Opiate Dependence', mandatory 8-hour training sessions for doctors who wished to prescribe Subutex, a centralised electronic system of prescription monitoring [Central Addictions Registry for Drugs, Singapore (CARDS)], as well as regular audits of Subutex-prescribing clinics to monitor doctors' prescribing and dispensing patterns.

Despite the introduction of such measures, the abuse of Subutex persisted. In fact, at the height of the crisis, drug abusers were abusing both Subutex and hypnotics such as Dormicum. The Ministry of Health and the Ministry of Home Affairs subsequently conducted a comprehensive review of the abuse situation and identified the urgent need to address the issue fundamentally. As such, buprenorphine (an active ingredient for Subutex) was classified as a Class A Controlled Drug (CD) under the First Schedule of the Misuse of Drugs Act on 14 August 2006, making

the illegal import, distribution, possession and consumption of buprenorphine an offence. The Ministry then worked with the Health Sciences Authority (HSA), pharmaceutical companies and healthcare institutions to withdraw the drug from the market. Only with these drastic measures did the Ministry finally manage to resolve the Subutex crisis. To prevent the recurrence of similar drug abuse crises, there is continuing close regulatory surveillance of drug prescribing activities among healthcare providers, in particular, for hypnotics and opiate substitution drugs such as methadone.

With stepped-up surveillance of drug dispensing activities and increased referrals of errant doctors to SMC, there appeared to be a decrease in the number of errant prescribing cases in the recent years (from 2009 onwards) and a decline in referrals to SMC. This could also be due to greater media coverage of errant doctors being penalised by SMC, thus creating a broad deterrent effect. Nonetheless, we have to maintain our efforts in surveillance and must be prepared to act swiftly to tackle any early signs of errant prescribing.

Development of Legislation

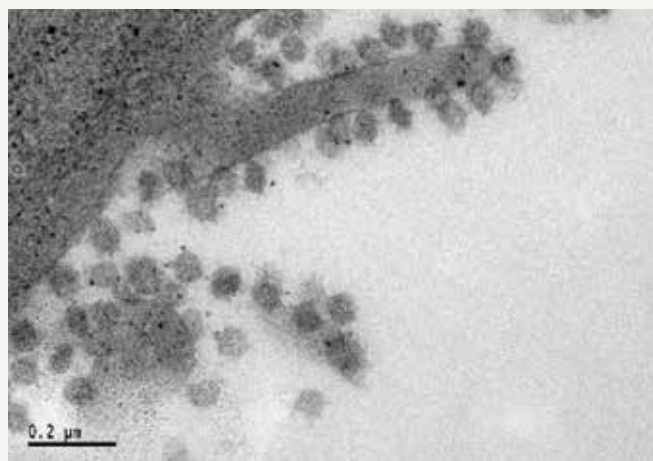
THE BIOLOGICAL AGENTS AND TOXINS ACT (BATA) - COPING WITH THE CHANGING LANDSCAPE IN BIOLOGICAL SAFETY AND SECURITY

The 2001 Anthrax Scares: Bio-security

In June 2000, Singapore declared its intention to become the biomedical hub of Asia; the biomedical sciences (BMS) sector would be the 4th pillar of the economy. The Sep/Oct 2001 anthrax scares in the United States occurred barely a year after and changed the world's perspective on biological agents. The new realisation was that biological agents, if misused, could potentially disrupt public health, as well as the economy and stability of a country.

The 2003/4 Laboratory-Acquired Infection: Bio-safety

A few months after the World Health Organization declared that the world was free of SARS-CoV (Severe Acute Respiratory Syndrome-Coronavirus), Singapore reported the first laboratory-acquired SARS-CoV infection in Sep 2003. This was followed by two other SARS-CoV reports from Taiwan and China. Lapses in laboratory safety were observed in all three laboratory incidents.



Transmission Electron Microscopy of SARS CoV-infected vero cells at 24hrs; The extracellular virus particles are seen on the sides of the cell (Acknowledgement : Electron Microscopy Unit, Yong Loo Lin School of Medicine, National University Health System, National University of Singapore).

The Development of the National Biological Safety and Security Regulatory Framework

The anthrax scares prompted an assessment of our local biological safety and security framework. It ignited Singapore's determination to develop a regulatory framework to oversee the growing BMS industry, and to safeguard national bio-safety and bio-security. The second high-profile incident (the laboratory-acquired SARS-CoV infection) accelerated the plans to develop, finalise and implement the regulatory framework.

The Biological Agents and Toxins Act (BATA) provides regulatory oversight on the safe use of biological agents and toxins. It was drafted in line with the practices in developed countries like the United States and the United Kingdom. Sufficient requirements were imposed in the Act to ensure the safety of workers and the community with little impediment to the advancement of the BMS industry. The BATA was enacted in Jan 2006 to regulate the import, transshipment, possession, use, handling, transport and transfer of biological agents and toxins that were of public concern, in a risk-based manner. It also prohibited the development, production, acquisition, use, stockpile, retention, possession and transfer of any biological agents and toxins for non-peaceful use.

Close collaboration with relevant ministries and agencies facilitated the enforcement of the Act. The strategies below allowed the Act to be quickly and efficiently implemented:

- a) Early engagement of stakeholders. Engaging the major stakeholders early helped with the gaining of buy-in and expedited the acceptance and compliance of the Act.

b) Leveraging on existing frameworks. We leveraged on the Protected Areas and Protected Places Act and the expertise of the Ministry of Home Affairs in security enforcement. We also worked closely with the Agri-food and Veterinary Authority and the Immigration and Checkpoints Authority to facilitate legitimate importations of human pathogens and toxins.

c) Pooling expertise for a quick ramp-up of capabilities. Working with able stakeholders (e.g., professional associations) to co-create the needed capabilities (e.g. to verify compliance to the Act) enabled full compliance with the legislation within 6 months.

d) Use of information technology. The use of information technology made the administration of the Act more efficient. It allowed stakeholders to submit on-line paperless application, and enabled real-time capturing of the inventory of biological agents and toxins. The bio-safety website provided easy access and quick information to stakeholders, freeing the staff for other work.

HUMAN CLONING AND OTHER PROHIBITED PRACTICES ACT – FIRST STEP IN A STEP-WISE APPROACH TO REGULATING HUMAN BIOMEDICAL RESEARCH

Biomedical Science Research and the Ministry of Health

The Bioethics Advisory Committee (BAC) was set up to address the ethical, legal and social issues arising from BMS research in Singapore. Following the first set of recommendations of the BAC, MOH was tasked by the Government in 2002 to establish a comprehensive legislative framework and guidelines for the licensing, control and monitoring of all human stem cell and cloning research conducted in Singapore.

The Broad, Wide-ranging Scope of ‘Biomedical Research’

Respondents at the 2003 public consultation of the Regulation of Biomedical Research Bill supported

MOH’s efforts to regulate biomedical research through a legislative framework. While the definitions for biomedical research in the Bill had been crafted after much prior consultation with experts and other stakeholders, the feedback indicated that the definitions were still not clear, and that the legal definition of “biomedical research” was deemed too broad¹.

Decision on a Step-wise Regulatory Approach

A decision was taken in 2004 to adopt a step-wise approach to regulating biomedical research activities. The topic of human cloning was chosen as the first area of focus for regulation, as this was of greatest ethical concern. There was also unanimous agreement from the international and local community that reproductive cloning of human beings was abhorrent and should not be allowed under any circumstances.

Regulate Issues of Greatest Concern First

As a first step, MOH introduced the Human Cloning and Other Prohibited Practices Act as a stand-alone legislation that only addressed human cloning without other forms of biomedical research activities. The Act, modelled after a similar Tasmanian statute, prohibits human reproductive cloning and other related practices, such as developing human embryos outside the body of a woman for more than 14 days.

This approach delineated clear unacceptable practices, which researchers should not venture into. At the same time, this strategy allowed for research into therapeutic cloning to continue (including stem cell research that could provide cures for persons who suffered from diseases such as diabetes and stroke), while reproductive cloning was banned.

The strategy to approach legislation in a step-wise manner – focusing on important issues with clear consensus – was effective. The proposal to ban reproductive cloning was met with support during the public consultations on the draft version of this Bill. Even though the Whip was lifted for Members of Parliament to vote according to their conscience, the Bill received unanimous support from the House.

¹ “Biomedical research” in the draft Regulation of Biomedical Research Bill means “any research :

(a) that is conducted for the primary purpose of increasing fundamental knowledge and understanding of the physical, chemical and functional mechanisms of human life processes and diseases; and

(b) that involves the use of human, animal or plant tissue, and includes :

(i) any form of human embryonic stem cell research;

(ii) any somatic cell nuclear transfer research involving human tissue;

(iii) any form of research on human tissue;

(iv) human tissue banking; and

(v) any other type of research as may be prescribed as a type of biomedical research for the purposes of this Act,

but does not include the taking, storage or archiving of any human tissue for any therapeutic or diagnostic purposes. ”

ACKNOWLEDGEMENTS

Mr Peter Lee

Mr Derek Lee

Dr P A Ravi

Ms Ho Lai Chan

Ms Angeline Ye

Ms Sandra Tay

Ms Wang Wen

Chapter

9

Emergency Preparedness, Response and Medical Support for National Events

“ I believe the answer lies not in convincing ourselves that the pandemic will not come, or in avoiding it should it come, but in being well-prepared. ”

Professor K. Satku,
Flu Pandemic Symposium, 2006



Emergency Preparedness, Response and Medical Support for National Events

by: Mr Philip Tan and Mr Lim Weng Kee

The Ministry of Health (MOH) is one of the key members in a whole-of-government crisis management and response framework, and its role is to provide prompt, coordinated, and integrated public health responses to national disasters (i.e. civil emergencies) and public health crises [i.e. disease outbreaks such as the Severe Acute Respiratory Syndrome (SARS) and pandemic influenza A (H1N1-2009)].

MOH has also been actively involved in providing medical support for overseas crisis relief missions as well as for national events such as the National Day Parade, Singapore Grand Prix F1 and the Youth Olympic Games.

Capability and Capacity Building

Over the past eight years, MOH has been progressively developing capabilities in Singapore's healthcare system to respond to the medical needs of the population in civil emergency and disease outbreak incidents. These two major categories of incidents can be understood as follows:

- a) Civil emergency incidents are those involving sudden and unpredictable disasters such as structural collapses, aircraft crashes, transport accidents, and accidents involving large numbers of casualties on land or at sea. Such incidents may also include 'manmade' disasters involving large numbers of casualties where there is, for example, intentional detonation of explosive devices, release of radio-active or hazardous materials.
- b) Disease outbreak incidents are those which involve outbreaks of novel viruses such as the influenza A (H1N1-2009) pandemic, and 'manmade' incidents of bio-terrorism such as planned anthrax attacks.

In civil emergency incidents, MOH is an integral part of a multi-agency civil emergency response framework which supports the lead agency in crisis response. MOH is responsible for providing the overall medical support in a crisis at two levels; namely at the pre-hospital stage (i.e. at the incident site, by deploying medical teams to manage the seriously injured casualties), and at the hospital stage (i.e. by administering definitive medical treatment to seriously injured casualties).

As the lead agency for managing disease outbreak incidents among the local population, MOH provides guidance and advice to responding agencies on appropriate public health measures in order to effectively manage the outbreaks. The measures are based on a phased disease outbreak management framework involving preventive programmes (to prevent the onset of disease in humans), surveillance (early detection of potential outbreaks and readiness preparations), and outbreak response (implementing calibrated measures for effective responses).

Key Partners

In order to competently provide the overall medical support needed in a crisis situation, MOH has over the years been working in close partnership with healthcare institutions, government and statutory board agencies, non-governmental organisations (NGOs) e.g. Singapore Red Cross Society, St John Ambulance Singapore and Mercy Relief, as well as commercial vendors to build up capability and capacity for effective crisis response. The scope of the partnership with responding agencies will depend on the nature of the crisis. For example, partnering with agencies such as the Immigration and Checkpoint Authority of Singapore (ICA), Civil Aviation Authority of Singapore (CAAS), and Maritime and Port Authority of Singapore (MPA) during a pandemic outbreak incident to implement border health control measures at the points of entry into Singapore; or working with the Singapore Civil Defence Force (SCDF)

during a mass casualty incident to provide on-site emergency medical support for the management of seriously injured casualties, as well as other government agencies to provide psychological and emotional support to victims and family members to mitigate the impact of psychological trauma during a crisis.

For the public hospitals in particular, MOH has established a system for the management of patient load surges (e.g. during a disease outbreak incident), as well as an influx of mass casualties requiring urgent medical treatment. This involves the provision of funds for infrastructure development (e.g. building decontamination facilities); purchase of additional medical equipment, supplies and drugs; and training of staff.

Emerging Threats

MOH constantly reviews its emergency medical response plans to ensure that they remain current and effective. Such reviews include scanning the environment to identify and assess emerging threats in order to develop new contingency plans to respond to such incidents if they do occur.



Public hospitals have been equipped with decontamination facilities to manage radiation casualties arising from a 'dirty bomb' incident.

In recent years, the threat of international terrorism, including bioterrorism and radiation dispersion device (commonly referred to as 'dirty bomb') threats, has been a concern among many countries around the world.

Over the past few years, MOH has been working with partners in both the government and private sectors to coordinate and develop medical response plans to manage already identified threats. These plans include the procurement of specific equipment, antidotes and drugs (i.e. for a particular agent or virus).

The Biological Agents and Toxins Act (BATA) which came into force in January 2006, provides MOH with the means to regulate the possession, use, import, transshipment, transfer and transportation of biological agents and toxins that are perceived to pose public health risks and/or potential security threats. Only parties who meet the specific safety and/or security requirements under the BATA are granted approval or permit to possess or handle such agents/toxins.

Operations Support

LOCAL OPERATIONS

Besides managing local crisis incidents and major events, MOH also despatches medical teams from our public hospitals to neighbouring countries for crisis relief support under a government-to-government arrangement. The significant operations which MOH has been engaged in over recent years, both locally and abroad, are described in this section.

SARS, 2003

On 12 March 2003, the World Health Organisation (WHO) issued a global health alert on emerging cases of atypical pneumonia, which was subsequently named SARS. Shortly after, Singapore reported its first SARS patient. This triggered off a wave of infections, and the outbreak had to be declared a national crisis on 6 April 2003. By the time the WHO removed Singapore from the list of SARS-affected areas on 31 May 2003, 238 cases had been reported, of which 33 resulted in fatalities.

The SARS crisis posed unprecedented challenges to MOH, with many of the problems arising because

the Ministry was hampered by a lack of operational resources to handle the outbreak as it grew in severity. On 6 April 2003, after it became clear that MOH could no longer deal with the SARS epidemic based on its own resources, then Prime Minister Goh Chok Tong announced the setting up of an Executive Group and Ministerial Committee, paving the way for a concerted government-wide effort to deal with the national crisis. Despite the many challenges, MOH with the assistance of other government agencies was able to place 5,798 persons under Quarantine Orders (QOs) between March and June 2003.

Influenza A (H1N1) Pandemic, 2009

The influenza A (H1N1) pandemic of 2009 provided MOH with the opportunity to demonstrate its operational capabilities since the SARS crisis of 2003.

An outbreak due to a novel influenza A (H1N1) virus which originated in Mexico in late March 2009 spread quickly across the border to the US and eventually to many parts of the world including Singapore. MOH

activated its disease outbreak containment plans on 28 April 2009 after assessing that the importation of the highly infectious virus into Singapore was imminent, and promptly worked with its healthcare institutions and partners to implement calibrated measures to manage the crisis. Pandemic response measures were implemented at the six public hospitals [i.e. Alexandra Hospital (AH), Changi General Hospital (CGH), KK Women's and Children's Hospital (KKH), National University Hospital (NUH), Singapore General Hospital (SGH) and Tan Tock Seng Hospital (TTSH)] as well as the polyclinics, to screen and manage suspected and confirmed cases. MOH also worked with the border control agencies to implement health control measures at the land, air, and sea immigration checkpoints to identify travellers who fit the case definition, and convey them to designated hospitals for further assessment and treatment.

Concurrently, the QO programme was activated to quarantine close contacts of confirmed cases to slow down the spread of infections within Singapore while efforts were being made internationally to develop effective vaccines against the disease. MOH constantly updated the public on the outbreak situation and medical response measures through the mass media and via the MOH website. In all, the healthcare institutions treated some 1,200 confirmed cases, and some 2,500 close contacts (both locals and foreigners) were placed under the QO programme which was in force for a period of about three months. When the influenza A (H1N1-2009) vaccine was eventually developed, MOH was able to leverage on the procurement capabilities which it had built up following the SARS outbreak and this allowed Singapore to be amongst the first nations in the world (first in Southeast Asia) to receive the vaccines.



Nurses donning their protective gear

Japan Earthquake, Tsunami and Nuclear Plant Incident, 2011

The after-effect of a 9.0 magnitude Tōhoku earthquake that occurred on 11 March 2011 with epicenter near the island of Honshu of Japan, resulted in a tsunami which caused a series of equipment failures, nuclear meltdowns, and releases of radioactive materials at the Fukushima Daiichi Nuclear Plant reactors. Anticipating the possibility that returning Singaporeans and other visitors from the radiation affected areas in Japan could cause contamination when they arrived in Singapore, MOH leveraged on the already formulated contingency plan for the 'dirty bomb' threat to manage the new risk. MOH worked closely with the public healthcare institutions and responding agencies to adjust the in-hospital and border control plans to manage persons returning from Japan who either required or requested medical consultation. Additional resources such as antidotes were procured to treat potential radiation contaminated persons. MOH also jointly worked with other government agencies to provide health advisories to the local population and to concerned Singaporeans in Japan. The public healthcare institutions attended to 111 cases, none of whom had radiation sickness.

NATIONAL EVENTS

Asian Youth Games, 2009

Besides partnering public hospitals to provide medical teams to support the usual major annual events such as the National Day Parade and Singapore Grand Prix F1, MOH also plans and provides medical and healthcare services at large scale international events in Singapore. One such event was the Asian Youth Games (AYG), which Singapore hosted from 18 June to 9 July 2009 as part of the preparatory test run to host the Youth Olympic Games (YOG) in 2010.

The AYG provided MOH with the opportunity to 'test-bed' important medical services operations, workflows and processes and contingency plans for the YOG. The lessons learnt and experiences gained from the AYG were incorporated into the medical, healthcare and contingency plans for the YOG. Some 600 personnel from the public and private medical institutions and providers, institutes of higher learning, NGOs and the Singapore Armed Forces (SAF) were involved in the provision of medical and healthcare services during the AYG. In all, MOH operated four AYG hospitals (i.e. CGH, NUH, SGH and TTSH), 21 medical rooms, 44 medical posts, 48 first-aid posts, and 24 ambulances, serving a total of 21 venues. At its peak during the main competition period, there was an average of 19 persons seeking medical treatment every day.

In the six weeks leading up to the start of medical services operations for the AYG on 18 June 2009, Singapore (like most other countries around the world) was confronting the medical issues brought about by the influenza A (H1N1-2009) pandemic. The situation posed serious challenges to MOH due to possibilities that the AYG would have to be cancelled if community transmission was detected within Singapore. Despite this, MOH together with the organising committee and other partner agencies, managed to implement the necessary health and infection control measures that prevented the spread of influenza A (H1N1-2009) virus at all venues over the duration of the AYG. This allowed the event to eventually take place and be completed without any threat of cancellation. Singapore hence became one of the few countries which have had the unique experience of hosting a major multi-sports event while in the midst of an influenza pandemic.



Medical staff in action, treating an injured soccer athlete during the AYG in 2009.

Youth Olympic Games, 2010

MOH assumed leadership for the planning and provision of effective, prompt and internationally-recognised quality medical and healthcare services (including counselling) for the inaugural YOG in 2010. Some 2,400 personnel from the public and private medical institutions and providers, institutes of higher learning, NGOs and SAF were deployed at 38 venues during the YOG. The Ministry operated four YOG hospitals (i.e. CGH, NUH, SGH and TTSH), 33 medical rooms, 86 medical posts, 55 first-aid posts, and 54 ambulances. A total of 1,337 persons sought medical treatment during the YOG period. A peak daily average of 91 persons was recorded during the main competition period.

The YOG commanded the single largest-ever deployment of medical manpower and resources out of medical institutions into the community, and was the most complex operation ever undertaken by the Ministry. Our medical services received much praise from the International Olympic Committee (IOC), international

sporting communities, participating countries and future Olympic Games host cities. Being the first ever such event in the world, MOH had no precedents to follow in terms of standards of care and levels of service delivery. However, in blazing the trail and co-creating the event together with the IOC, the Ministry contributed to the success of an international event which has left a lasting legacy for the future of Singapore.



Medical staff in action, treating an injured Singapore triathlon athlete during the YOG in 2010.

OVERSEAS CRISIS RELIEF SUPPORT

The Indian Ocean Tsunami, 2004

On 26 December 2004, an earthquake measuring 8.9 on the Richter scale struck the Indian Ocean off Aceh province on Sumatra Island, unleashing tsunamis that devastated the coastlines of Sri Lanka, India, Thailand, Indonesia, the Maldives and Malaysia. Singapore was one of the first countries to respond by sending aid to the tsunami-affected areas. MOH provided and co-ordinated the medical relief teams from public healthcare institutions which were sent to Aceh (Indonesia), Phuket (Thailand) and Trincomalee (Sri Lanka) to render medical assistance to those affected by the disaster. A total of 30 doctors and nurses from the public healthcare institutions volunteered for the medical relief trips, with each trip lasting between 10 and 16 days.

The Myanmar Cyclone, 2008

Cyclone Nargis struck Myanmar on 2 and 3 May 2008, resulting in landfall in the Irrawaddy delta region. The country's largest city Yangon also experienced the direct force of that devastating cyclone. Widespread death and damage was reported throughout the affected areas. Following Myanmar's agreement at the Special ASEAN Foreign Ministers meeting to allow ASEAN member countries to send in medical teams to assist in the relief effort, MOH sent a team of 13 doctors, nurses and pharmacy technicians from eight public healthcare institutions to Myanmar on 22 May 2008. Working under a unified Singapore Team, the

MOH team combined efforts and resources with the Singapore Red Cross and Mercy Relief to treat some 3,800 disaster-affected persons (mainly with respiratory ailments, skin infections, and gastroenteritis) over a two-week period from 22 May to 5 Jun 2008.

The Padang Sumatra Earthquake, 2009

The September 2009 Sumatra earthquake occurred just off the southern coast of Sumatra, Indonesia and resulted in a high death toll and extensive structural damage. Supporting the SAF, MOH together with TTSH sent a surgical team of seven surgeons and nurses to treat the disaster victims suffering from orthopaedic conditions which required external fixations and amputations. Over a one-week period from 5 to 13 Oct 2009, the MOH-SAF medical team treated 864 persons,

with 84 surgeries successfully carried out.



The TTSH surgical team performing surgery in a field hospital in Sumatra in 2009.

Readiness Activities

MOH has in place an established training management system to ensure that, in the absence of actual incidents, healthcare institutions such as public hospitals, key supporting agencies as well as vendors and suppliers continue to maintain their capability to respond to a crisis. The system includes individual-level skills training, and system/team-level table-top (i.e. 'paper play') and realistic deployment exercises, with follow-on improvements after the exercise reviews are conducted.

ACTIVITIES WITHIN THE HEALTHCARE SECTOR

Civil Emergency Exercises

The training management system includes conducting regular deployment exercises at each public hospital to ensure that key clinical departments (e.g. the emergency department, intensive care unit, and operating theatre), and supporting (e.g. logistics) departments can work both individually and as an integrated unit during a disaster. The system also ensures that public hospitals maintain the required numbers of staff trained in various competencies (e.g. trauma management, resuscitation, burns management, and chemical and radiation contamination management) needed to manage mass casualties. Such civil emergency hospital exercises typically involve 250 simulators playing the role of disaster casualties or next-of-kin, 30 to 40 exercise controllers and evaluators, together with about 1,500 exercise participants from various hospital departments.

Disease Outbreak Exercises

MOH conducts periodic exercises at each of the public hospitals to ensure that they remain capable of detecting any suspected case of infectious disease at their hospital; and having detected it, to be able to isolate and manage the patient(s) concerned and also initiate appropriate protective measures for hospital staff. These exercises typically involve some 200 hospital staff from various departments.

Additionally, MOH conducts QO exercises involving some 80 staff from MOH, nurses from the Health Promotion Board, and the QO vendor. Such exercises run through the various phases of the QO operations from the onset of activation, issuance of quarantine orders to persons placed under quarantine, to the follow-on quarantine support operations.

ACTIVITIES WITH AGENCIES OUTSIDE OF THE HEALTHCARE SECTOR

Border HealthControl Exercises

MOH works in close partnership with the air, sea and land border checkpoint agencies and medical services vendors on the readiness of border health control measures to prevent infectious diseases from infiltrating Singapore. The measures adopted include the setting up of thermal screening stations, triaging of febrile cases and the transferring of suspected cases requiring further medical assessment to designated hospitals. Such exercises typically involve some five staff from MOH, together with 20 staff from the medical services vendor.



Border Health Control exercise at one of the sea checkpoints in 2009.

Civil Emergency Exercises

MOH works with the lead agencies of the different civil emergency scenarios, usually SCDF, to plan and conduct exercises through which the Ministry has opportunities to practise its on-site emergency medical response. Typically, some 10 staff from MOH and 30 staff from the public hospitals (deployed as medical teams) are involved in such exercises.

Integrated Pandemic Outbreak Exercises

MOH conducted a national system-level deployment exercise lasting from 21 to 22 July 2006. This was part of the overall national effort to gear up response plans and ensure the readiness of the Singapore healthcare system to combat a possible influenza pandemic, and also to build up public awareness and confidence in the country's pandemic influenza response plans and measures. The main objective was to practise the critical components of the influenza pandemic medical response plan (i.e. management of imported cases and close contacts; healthcare institutions' infection control measures and case management; and the operation of influenza clinics). The exercise involved more than 1,000 staff from 21 government and related agencies (Ministry of Education, CAAS, ICA, MPA, and the People's Association) and was conducted at various locations throughout Singapore including the land, sea and air border checkpoints, seven public and five private hospitals, two public polyclinics, a nursing home, four general practitioner (GP) clinics and two schools. Some 500 community volunteers played the role of influenza patients and close contacts at the various exercise locations.

Procurement and Stockpiling

Over the years, MOH has built up a substantial stockpile of pharmaceuticals, biologics, and personal protective equipment (PPE) to protect and treat the local population, as well as to ensure that our healthcare workers (HCW) and participating private GP clinics have access to critical PPE in the event of public health crisis such as influenza pandemics, or other civil emergency incidents. The stockpile, which includes anti-viral drugs, anti-toxins, antidotes, vaccines, immunoglobulin, N95 masks, surgical masks, examination gloves, and isolation gowns, is mainly stored at MOH warehousing facilities, with some of the stock also kept at the public hospitals to allow for immediate deployment when needed. An efficient and robust logistics system with extensive private GP clinic coverage has also been established to ensure the timely availability and replenishment of potentially critical life-saving medicine and PPE to the local population and HCWs when needed.

To reduce stockpiling costs and to minimise stock obsolescence, public hospitals and polyclinics generally adopt the practice of 'rotating' stockpiled items through their routine usage. However, not all stockpiled items can be refreshed within their product shelf-life.

To further reduce stockpile replacement costs, MOH embarked on a shelf-life extension programme with the product manufacturers. For example, MOH has worked directly with manufacturers on long-term stability testing for stockpiled products, and on employing sub-zero storage conditions for several drugs and vaccines. Since 2006, MOH has achieved total cost savings of more than \$48 million through these initiatives. The Ministry's cost reduction efforts earned it the Public Service Best Practice Award (Resource Management) in 2010.



PPE stockpile at a MOH warehousing facility

Moving Forward

MOH will continue to work closely with its partners and other parties in developing effective national frameworks to respond to disaster and public health crisis in Singapore. While the public has the assurance that the Ministry would use every resource available to cope with such situations, they must also take personal responsibility for their own health by taking note of and adhering strictly to all health advisories issued by the government.

Chapter 10

International Cooperation

“ To be able to cooperate effectively, we need to uphold transparency as well as actively share our experiences, information and best practices freely. All of us share a common interest to strengthen regional health security. And there is no other way to achieve this than through unconditional and unreserved collaboration with each other. ”

Professor K. Satku,

Opening Remarks at the Asia-Pacific Economic Cooperation Health Working Group, 2009



International Cooperation

by: Ms Joanna Teo

International cooperation in healthcare is invaluable and especially so during global public health crises, such as Severe Acute Respiratory Syndrome (SARS) in 2003 and influenza A H1N1 pandemic in 2009. This is because such cooperation ensures that Singapore is well-positioned in terms of domestic readiness to handle pandemic outbreaks and prevent further cross-border spread of diseases.

Even in the absence of any pressing health crisis, international networks are still important. This is because nations experience common healthcare challenges, such as keeping an ageing population healthy and share aspirations such as shaping financially sustainable, high quality healthcare systems. The

Ministry therefore sees great value in forging stronger links with the international healthcare community to facilitate the sharing and exchanging of experiences, technical know-how and professional expertise. Our international engagement efforts and growing networks facilitate the engagement of global healthcare experts in collaborations to further refine domestic policies and methods, and keep ourselves at the forefront of healthcare policy thinking.

We are working closely with other countries, especially those within the Association of South-east Asian Nations (ASEAN), and participating actively in international organisations like the United Nations (UN) and World Health Organisation (WHO).

Engagements with the World Health Organisation



WHO Executive Board meeting in progress

Singapore joined the WHO officially in 1966, and was assigned to the Western Pacific Region. Singapore served its three-year term on the WHO Executive Board (EB) for the first time from May 2006 to May 2009. We were also elected as Chair of the EB from May 2007 to May 2008, represented by former Senior Minister of State (Foreign Affairs), the late Dr Balaji Sadasivan. Singapore's chairmanship was well-received by the WHO and other member states for our effective and objective handling of several sensitive issues on the agenda for the World Health Assembly.

Our active participation in the negotiation process for several WHO legal instruments, e.g. the Framework Convention on Tobacco Control (FCTC) and the Pandemic Influenza Preparedness (PIP) Framework for the Sharing of Influenza Viruses and Access to Vaccines and Other Benefits, also earned us a

good reputation within the WHO and with member states as an objective and constructive global player.

As at 2012, the WHO has designated 10 departments/agencies in Singapore as WHO Collaborating Centres (CC). These include the Ministry of Manpower, Health Promotion Board, Health Sciences Authority, National Cancer Centre, National University of Singapore, Public Utilities Board, and National Environment Agency. All have earned the designation due to their outstanding technical capabilities, contributions to national and global public health, and commitment to medical excellence.

Singaporean institutions have also won the WHO Foundation Prizes several times. The Prizes are awarded to individuals or institutions for outstanding achievements in specific areas of health development and excellence in healthcare provision and innovation. In 2006, the Institute of Mental Health won the WHO State of Kuwait Award. In 2009, the KK Women's and Children's Hospital's perinatal care team was awarded the United Arab Emirates Prize. In 2010, Action for AIDS was awarded the Lee Jong Wook Prize.

As a nation, Singapore has played an active role in providing assistance to members of the global community. For example, responding to WHO Director-General's request during the H1N1 influenza pandemic in 2009, Singapore donated 50,000 doses of the pandemic influenza A (H1N1) vaccine and 200,000 doses of Tamiflu to WHO to assist developing countries.

Other International Engagements

In addition to the WHO, Singapore also actively participates in other international meetings, such as Asia Pacific Economic Commission (APEC) Health Working Group and ASEAN Health Ministers Meeting, as well as other international technical forums such as the International Standards and Quality (ISQua) Forum. We also took the lead in selected expert working groups at ASEAN and WHO by appointing Singaporeans as ad-hoc experts or “temporary advisors”. These were in specific areas such as pandemic preparedness, tobacco control, non-communicable disease and dengue, etc.

These engagements have allowed us to contribute to the international health agenda as an objective and constructive global player, and to develop solutions to emerging health issues. Our international engagements have allowed us to refine our own system by learning from global best practices. In turn, we contribute to international health capability by sharing our own experience and areas of expertise, as well as by providing technical assistance and training to other countries.



ASEAN Health Ministers Meeting in progress

Selected Speeches

by Director of Medical Services

Lecture entitled 'Singapore's Experience with ACGME* Accreditation' delivered on 3 March 2011, at ACGME Educational Conference, held at Gaylord Opryland, Nashville TN, United States

Good morning,

1. Thank you for inviting me to share Singapore's experience in transforming its graduate medical education environment. As many of you may not be familiar with Singapore, let me begin with some background information on my country, its healthcare system, and the pre-existing graduate medical education environment so that you may see our experience in context.

BACKGROUND ON SINGAPORE

2. Singapore is an island nation located halfway across the globe from Nashville. We became an independent nation close to 50 years ago and have now become a cosmopolitan metropolis. Our land area is very small, measuring 26 miles from east to west, and 16 miles from north to south. We have a population of about 5 million, and a GDP of about US\$220 billion. The mean monthly wage is about US\$2750.

3. Our population has doubled in the last 30 years, and is also aging rapidly. The number of elderly persons has doubled in the last 20 years, and is expected to triple in the next 20. This has resulted in an increasing prevalence of chronic diseases, and greater demand for healthcare.

4. Singapore spends a little less than 4% of its GDP on health. We have 13 acute care hospitals with a bed capacity of over 8,000 beds. Life expectancy at birth is 81 years, and the infant mortality rate is 2.2 per 1,000 births, which is the lowest in the world.

5. The healthcare system is sustained by a financial framework made up of taxes, out of pocket expense, a compulsory personal medical savings account called Medisave, medical insurance, employee benefits and an ultimate safety net for the needy. There is a strong emphasis on individual fiscal responsibility

for health, which means that, even as there are heavy government subsidies, individuals will generally need to pay deductibles and co-payments. However, most people will be able to pay these deductibles and co-payments from their medical savings account, making them quite manageable.

6. Healthcare is delivered through a combination of public and private sector hospitals, specialty centres, primary care clinics and intermediate and long-term care facilities. The public sector provides approximately 80% of acute inpatient hospital care, and 20% of primary care. Public sector facilities are wholly owned by the government, but are run as separate corporate entities. That is to say, although the public sector is heavily subsidised, it is run efficiently, and about a quarter of its facilities are run like private facilities where patients pay the full fee for personalised service. Both undergraduate and graduate medical education activities take place almost exclusively in public healthcare institutions.

7. We have approximately 9,000 doctors giving a ratio of 1 doctor to 560 people. 3,500 of our doctors are specialists, while an additional 900 have completed formal training in Family Medicine. The remaining 4,600 doctors have not completed formal graduate medical education. We produce about 300 doctors and recruit 300 international medical graduates annually.

8. We currently have two medical schools and a third will open in 2013. The Yong Loo Lin School of Medicine is over a hundred years old, and is a baccalaureate equivalent entry programme which currently produces 250 graduates each year. Four years ago, we started a graduate entry programme in collaboration with Duke University. This will produce 50 graduates annually in steady state. The third medical school is being developed in collaboration with Imperial College London, and will produce 150 graduates annually in steady state, reducing our reliance on international medical graduates.

* Accreditation Council for Graduate Medical Education

EXISTING SYSTEM OF GRADUATE MEDICAL EDUCATION

9. Singapore inherited the British system of medical training. Doctors spend their first year after graduation as interns to obtain their license to practice. Then, at a variable interval after internship (ranging from immediately to a few years after), about half would choose to undertake graduate medical studies. The rest would continue on their careers without any formal graduate medical education. Once a doctor is selected for graduate medical education, he is assigned a supervisor to mentor him.

10. Specialty education begins with a broad based education for 3 years, followed by more focused advanced specialty education for a further 3 years. There is a high bar intermediate exam between the basic and advanced years, which only about half of candidates will pass at each sitting. This high stakes exam has traditionally been a key driver of learning by the residents.

CHANGING CIRCUMSTANCES

11. In the early years as an independent nation we needed a little more than a hundred medical graduates annually. Medical progress was slower than it is now, and undergraduate medical studies appeared to provide the necessary competence for non-specialist practice. Hence, we had few residents doing graduate medical education. Doctors' salaries were not influenced by the volume of cases they saw or procedures they performed, which meant that their earnings were not affected by time taken away from patient service for teaching activities. The apprenticeship model of education seemed adequate for the time.

12. However with the increase in service demands of a larger and older population, the rapid progress of medicine, the corporatisation of public hospitals, introduction of fee for service also in the public sector and a larger number of junior doctors entering our healthcare system annually, the apprenticeship model of education began to show signs of strain.

13. Senior doctors who were the residents' supervisors could not spend as much time teaching as before. They were required to meet increased service demands. Additionally their income became increasingly dependent on the fee for service system and the type and volume of service delivered. Finally, the rising number of junior doctors meant increasing numbers of residents, and there was little capacity to cope.

14. Under these changed circumstances, the apprenticeship system added very little value, and doctors who completed their training did so largely through their own effort. The high bar exams of the British system, combined with a difficult training environment, led to a significant proportion of doctors abandoning their training and choosing to be general practitioners (GPs). The exams were also a deterrent for many doctors who might have otherwise pursued further training. As a result, 50% of our doctors did not undergo formal graduate medical education.

15. A related problem was that most GPs working in the community had only undergraduate medical degrees, and were unable to meet the care needs of patients with complex chronic diseases. This led to an increasing number of patients attending specialist outpatient clinics in acute care hospitals for their chronic care, adding to service load, and further compromising the ability of supervisors to train residents.

FINDING A NEW DIRECTION

16. For some years there was a growing recognition of the need for change, both to ensure quality training for our specialists and to provide would-be GPs formal graduate medical education so that they could better address the care needs of patients with complex chronic diseases.

17. The British model of graduate medical education was not serving our needs in a changing environment. Attempts were made to tweak the system. For instance, we attempted to buy protected time for residents so that they could have time to reflect and study. But after almost 5 years of doing so, and spending millions of dollars, we found that protected time was rarely honoured. We needed a more radical change to the graduate medical education system if we wished to provide the high standard of care that our people deserve.

18. About 5 years ago we set about to seek a solution. A group of clinician leaders undertook visits to a number of countries to study various graduate medical education systems. We noticed a worldwide trend toward improving graduate medical education. The British themselves were undertaking major restructuring of their graduate medical education. There was recognition that their existing training system was not sufficient for future needs.

19. The opening of the National University of Singapore-Duke Graduate Medical School in Singapore gave us the opportunity to review the US residency

system in some detail. We noted that the US residency system had a very well defined structure, and its components fit together into a logical whole that made for a good educational system. The ACGME system had strengths especially where we were weak. None of the other systems was so thorough. As we saw it, ACGME's residencies had four key components – curriculum, assessments, people and systems. I will talk about each of these in turn.

CURRICULUM

20. The curriculum not only covers the conventional competencies of medical knowledge and patient care but also the newer issues of professionalism, communication, practice-based learning, scholarly activities and system-based practice – competencies which we were seeking to include in our curriculum.

21. For medical knowledge and skills in patient care, the curriculum also details how each area should be taught progressively, visibly demonstrated and practised so that residents could increase their responsibilities in a stepwise manner.

ASSESSMENTS

22. In our prevailing British system the emphasis was on intermediate and exit summative examinations which because of their punitive nature drove learning. Formative assessment processes and tools such as mini clinical exams and in-training exams were not given specific attention nor importance.

23. There was much for us to learn from ACGME on the conduct and use of formative assessments to improve on the resident's weaknesses, so as to achieve the required level of competence. Many of these tools were also psychometrically-validated, enabling international benchmarking. They would give us a better evaluation of the progress of our residents at every stage.

PEOPLE

24. In the past, we had never prescribed protected time for the faculty. Teaching was considered an honourable or respectable thing to do and it was assumed that somehow, despite not being allocated time for it, it would be done with dedication.

25. When I was a junior doctor, this was certainly the case. I had the benefit of many excellent and dedicated mentors who took the time to train me and my peers. They were able to do so because their

salaries were not tied to service, and because service demands were not so great at that time. However with the changing environment – the workload increasing and income tied so closely to service – few of our senior doctors found the time to devote to actual teaching, much less planning teaching activities or following up on the development of their trainees.

26. ACGME prescribed protected time for the faculty with varying amounts of time for the different categories – Designated Institutional Officials, Programme Directors, Core Faculty. Attention would also be given to the development of the faculty. Teaching activities were also supported by administrative staff such as programme coordinators.

SYSTEMS

27. Finally, the education process would be buttressed by a system of supporting organisational structures providing checks and balances to ensure compliance with processes. This would ensure that residents were having the desired learning experience and that teaching was indeed conducted regularly and in accordance with plans.

28. Over and above the institutional education committees, ACGME's residency review committee would be the accrediting body which, as part of this process, would conduct regular audits on the integrity of the institution's systems and the volume and quality of the teaching processes.

29. The elements of these four components create a comprehensive matrix that will ensure the quality of teaching and learning and therefore the quality of specialists. This robust structure was the reason why we engaged ACGME.

EMBARKING ON CHANGE

30. We consulted the management of ACGME with a request for assistance in 2008. Our timing was fortuitous. ACGME was also considering going global as they had also recently received request for assistance from other countries. Following a visit by ACGME senior management to Singapore in August 2008 ACGME agreed to work with us in our transformation. Once the decision was made to engage ACGME to remodel our education system we had to enable the change.

31. We developed a change management strategy. Some of the key issues we had to address were:

- a) Defining the scope of the changes we were going to make. What did we wish to retain, and what

did we wish to change?

b) Deciding on the pace of change. When would we start? How would we phase the implementation? Would we give choices?

c) How the implementation would be done, specifically:

i. How we would meet ACGME's accreditation needs

ii. How we would work with ACGME-International

iii. How we would work with our colleagues and institutions

d) Managing the ground – how would we engage all stakeholders?

DEFINING THE SCOPE OF CHANGE

32. The most important change that we had to make was to embed the ACGME structured educational framework and processes into our healthcare system. However, we recognised that there were significant strengths to our own training system that we should try to retain. In particular, we decided early that we would not expand beyond the 35 specialties and 4 sub-specialties that we have in Singapore, in order to minimise fragmentation of care.

33. We also chose to retain a broad based approach to training. This was to enable specialists to go beyond their own areas of specialty or interest, and provide more holistic assessment and care, thereby minimising fragmentation of care for patients with multiple comorbidities.

34. In the U.S. system, dermatologists and neurologists are trained without having to complete residency in internal medicine. We understand that this is partly historical, as they were among the first specialties to be registered. In our system, trainees had to undergo broad training in internal medicine before they could choose to specialise in neurology or dermatology. We wished to retain our system of training for these specialties.

35. Similarly, we needed surgeons to maintain some degree of all-rounded competence. So some U.S. specialties, like colorectal surgery, do not exist as discrete specialties in our system. We preferred such expertise to remain within the ambit of a larger specialty. Trainees would hence continue to train in general surgery, and only later would they pursue their special interests in disciplines like colorectal surgery.

36. Our system also differed from the U.S. system in the duration of training for many specialties. Specialty

training in the U.S. typically takes 3 to 4 years, while ours usually takes 5 to 6 years. As there is not enough evidence to indicate the optimum duration of training with certainty, we chose to retain our current training durations for now. However, we recognise that training should ideally be competency rather than time based, and this will hopefully become possible in future as graduate medical education evolves.

37. We also made a decision to retain our intermediate exams until we are able to effectively employ formative assessment tools to ensure the progressive development of our residents.

DECIDING THE PACE OF CHANGE

38. Next, we had to decide on the right pace of change so that the change would be doable and welcome. We had neither the numbers nor the competency within our teaching faculty to make a complete switch to the U.S. residency system in a single stroke. We needed to recruit more specialists so that service provision and patient care would not suffer because of faculty time taken out for resident training. Many senior doctors also needed instruction in the science and processes of education – for example, how formative assessments should be undertaken. This would take time. We also needed to develop additional infrastructure facilities for teaching activities

39. We decided to introduce the changes in phases, beginning with a few specialties. Phase 1 would see us starting with 7 specialties, and Phase 2, a year later, with 7 more.

40. We also wished to give our graduates choices. In the U.S., residency usually begins immediately after graduation. We implemented this as an option in our own residencies. However, we kept open the option of doing housemanship followed by rotations as a service medical officer. Individuals who chose this option could still enter residency training later on. We kept this option because it was the route that existed under our old training system, and we felt that some graduates might prefer the more familiar choice. Ironically, our most recent round of applications suggests that most students prefer to enter residency immediately after graduation.

41. Finally, the changes would only be applied to new residents, and the old training system would continue for residents already in training. However, we asked Programme Directors and Core Faculty to extend any additional protected time to the residents in the old training system. We wanted the change to be inclusive.

42. In summary, we paced our changes as follows. In 2009, we built capacity and capability. In 2010, we began Phase 1, which consisted of residency programmes for 7 specialties. This year, we will begin Phase 2, in which programmes for a further 7 specialties will be launched. It may appear that we have only covered 14 of our 35 specialties, but many of these training programmes lead to multiple specialties, so we have really covered the majority of our 35 specialties with these 14 specialty training tracks. For instance, the internal medicine residency branches out into 15 medical specialties in the advanced years.

IMPLEMENTATION

43. When we began implementation of the ACGME-I Institutional, Foundation, and Advanced Specialty requirements, we had to contextualise them to our setting. We recognised three levels of difficulty.

44. First, there were requirements that we could achieve immediately, albeit with some effort. Second, there were requirements that our system could not meet in the immediate term, and would need to be phased in. Third, there were requirements which were incompatible with the design of our system and our needs. Let me discuss each in turn.

Requirements that we could implement immediately

45. There were many requirements that we could implement without much difficulty. We very quickly identified the sponsoring institutions (SIs) and participating sites for each institution. We were also able to develop the organisational structure for graduate medical education within each SI. It was also relatively easy to establish protected time for faculty, as well as kick-start faculty development through workshops and educational symposia. When we were unable to meet certain curricular requirements, we managed to include variations as a Singapore addendum.

46. By the end of 2009, we had already undertaken the following:

- a) Graduate Medical Education Committees were set up in all 3 SIs in the 2nd half of 2009.
- b) About 200 clinical faculty members had been identified and appointed.
- c) Training of key personnel was progressing smoothly. ACGME helped us to organise educational symposia and data systems workshops.

Implementable but phasing required

47. The second group of requirements needs time for implementation. There are issues regarding case load and work hour requirements. We recognise the

value of appropriate case load and work hours, and would like to reduce them to match ACGME standards. However, this will take time as we will need to increase manpower levels among junior staff.

Not implementable because of system design

48. Finally, because of system design, some requirements were not implementable. To be licensed to practice, our graduates have to do at least 3 months each in medicine and surgery during Post Graduate Year 1 (PGY1 – equivalent to the House Officer year). So despite ACGME curricular requirements for the Phase 1 programmes, which start in PGY1, all our residents had to have medical and surgical practice experience. Fortunately, there were sufficient elective opportunities in most residency requirements to enable our licensing requirements to be met.

49. Some ACGME curricular requirements included 1 month rotations, but rotations in our system are usually done at 6 month intervals. Having 1 month rotations between departments would cause significant disruption in our system and cause service, and patient care, to suffer. In addition, many of my colleagues argued that such short rotations might not have educational value. Hence, we could not implement 1 month rotations between departments. However, we allowed Programme Directors to organise 1 month rotations within different disciplines in a single department.

WORKING WITH ACGME-I

50. There were 3 key initiatives that we developed with ACGME-I that helped us to make the transition successfully.

51. First, a Joint Steering Committee, made up of senior management from ACGME-I and MOH, held regular video conferences to iron out difficult issues.

52. Second, ACGME-I located a senior staff member, Dr William Rodak, in Singapore for 2 weeks every two months, so that he could meet faculty and discuss implementation issues.

53. Third, ACGME-I held workshops and symposia in Singapore to educate the many staff who had been identified as faculty, Programme Directors, Designated Institutional Officials, Institutional Coordinators and Programme Coordinators, so that they understood the residency system better.

WORKING WITH MY COLLEAGUES

54. My Ministry set up an Implementation Committee, made up of senior Ministry and SI officials, senior clinicians, and Designated Institutional Officials, to address implementation issues, resource requirements, communications and policy formulation. It served to standardise and resolve many issues such as payment for protected time, cost of faculty development, and implementation of night floats.

55. We also set up a local Residency Advisory Committee for each specialty to complement ACGME's efforts. These committees oversaw issues such as curricular content, to ensure that local variations in disease burden are addressed. They will also add another level of checks and balances by conducting audits on the system.

RESIDENCY MATCHING PROGRAM

56. One of the requirements of the programme was the provision of a national matching process of residents to SIs. We contemplated working with the National Residency Matching Programme office in the U.S. but there were many constraints that made it difficult for us to comply with their requirements, including timelines.

57. We therefore designed a simple system to do the matching in-house. This was possible as the number of applicants involved at each matching exercise was small, about 400 applicants. Also, residents were restricted to 2 specialty choices but in any of the 3 SIs.

WORKING WITH THE AMERICAN BOARD OF MEDICAL SPECIALTIES (ABMS)

58. We are confident that the structure that we have put in place will improve the training of our residents. However we remain concerned about the high bar British exams which create waste and have been a deterrent to universal Graduate Medical Education (GME) for our doctors.

59. We have begun working with ABMS to make available exams, benchmarked to US Boards, for our residents so that they may have alternative assessment tools for certification. Much work remains to be done in this area.

MANAGING THE GROUND

60. An issue that I have left to the last, but one that is important in any transformation, is managing the ground - that is engaging the stakeholders - the medical

community - our colleagues, hospital administrators, medical students, - the public, and - even the politicians so that they see the need for change, and support it.

61. While many colleagues welcomed the initiative there were some detractors. Parents of medical students were concerned about their children's future opportunities. Politicians too were concerned and wanted reassurance.

62. We held briefing sessions, press conferences and our Minister had to answer several questions in parliament. They all needed to be assured that the change was a step in the right direction and that the system will produce the high quality specialists and family physicians our people deserve.

CONCLUSION

63. Let me, in closing, sum up our experience.

64. By the turn of the millennium our Graduate Medical Education was showing strains and it was clear that we were at the crossroads. I would not be exaggerating when I say that many of us were quite despondent as to what could really be done through our incremental efforts in the face of the much more powerful pulls of service needs and remuneration that was tied to service.

65. We believe that the ACGME programme offers us a paradigm shift, - bold and ambitious, yet also well-thought out, well documented and adaptable - a framework we could implement easily. There is an excitement in the air in Singapore regarding medical education now. We have well founded hopes that it will rejuvenate GME in Singapore and help us regain the confidence we used to have in our system.

66. 2010 will be a turning point for graduate medical education in Singapore. This would not have been possible if not for the dedication and extra hours that many of my colleagues both doctors and non doctors, such as administrators and institutional CEOs, have put in.

67. It would also not have been possible if ACGME leadership had not reached out to reshape global graduate medical education. On that note I wish to thank Dr Nasca and the senior management of ACGME for reaching out.

68. And to all of you, thank you for your attention and have a pleasant day ahead.

Speech delivered at the Physician's Pledge Affirmation Ceremony on 3rd November 2012

INTRODUCTION

1. The physician's pledge affirmation ceremony is a significant milestone in the career of our doctors.
2. Let me congratulate you for having come this far, as you join our ranks and embark on this new phase of your lives. You are now at the threshold of obtaining full registration.
3. With full registration will come many responsibilities and accountabilities, including self-regulation and appropriate ethical conduct. Society expects these responsibilities of all professions, but perhaps they have higher expectations of ours.
4. The medical profession has for centuries been a noble calling. As every day, people, rich and poor, important and ordinary, commit their own lives and the lives of those near and dear to them into our hands.
5. I hope you will each take some time to reflect on what full registration means to you personally – the fulfilment of your aspirations to become a doctor, the beginnings of your life's work.
6. More than a century ago, US Supreme Court Justice Louis Brandeis, a learned man who had a great influence on his own profession, defined the characteristics of a profession, as opposed to other occupations.
7. Let me tell you what he said in my own words-
-First, a profession is an occupation which is pursued primarily for the benefit of others, and not merely for oneself. Second, a profession is an occupation for which the necessary training is intellectual in character, involving knowledge, and learning, as distinguished from mere skill. It involves mastering a body of knowledge. Third, it is an occupation in which the amount of financial return is NOT the accepted measure of success. Allow me to briefly expand on these points.

PATIENT CENTREDNESS

8. We are in this profession primarily for the benefit of others. I am sure this is why you started medical school. This is what we came into the profession for. This means that not only must we work for the benefit of our patients, but also that we cannot take advantage of our patients.
9. Rich or poor, our patients are always in a vulnerable position. We should not feed unnecessary fear, nor should we advise doing procedures which may not be necessary. We should not be neglectful of our duties and we should never hesitate to look up the literature or consult our colleagues in order to do a good job.
10. Because our patients are in a vulnerable position, even if you have your patient's consent you will be deemed to be taking unfair advantage of your patient if our colleagues do not agree that your actions are reasonable.
11. It is good, as a working doctor, that you reflect often on why you took up medicine in those post A-level days. You were inspired to do good and to help your fellow man.
12. If you can adhere to this purpose and remind yourselves sometimes of the pledge taken here today, I think you will also fulfil the first requirement of a profession.

SOCIAL RESPONSIBILITY

13. However, while recognising that responsibility to your patient is of primary importance, it must be said that you also have another responsibility - to society and to the system set up, in good faith, by society, to care for the sick.

14. In the context of a healthcare system, resources are finite. You will need to consider the opportunities and limitations of the system, and the needs of other patients, while looking after your own.

15. The Singapore Medical Council (SMC) physician's pledge contains the various elements to cover all these aspects. Take it seriously, put it up on your wall, and let it guide your medical practice.

CONTINUED LEARNING AND EXPANSION OF KNOWLEDGE, FURTHER TRAINING

16. In our progressive world, the body of knowledge for medicine continues to evolve. Rapid changes in science and technology dictate not only adoption of new treatments, but also rejection of some of those previously recognised as good.

17. Indeed, medical knowledge has become so complex nowadays that it is increasingly being recognised worldwide, that a basic degree, an MBBS or a MD, may soon be inadequate training for the practice of medicine.

18. I earnestly encourage all of you to apply for a residency programme. Your personality, your personal preferences and choice of lifestyle will determine which specialty you choose or whether you choose to do family medicine. But whatever you choose to do, take pride in it.

19. Most of you will be serving your bonds for the next five years, so this is your opportunity to make a quantum leap in your career, to put in an investment with no loss. The ministry aims to expand our capacity to train everybody, be it in family medicine or the specialties.

BUILDING THE PROFESSION

20. There is another responsibility I would like to address: shaping the profession. Each of you, whether you realise it now or not, have a role to play in formulating our medical landscape. If each of you only looks out for your own interests, our healthcare system will disintegrate.

21. We need you to get involved to help build up and sustain the profession. It can be done in many ways - you can start by mentoring medical students or housemen. But eventually, to play a role, you will need to get actively involved in a professional organisation.

22. If you have a heart for sharing, teaching, or even just a passion for your particular area of interest, take an active role in the society or specialist chapter that has been set up for its advancement.

23. Don't let someone take a role in the society who has no interest in sharing but is there to further his own self-interest. Or someone who leads the society down the wrong route - he will misguide and misrepresent the profession.

24. If all of us say, "let the other doctor do it", we will let those who have self-interests run our societies and associations.

25. You should, as many say, ask what you can do for the organisation and not what the organisation can do for you.

26. Let me leave you with this quote from Edmund Burke, a statesman from the eighteenth century in England, a quote that has meant a great deal to many great men and women over the years: he said, "The only thing necessary for the triumph of evil is for good men to do nothing."

27. And so my colleagues, if you have a chance to do something, take the challenge and make your presence felt in the profession.

28. On this note, I would just like to remind you once again to take the Physician's Pledge to heart and continue to uphold the ethical code and the values of the profession.

29. If you practise medicine with a conscience and with dignity, it will always be to the benefit of your patients, our profession and society. Then, I am sure, you will have a fulfilling life's work, and a good life. Thank you.

Speech entitled 'Lessons from the Healthcare Family's Response to the H1N1 Pandemic' delivered at the MOH Workplan Seminar 2009

1. We have been preparing for a pandemic for some years now and our planning premise was that the pandemic would begin in our region and it would be upon us very quickly. We had anticipated that it would be a virulent virus, possibly H5N1.

2. Yet when the Pandemic began, the epicentre could not have been further away from Singapore. This gave us sufficient time to manage the situation better. The virus too turned out to be milder and hence we had to act quickly to modify our responses to commensurate with the threat.

3. On reflection there were many lessons learnt-

- a) Be prepared, be flexible
- b) Creatively build and use surge capacity in peacetime
- c) Intelligence/Science must underpin outbreak response
- d) Communicate strategically and clearly within an environment of trust
- e) System discipline is critical for coherent public health response

4. The first point we'd like to share is that being prepared was extremely useful, but despite this there will be surprises and hence we must remain flexible to accommodate them.

5. We were prepared and this allowed us to act reasonably well

FOR THE WHOLE-OF-GOVERNMENT (WOG):

6. We had a Homefront Crisis Ministerial Committee and a Homefront Crisis Executive Group that had made preparations for an epidemic and had released a document on it. These groups were responsible for setting policies and coordinating Whole-of-Government preparedness and response.

MOH HQ:

7. We had a similar structure in the Ministry, setting policies and coordinating responses within the Healthcare Family.

8. Our Operations Group developed and exercised preparedness plans. We built a stockpile of Personal Protective Equipment (PPE) and antivirals. We had also organised the logistics for patient transport, distribution of PPEs and antivirals, Home Quarantine Orders (HQOs). We increased the number of isolation rooms and Intensive Care Unit (ICU) beds. We recruited and set up the Pandemic Preparedness Clinics (PPCs).

HEALTHCARE INSTITUTIONS:

9. Healthcare institutions were similarly prepared. We conducted numerous exercises at different levels so that we were familiar and prepared. This proved most useful because it allowed us to act strategically and efficiently. But reality often differs.

10. We had developed a Disease Outbreak Response System (DORSCON) framework to guide response. This framework was primarily based on a single dimension of differing rates of human transmission, assuming the pathogen to be a virulent virus, e.g. H5N1.

ORIGINAL DORSCON

11. The original DORSCON framework was essentially a single dimension framework, colour-coded, to correspond with WHO's Phases 1-6. It was premised on a virulent virus, with progression through alert levels largely based on increasing transmissibility. For example, when there was community transmission, it should be red. This was what we had planned for.

12. However WHO surprised everybody by introducing a new pandemic alert framework just before

they announced phase 4. But it still didn't answer our concerns that we were dealing with a virus that was less virulent.

13. So within a week, we came up with an alternative framework, which we used for the rest of the pandemic, recognising that further work would be necessary. There are three dimensions – transmissibility, severity index, and geographic proximity to Singapore, as well as whether we are in containment or mitigation.

14. There were other issues too. We had recognised that requiring all hospitals to maintain a prolonged state of preparedness for a pandemic would create fatigue. We thus developed a rapid response hospital and in all hospitals rapid response teams. We exercised this plan on a regular basis so that they could be the first responders in the instance of an outbreak, giving the other healthcare institutions and workers time to ramp up their capabilities.

15. Another lesson that we learnt was to do with PPCs. As our DORSCON framework was based on a virulent virus originating in our region and as we expected the evolution to community spread to be rapid, we had informed PPCs that we would activate PPCs in DORSCON Red and when there was community spread, and release the national stockpile of PPEs and antivirals for their use, and that in the interim they had to rely on their own stockpile.

16. But because of the milder nature of the virus we declared that PPCs would be activated in Yellow. Further our containment measures delayed the entry of the virus into Singapore and we had a protracted containment period. This created much confusion and PPCs were also running out of PPEs. We finally activated PPCs in late containment.

17. In summary, we had prepared extensively for a pandemic and our pandemic preparedness proved most useful. But yet, we had not anticipated certain features of this pandemic. We believe that it is not possible to prepare for all eventualities and one must be prepared for an element of surprise and hence we should be prepared to revise our response.

18. We believe that some of the difficulty in adapting to the new changes was because agencies had used our DORSCON framework as a plug and play tool without understanding and internalising the rationale for the response. If they had understood the rationale, change would have been easily undertaken. We must be nimble in developing and executing our responses during an outbreak as the situation will be highly dynamic.

19. Our preparedness response should move away from an "all or none" approach where all elements are activated when we move to a particular alert level. Instead we should adopt a modular approach that allows a more nuanced and customised response depending on the assessed risk. A modular preparedness response allows us to choose the appropriate modules to deploy in the particular situation. For example, full PPE is a module which would be deployed not only in Orange but also selectively deployed in specific high-risk areas depending on the situation in Yellow.

CREATIVELY BUILD AND USE SURGE CAPACITY IN PEACETIME

20. The next lesson is that we need to creatively build and use surge capacity in peacetime. MOH had convened various expert committees to advise on the likely surge requirements in a pandemic and progressively increased our capacity both in terms of physical infrastructure and manpower capabilities as well as clinical management guidelines to ensure that patients receive the care that they need. We also built up our national stockpiles taking into account likely attack rate of the disease and operational demands. We were also prepared to suspend electives to release additional resources if the need arose.

21. Still, there were challenges. As our Paediatric ICU capacity was starting from a low baseline, an increase of just 4-6 extra beds constituted a 50% increase in capacity with increased requirements for trained manpower especially nurses. Our polyclinics were seeing 1.5 to 2 times their usual number of patients with several polyclinics seeing more than 2,000 patients per week. Our Emergency Departments (EDs) were also stretched with hospitals such as KKH, CGH and TTSH seeing at their peak 692, 770 and 812 patients per day respectively which is nearly two times higher than their usual average daily attendance.

22. Our laboratories responded well to the outbreak by ramping up their capacity as well as capabilities to perform complex tests within a very short time frame. Manpower constraints meant that our laboratories could not sustain 24/7 operations as our laboratory staff were already working extended hours.

23. The 993 (telephone number) ambulance service was overwhelmed with the rapidly increasing demand to transport patients from various points such as airport, medical clinics and homes as well as transporting patients home from the ED while waiting for their results.

24. As each of these key components form part of the overall patient flow process, a bottleneck in any of these components created a compounding effect in other parts of the system. For example the lack of laboratory testing at night resulted in suspected cases being admitted, reducing the availability of beds (especially isolation beds) increasing the waiting time for admission.

25. Our healthcare system especially in the public sector is working at close to maximum capacity even in peace time. In fact some hospitals have had to draw down on some surge capacity such as ICU beds to meet their regular day to day operations in peace time.

26. We need to creatively build and use surge capacity in peacetime so that we can be efficient and effective in our use of resources while ensuring that our people are not over-stretched in a crisis.

INTELLIGENCE/SCIENCE MUST UNDERPIN OUTBREAK RESPONSE

27. Thirdly, it is important that intelligence and science underpin our outbreak response. MOH was able to initiate our preparedness response 3 days before WHO's official announcement with the advance notice from WHO Western Pacific Region (WPRO). This allowed MOH to alert healthcare professionals and convene a Chairman Medical Board (CMB) meeting to selectively implement Yellow alert measures in our hospitals before moving officially to Yellow alert on 28 Apr concurrently with WHO's raising of its alert level to 4.

28. External networks complemented other information sources such as media reports, official websites and scientific publications in informing MOH's decision making process. These sources provided information on clinical features of cases, at risk groups and treatment protocols which guided local clinical management and public health measures. Data on healthcare utilisation patterns in other jurisdictions in particular New York City helped us to estimate the potential impact of the outbreak on our healthcare system.

29. Our local clinical and scientific community contributed significantly to the decision making process in their respective areas such as formulating clinical guidelines, developing and validating diagnostic tests, conducting genomic analysis to characterise the virus and detect possible mutations.

30. Our public health experts also played a critical role in enhancing our disease surveillance system and interpreting the surveillance data which were then translated into public education messages and public health responses as well as guide clinical decisions.

COMMUNICATE STRATEGICALLY AND CLEARLY

31. The fourth lesson is that we need to learn to communicate strategically and clearly within an environment of trust. Proactive public messages on good hygiene and social responsibility as well as the eventuality of community spread and deaths helped the population to play their part and prepared them psychologically for bad news without causing panic. Our public communications efforts during the crisis benefitted from the high level of public trust which was cultivated in peacetime. As a result, surveys by then Ministry of Information, Communications and the Arts (MICA) consistently showed strong public confidence in the government's response to the outbreak despite occasional negative comments from some members of the public.

32. In terms of internal communications, we had instituted various communication channels such as MOH circulars, meetings, hotlines, MOH website etc. We recognise however that this is an area that requires more work. The challenges faced in internal communications included:

- a) Keeping messages concise, clear and timely while ensuring that the rationale for decisions are conveyed and key information is not inadvertently omitted
- b) Not having a dedicated team that was overseeing the communications to our various partners including the public and private healthcare institutions, Intermediate and Long-term Care (ILTC) sector and GPs.

33. We had paid significant attention to the content but could have done better in terms of ensuring that the messages were conveyed accurately and in a timely manner. We faced technical issues such as limitations of MedAlert and messages not reaching the relevant party as mailing lists were not updated, and so on.

34. As this outbreak affected all layers of healthcare staff, it was critical to ensure that critical messages from MOH were disseminated expeditiously by healthcare institutions to their staff. There appears to have been some gaps in their processes. For example we were receiving queries from healthcare staff on issues that had already been addressed in MOH's circulars.

35. Two key areas for improvement are
- a) communications strategy : what, how and when to communicate; and
 - b) communications environment: similar to our public communications, internal communications should be within an environment of trust

SYSTEM DISCIPLINE IS CRITICAL

36. Finally, system discipline is critical for a coherent public health response. In order to move forward, all wheels must move in the same direction. Such discipline must however be developed and built up in peacetime. We need to improve communications and build trust with stakeholders and provide opportunity for differing views to be heard, considered and resolved. We also need clarity and principles for determining areas where compliance is essential and areas where providers have discretion to adapt according to their needs.

37. To summarise...

38. First, we must be prepared for different scenarios but should at the same time expect surprises and respond accordingly. In the planning and development of the overall preparedness plan, we should appreciate not just the basis but also the subtleties of our planning. We must move away from rote learning, especially within the healthcare family. The plan must be modular, so that if any part is put

in/taken out, the whole plan would not fall apart. The plans could also then be exercised in modular form. This way, we can be prepared and yet be flexible.

39. Secondly, we need to creatively build and use surge capacity in peace time. We could deploy additional manpower to grow research and teaching in peacetime. This would support our efforts to raise the quality of training and biomedical sciences initiatives. Suggestions for how to create surge capacity in facilities are welcome.

40. Thirdly, intelligence and science must underpin our outbreak response. We must continue to strengthen our external networks and science capabilities to facilitate evidence-based policies and management.

41. Fourthly, we need to communicate strategically and clearly within an environment of trust. We need to invest in our internal communications capacity to handle large volumes within a short time frame and capabilities to convey critical messages clearly and quickly.

42. Lastly, system discipline is critical for coherent public health responses. System discipline requires a clear command and control structure, but success depends on the ability to work together, the willingness to compromise when necessary, underpinned by clear communication.

Speech delivered at the GP Flu Pandemic Symposium on 13 May 2006

Good afternoon,

1. It gives me great pleasure to join you this afternoon at the 1st GP flu pandemic preparedness symposium. I believe this is the first symposium specially organised for our primary care practitioners. Let me explain why I felt this symposium is an important one to have.

2. The World Health Organization (WHO) first expressed concern over the possibility of the avian influenza in Asia evolving into an influenza pandemic in 2005. This influenza pandemic threat is real and the risk to public health could be severe as we are dealing with a new sub-type of the Influenza A virus, the H5N1 virus, to which humans have no immunity. WHO has further warned that although precise predictions of the occurrence of pandemics are not possible at this stage, the conditions favouring the emergence of a pandemic had all been met, all except for one: efficient human-to-human transmission.

3. Today, this formidable virus has not only become endemic in Asia, but has also spread beyond the region to as far as Europe, Middle East and Africa. As long as avian flu outbreaks continue among poultry, human infections can occur. With time, there is a likelihood that the H5N1 virus would mutate and acquire the ability to efficiently spread from person to person. To add to the gravity of the situation, human cases experience severe illness with a very high mortality rate.

4. During the recent Lancet Asia Medical Forum, some experts have expressed the opinion that a pandemic of influenza will eventually occur and is an inescapable fact, but it is not inevitable that an avian influenza virus will cause the pandemic. Some felt that the H5 strain has historically never caused a pandemic and if anything, a H2 strain may be the cause of the next pandemic due to lowered herd immunity.

5. Whatever the strain of the virus, the fact remains that in the event of such a pandemic, the toll of human death is unimaginable. Even for those who fortunately survive, many cannot escape the pain of losing their loved ones or from the devastating economic impact that will most certainly accompany a pandemic. The magnitude of such an impact, both in terms of human death and economic downturn, is likely to be even greater than that of SARS.

THE NEED FOR SINGAPORE TO BE PREPARED -- OUR NATIONAL INFLUENZA PANDEMIC READINESS & RESPONSE PLAN

6. Recognising the need for Singapore to be prepared to deal with the imminent threat of a flu pandemic, our National Influenza Pandemic Readiness & Response Plan was completed some time last year. The Plan, which is based on WHO guidelines, is constantly updated to make sure it stays relevant and responsive to global and local developments. The plan adopts a colour-coded risk management approach, with appropriate public health measures to be adopted for each alert level. The Ministry of Health (MOH) has been working with the various ministries, public and private healthcare institutions, as well as other stakeholders including Singapore Medical Association (SMA) and the College of Family Physicians (CFPS) to address the various operational issues of the plan.

7. Although the most effective control measure is to immunise the entire population against the new viral strain, the development of pandemic influenza vaccine could take some time. Research is now underway to develop a vaccine against the H5N1 virus.

8. Tamiflu is the current drug being used for the treatment of H5N1 infections. Like many other countries, we have started to stockpile this drug. This will be used as prophylaxis for identified frontline personnel or essential services personnel and the treatment of flu patients in a pandemic. In addition, we are also stockpiling Relenza for use as a second-line drug.

9. Besides having anti-virals as a preventive measure, we have also built up other capabilities such as having a stockpile of N95 masks and other Personal Protective Equipment (PPE).

10. In order to ensure that our national plan is operationally ready, the Ministry has already initiated hospital preparedness exercises. We are also planning for a 2-day Flu Pandemic Exercise, involving public participation. It will be a comprehensive exercise, involving different points of care delivery in the healthcare system - hospital, polyclinic, nursing home and selected GPs clinics. With these efforts, we hope to ensure that our plans are not mere paper descriptions but actual, operational plans. With each exercise, we learn and improve on our plans so that we can be even better prepared, should the pandemic strike.

ENGAGING GPs DURING A FLU PANDEMIC

11. In the event of a pandemic, the projected number of outpatient attendances and hospitalisations could overwhelm our public institutions in a short time. However, with the use of antivirals, we hope to reduce the number of patients requiring hospitalisation. Unfortunately antivirals will not have much impact in reducing the number of outpatient attendance.

12. The vast majority of patients who have flu-like symptoms are likely to first see a doctor in the primary care setting. These patients will be worried about their symptoms and wonder whether they have caught the virus. They seek not just treatment but also words of comfort. At the same time, as doctors we will have other patients who do not have flu symptoms but require medical attention. Thus, we have to ensure compliance to all infection control measures.

13. As we carry out our duty as a member of this noble profession, we will not want to inadvertently bring unnecessary risk to our families and loved ones. Of course, one could throw in the towel and call it quits as the pandemic approaches. But would we then be able to hold our heads high amongst our peers and patients when it is all over?

14. I believe the answer lies not in convincing ourselves that the pandemic will not come, or in avoiding it should it come, but in being well-prepared. MOH is ready to partner GPs in this arduous journey. It is crucial that all GPs are part of the National Pandemic Response Plan and be equipped and ready to fight the battle against the virus as a team.

15. As part of our preparedness planning, a flu pandemic taskforce for primary care was set up by MOH earlier this year. Included in this task force are representatives from SMA, CFPS and the polyclinics. The role of this taskforce is to define the key areas and implementation strategies for primary care pandemic preparedness and response.

16. Under the ambit of this taskforce, we have jointly developed the Advisory in preparing primary care facilities for flu pandemic with CFPS. This advisory covers areas like procedures for triage, infection control as well as protection for clinic staff in the event of a pandemic. It is developed by a team of family physicians and I am sure you will find this practical and useful.

17. At the same time, we have also worked with the SMA to develop the National Primary Healthcare Pandemic Response Plan.

18. As a member of the Pandemic Response Plan, my Ministry recognises the need for us to provide integral support to our GPs, such as supplying PPE and Tamiflu. For a start, the workgroup has arranged for a mask-fitting session for all of you today. More professional training sessions and exercises will also be conducted in the future.

19. This symposium marks the beginning of our journey in partnership. I am pleased that this symposium has provided a platform for us to present the Advisory and Response Plan and seek your inputs on the further refinement of this plan. Rest assured that MOH is committed in working with all of you every step of the way. At the same time, I also ask for your commitment to join us in preparing for this battle, which I hope will never come. After this symposium, we will firm up the Advisory and Response plan, and send them to all primary care doctors, as well as make them available on the respective professional bodies' websites.

20. I would also like to take a moment to acknowledge our colleague from the Department of Health, Hong Kong, Dr Ronald Lam, who has taken time off his busy schedule to be here to share his primary care experiences with Severe Acute Respiratory Syndrome (SARS) and Avian Influenza. There is much that we can learn from our overseas counterparts who have dealt with these conditions.

CONCLUSION

21. I am heartened to see so many GPs here this afternoon. The battle ahead, should it come, could involve the loss of many human lives, some could well be people close to us. If one amongst us lets our defences down, the consequences can be dire. The key to success is held by each of you. Let us, the medical profession, unite as a team and prepare ourselves. I urge all GPs to join us in this concerted effort. Do give us the feedback that will make our plan better. Be assured that we will support you, should the pandemic come knocking on our doors. I am confident that such selfless contributions would make everyone proud to be a member of the medical fraternity.

22. On this note, I wish you all a very stimulating learning and sharing experience.

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