Annex 2

DEVELOPING SINGAPORE AS THE COMPELLING HUB FOR HEALTHCARE SERVICES IN ASIA

PAPER 2: POTENTIAL IMPLICATIONS ON DOMESTIC POLICY OBJECTIVES

BACKGROUND

1. Regional demand for healthcare will rise in tandem with the growing population, greater life expectancy and increasing purchasing power in Asia. Singapore can benefit from this market opportunity by attracting more well-heeled Asians to seek healthcare services here.

2. In HSWG's first paper that was submitted to the ERC on 23 April 2002, we proposed that Singapore aims to increase its market share from less than 1% in 2000 to 3% by 2012. If this is achieved, it would represent an inflow of 1 million foreign patients per annum, which could contribute some $2.6 billion of value-add to our GDP.

3. HSWG also recommended that Singapore clearly positions itself to be a compelling hub with two mutually reinforcing elements: Clinical Medical Hub and Economic Medical Hub. The former's intent is to build an enduring brand-name based on clinical excellence, whilst the latter's goal would be to attract a high throughput of foreign patients for economic impact and economies of scale. Maintaining and enhancing Singapore's position as the regional medical hub will contribute significantly to Singapore's attractiveness as total business and services hub.

4. Singapore should launch a national marketing initiative to regain mindshare as the region's premier medical hub. In addition, HSWG concluded that it is important to reduce manpower supply rigidities to enhance the cost competitiveness of the sector and to enable industry players to better respond to market demand. A number of fiscal incentives were also suggested to help attract more investments and capability development.

AIM

5. The objective of this paper is to address the implications of our medical hub ambition on other national objectives. We identified four key issues:

   I. Impact on local healthcare costs
   II. Perception of disparity; and access to Affordable Healthcare
   III. Meeting the demand for doctors and the implication on our talent spread

IV. Support for clinical research

ISSUE I: IMPACT ON LOCAL HEALTHCARE COSTS

6. The concern is that attracting more foreign patients could inadvertently spur inappropriate demand by local patients, and cause local healthcare costs to rise.

7. In conventional economics, increased supply lowers the price for the consumer. However, unlike other markets where consumers make informed choices, doctors and other healthcare providers as suppliers have significant influence over the consumer decision in healthcare services due to *information asymmetry*. As a result, "more competition and supply of medical services may drive costs up instead of down"[1]. Known as **supplier-induced demand,** this hypothesis rests on three key assumptions:

   (a) *Target-income hypothesis*, expounded by Newhouse[2] as follows: "Suppose physicians have a certain income target. As the number of physicians in an area increases, visits per physician will tend to fall. To achieve any given target income, each physician will then have to charge higher fees."

   (b) *Physician moral hazard*: By itself, information asymmetry is not an issue as it is precisely this informational advantage that the patient sees the doctor for. However, the doctor could exploit this and advise the patient to consume inappropriate services and procedures. For instance, this may occur if the doctor is motivated by personal financial gain and operates in a practice structured as an entrepreneurial profit making firm. In such situations, the doctor is said to be an "imperfect agent".

   (c) *Patient moral hazard:* In a healthcare system where there is assured payment through Government reimbursement or private insurance systems, patients have no motivation to be discerning in their choices in healthcare services. The natural tendency would be for the patient to over-consume healthcare services, regardless of whether it actually improves his or her health.

8. When the three assumptions hold, supply does appear to create its own demand. In 1951, Milton Roemer found empirical evidence from Saskatchewan (Canada) which showed that hospital bed availability appeared to have insatiable capacity to generate utilization. This led to Roemer's Law: "a built bed is a filled bed". However, it is important to note

[1] Source: White Paper, Affordable Health Care, 1993
[2] Source: Joseph Newhouse, A Model of Physician Pricing, Southern Economic Journal, 1970

that Roemer himself qualified in a later study in 1993 that this observation holds "if there is an assured payment system".[3]

9. Indeed, many of the studies on supplier-induced demand were supported by empirical evidence from fully insured healthcare systems. For example, in the fixed-fee, national health insurance systems of Canada and Western Europe, studies found that whenever fees were lowered, the utilization rate of healthcare services tended to rise. In the United States, which was mainly funded by a private insurance system and where fees were not constrained by fixed schedules, studies found that fees rose together with the number of doctors.

10. Singapore's experience provides a useful contrast. Figure 1 suggests that the utilisation rate of polyclinic and private GP services has declined despite an increase in the number of primary healthcare doctors from 1993 to 2001. A possible explanation could be that more patients were going directly for specialist consultation. We were unable to obtain data on specialist out-patient visits in the private sector. However, looking solely at the number of polyclinic and public specialist out-patient visits, the same trend of declining utilisation rate is present.

Fig 1: Singapore's out-patient experience[4]

Total public (polyclinics) and private sector (GPs) visits

Year	No. of doctors	No. of visits	Ave. visits / person / year
1993	1247	16.56 million	5.0
2001	1632	18.04 million	4.4

Total public (polyclinics)

Year	No. of doctors	No. of visits	Ave. visits / person / year
1993	144	2.94 million	0.9
2001	152	3.02 million	0.7

Total public (polyclinics) including specialist out-patient visits

Year	No. of doctors	No. of visits	Ave. visits / person / year
1993	1175	4.81 million	1.45
2001	1230	5.87 million	1.42

11. Figure 2 looks at in-patient data. Even though the number of acute care hospital beds has risen from 1993 to 2001, both the bed-days occupied per thousand population per year as well as the overall occupancy rate at our hospitals have declined. The same downward shift is observed even after accounting for the trend towards more day surgery. It is also worth highlighting that the occupancy rate at our private hospitals has dropped rather precipitously from 68.1% to 47.1% during this same period.

[3] Sources: The Dartmouth Atlas of Healthcare, National Health Systems of the World, Volume Two, 1993

[4] Source: MOH

Fig 2: Singapore's in-patient experience[5]

Total public and private acute care admissions

Year	No. of beds	Bed-days occupied / thousand persons / year	Bed occupancy rate
1993	6476	548.8	77.3%
2001	8153	445.0	73.2%

Total public and private acute care admissions including day surgeries

Year	No. of beds	Bed-days occupied / thousand persons / year	Bed occupancy rate
1993	6476	679.9	84.1%
2001	8153	612.2*	78.8%

* Using year 2000 data for private sector day surgeries

12. HSWG is not asserting that supplier-induced demand does not exist in Singapore but recognises that it is a complex, multi-factorial issue. The Singapore experience suggests that appropriate brakes can help restrain supplier-induced demand or for that matter, demand for healthcare services per se.

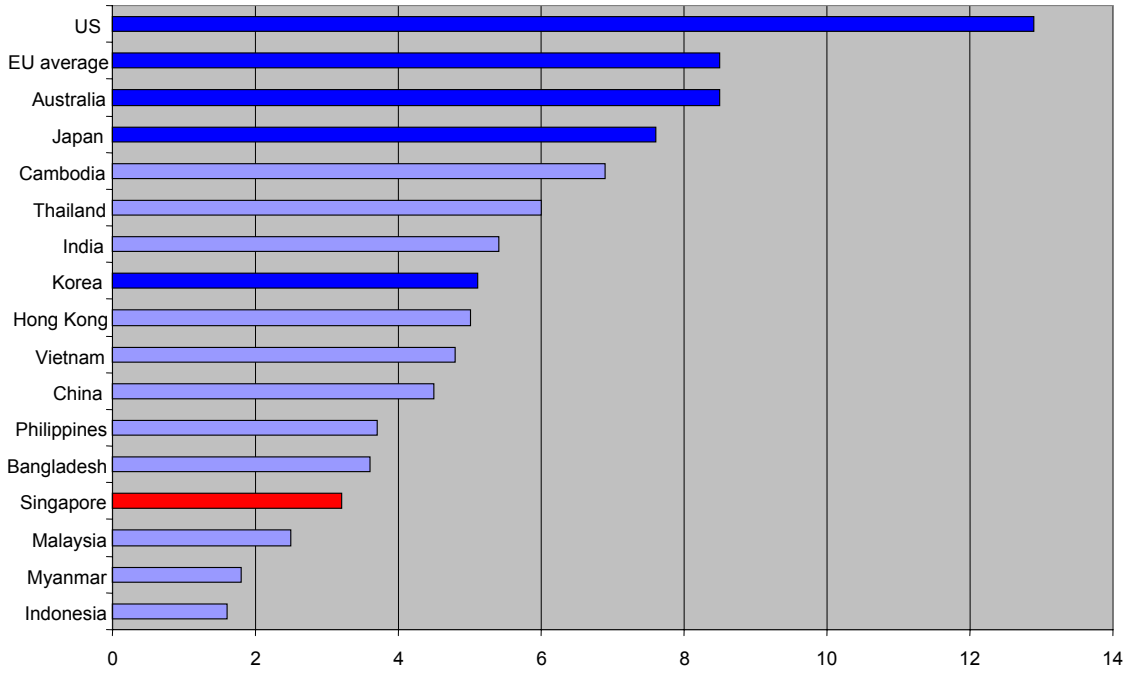
13. To discourage inappropriate demand by local patients, the checks include the principle of patient co-payment (through Medisave savings and out-of-pocket payments); as well as Medisave mechanisms such as withdrawal limits and in future, caps on balance billing in both the public and private sectors. In addition, it is mandatory for healthcare providers to provide financial counselling prior to hospital admission to ensure that patients are aware of the financial impact of their decisions.

14. To deter inappropriate supply, public sector providers are subvented according to disease related groups (DRGs). They are also subject to revenue caps, as well as medical audits by internal medical boards. Private sector providers have relatively more pricing freedom but face tremendous competitive pressures among themselves, from the public sector as well as hospitals in neighbouring countries, and this has discouraged inappropriate pricing or care.

15. Many of these checks were introduced following the 1993 White Paper on Affordable Healthcare. They have worked and the evidence bears this out. Overall, the increase in healthcare expenditure in Singapore has not exceeded our economic growth rate: healthcare expenditure has remained at about 3% of GDP since 1993. Similarly, the Government's share of healthcare expenditure has stayed relatively stable at about one-third. Both these indices compare very favourably with most developed countries (see Figs 3 and 4).

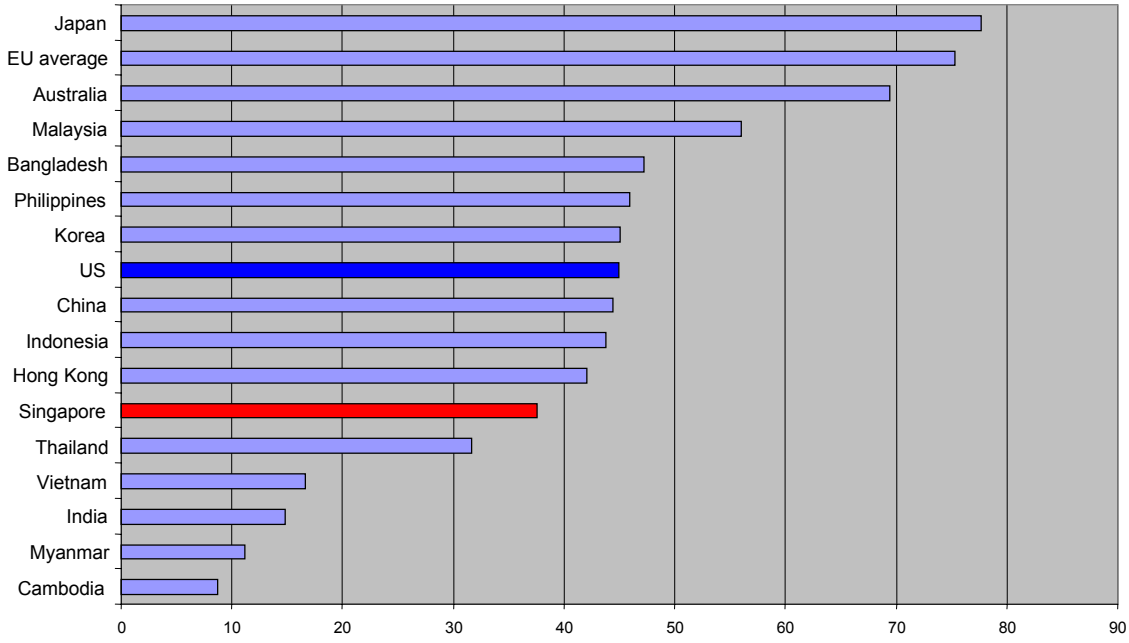
[5] Source: MOH. Each day surgery is treated as one bed day.

Fig 3: Total health expenditure as % of GDP



Source: World Development Indicators 2001, OECD, WHO

Fig 4: Public health expenditure as % of total health expenditure



Source: World Development Indicators 2001, OECD, WHO

Recommendation 1: To retain existing checks against inappropriate supply and demand for healthcare services, and to complement these checks with the formation of Healthcare "CASE"

16. In view of the above, HSWG is comfortable that the appropriate restraints against supplier induced demand are in place and these will also help curb any rise in local healthcare costs due to an increase in foreign patients. To complement these checks, a Healthcare "CASE" should be established to facilitate greater transparency on pricing and clinical practice norms and deter inappropriate behaviour by errant doctors. This would benefit both local and foreign patients, as well as ethical practitioners. Its composition should include representatives from MOH, major providers, professional organisations and independent persons of standing in society.

17. The Healthcare "CASE" would act as an intermediary and provide an informed opinion to address potential grievances by patients. It could also champion some of the following initiatives:
    (a) Itemized billing (of consultation fees, drug costs, etc)
    (b) Enhance patient awareness by making available information on professional fee guidelines and average bill size by Disease Related Groups
    (c) Use of Carepaths and Practice Guidelines
    (d) Compulsory internal audit to avoid unnecessary surgeries, over-charging, etc.

18. However, independent of supplier induced demand, we would like to caution that healthcare costs in Singapore are likely to rise. The cost drivers include our ageing population, the rapid technological advancement in medicines and devices, increasing patient expectations due to affluence, medico-legal claims with rising litigation as well as manpower supply constraints.

ISSUE II: PERCEPTION OF DISPARITY; AND ACCESS TO AFFORDABLE HEALTHCARE

19. Providing high-end, luxurious healthcare services to foreign patients could have a "**demonstration effect**", i.e. influence local patients to expect and demand likewise. If public hospitals do not provide similar services to subsidized patients, there could be a perception of disparity creating an issue of social equity and apparent conflict with the Government's stated commitment to provide universal access to Affordable Healthcare. This is exacerbated by the imbalance in the distribution of load and expertise between the public and private sectors (see Fig 5).

Fig 5: Current distribution of doctors and patients in Singapore[6]

[6] Source: MOH, Singapore Accreditation Board

	Private		Public/Restructured	
	Number	% of total	Number	% of total
Total Doctors	2809	52%	2586	48%
Specialists	856	45%	1036	55%
In-patient Admissions/ year	82500	21%	305532	79%
Average in-patient admissions / specialist / year	**96**		**295**	

20. If public hospitals do provide similar services to subsidized patients, public healthcare expenditure could rise. In addition, a booming private sector may recruit trained specialists too aggressively from the public sector and further drive up public healthcare expenditure as the public sector strives to match private sector salaries, to retain these specialists. These would put pressure on the policy objective to contain the Government's healthcare expenditure at 1% of GDP.

21. It would be impractical to insulate foreign from (subsidized) local patients in light of the significant expansion in the number of foreign patients that we are aiming for. Some have suggested that an alternative may be to discourage public sector restructured hospitals from seeing foreign patients. However, this would be an unnecessary loss of economic opportunity as there is substantial specialist expertise residing in the various centres of excellence in the public sector. Furthermore, it could worsen the perception of disparity i.e. the private sector offering "good hospitals", "great doctors", and "top-rate service" only to the privileged. Instead of insulation and building a higher artificial divide between the public and private sector, HSWG's preferred approach is to create a more porous system.

Recommendation 2: Increase porosity for specialists

22. The *Visiting Consultant Scheme* and the *Faculty Practice Plan* represent positive steps towards this. The availability of private specialists in the public sector as Visiting Consultants would help to reduce the perception of disparity and enable subsidized patients to benefit from limited specialist expertise. On the other hand, the Faculty Practice Plan could optimize the use of scarce expertise especially at the sub-specialty level as such expertise could be shared with the private sector. By giving public sector doctors "the best of both worlds" the Faculty Practice Plan may also help to retain them in the public sector. Equally important, both schemes would help to involve the best available expertise in Singapore to train the next generation of doctors.

23. Such arrangements should be implemented more widely, e.g. by allowing every public sector specialist to work up to a specified proportion of his or her time, say 30%, in the private sector. This practice of dual employment is common in Australia, UK as well as in many leading US centres, and caters to the needs of both cost-sensitive patients and comfort-conscious patients.

Recommendation 3: Allow subvention to be portable for treatment in private hospitals

24. The Government could contract with private healthcare providers to provide subsidized healthcare services to Singaporeans. For example, under the Primary Care Partnership Scheme, public polyclinics engage private GPs to provide out-patient healthcare services to needy elderly. The patients pay polyclinic charges and the Government provides a subsidy to participating GPs. This model should be progressively extended to in-patient services. In effect, the Government's healthcare subsidy would become portable. Under this system, patients would be subsidized up to a fixed amount. They can choose to be treated in public or private hospitals, which compete on the basis of price and care.

25. This would enable the Government to move away from being an operator / provider to being primarily a buyer and regulator of healthcare services for its citizens. This is desirable as it would enable the Government to avoid some of the role conflicts that occur when the objectives of its different roles diverge.

26. The qualifying conditions for private providers to participate in treating subsidised patients, would have to be specified by MOH and could include an appropriate proportion of subsidized beds, quality standards, etc. This initiative also requires a detailed study to determine who should be subsidized, what services should be subsidized and at what levels. It is likely that some form of means testing would eventually be necessary. HSWG's proposal is to introduce this only for in-patient care and to do so at the point of admission.

27. Similar to the porosity for specialists, the porosity for patients would neutralize the perception of disparity in access to private facilities and expertise. It would also facilitate market-based competition amongst public and private hospitals. In particular, the prospects of increased patient load would give private healthcare providers a strong incentive to offer competitive prices. The higher volume would in turn, enable them to be more cost effective, leading to a virtuous circle.

ISSUE III: MEETING THE DEMAND FOR DOCTORS AND THE IMPLICATION ON OUR TALENT SPREAD

28. In developing Singapore as a regional medical hub, there is concern that this could generate an increase in the demand for doctors thereby attracting more top talent to medicine. This would impact negatively the Government's effort to have an even spread of Singapore's indigenous talent pool to the different professions and jobs.

29. HSWG's preliminary assessment is that the drive to attract more foreign patients to Singapore will only result in each specialist seeing an average

of two additional foreign patients per day[7]. The impact on the demand for doctors is thus likely to be limited. This assumes that there will be greater porosity for specialists to straddle the public and private sectors.

30. However, various expert committees including the Medical Education Review Panel led by Lord Oxburgh, have projected that there could be a shortage of doctors based on our domestic load alone. HSWG's position is that there are inherent limitations to manpower projections and the actual number required would vary with market conditions. The job scope and desirability of being a doctor are also changing. We would thus not venture to prescribe a "magic number" of doctors required. Instead, our aim is to increase the responsiveness with which the supply of doctors can adjust to the demand arising from both local and foreign patients, as well as academia and industry.

Recommendation 4: Greater flexibility in tapping various sources to meet market demand for doctors

31. Existing sources of trained medical talent should be supplemented with new alternatives. The inflow of doctors would be moderated with appropriate valves to pre-empt over-supply.

    (a) **Establish criteria and system for selective recruitment of top talent from other countries** such as Europe, China, and India. In view of Singapore's relative unfamiliarity with the quality of medical schools in some countries, HSWG recommends that such candidates be required to sit for the NUS Final MBBS examination[8] as a screen for suitability. Those who pass will then be eligible for conditional registration according to market demand and market conditions.

    (b) **Expand the number of Registrable Medical Schools for Conditional Registration**, e.g. some of the better universities in USA, UK and Australia which were in the pre-1993 register[9]. Conditional registration requires the doctor to be employed by an approved healthcare institution. The candidate can only become eligible for full registration after 6 years, and even so, eligibility does not mean automatic approval by the Singapore Medical Council.

    (c) Other rigidities should be removed when there is no longer strong justification for them. For example, given the large number of working mothers in Singapore today, the female quota is no longer defensible. As shown in Fig 7, over a 10-year period, an average of 86% of female doctors remained economically active, compared to 91% of male doctors (i.e. in full-time or part- time employment). HSWG is of the view that **the Female Quota should be removed**.

[7] Please refer to ERC Paper 1.
[8] This does not imply that they will be awarded NUS MBBS degree.
[9] 176 medical schools were scheduled in the pre-1993 Medical Register. Since then, the list has been reduced to 24.

Fig 7: Work Status of Doctors by Sex over 10 years (1984-1993)[10]

Graduation Year	Sex	Working Full Time	%	Working Part-Time	%	Not Working	%	De-registered	%	Total
Ave from	M	109	88.7	2	2.1	1	0.5	11	8.7	123
1984-1993	F	44	73.3	7	12.4	1	2.4	7	11.9	59

32. Comparing recommendations 3(a) and 3(b) with the existing system, conditional registration is currently granted to foreign medical graduates from a small list of only 24 Registrable Medical Schools and to doctors with postgraduate qualifications e.g. Member of the Royal College of Physicians (UK) or Fellow of the Royal College of Surgeons (UK). Singaporean graduates with similar qualifications are able to obtain full registration following 1 year of provisional or conditional registration.

33. For graduates from the expanded list of Registrable Medical Schools, HSWG's proposal is for both the Singaporeans and foreigners to go through the minimum 6 years of conditional registration before he or she can be considered for full registration. This will ensure that we do not unintentionally open a route to bypass our talent spread policy. In any event, the high cost of overseas medical education and the limited places available in these schools for Singaporeans are natural controls. It should be noted that the 152 schools that were removed from the list of Registrable Medical Schools in 1993, accounted for only 10% (or 28 persons) of the total number of doctors registered from 1990-2.

34. Recommendations 3(a) and 3(b) represent readily-available, cost-effective sources of doctors as the Government would not need to bear the cost of funding their medical education. Furthermore, tapping on the talent pool from the region would enable our healthcare players to build a team that could eventually help in their expansion overseas.

35. Whilst the recruitment of graduates who already possess specialist qualifications may appear to be a more effective way to meet the demand for specialists, it is relatively more difficult to uproot and relocate established specialists to Singapore. There is also value in having the

[10] Graduates of pre-1993 were chose to eliminate the "bond" factor in their decision to remain in the workforce.

post-MBBS foreign talent undergo his or her specialist training in Singapore as this would help to localise and root the talent to Singapore. This is the experience of the US where they have consistently creamed off large numbers of trained doctors from India, Pakistan, Sri Lanka, Hong Kong, Malaysia and even Singapore.

36. To augment the existing NUS MBBS undergraduate stream, HSWG understands that the Government is evaluating the feasibility of a graduate medical track similar to the American system through the proposed **Graduate Medical Programme by NUS-SGH**. This would leverage on existing NUS and SGH infrastructure and resources for a quick and cost-effective ramp-up. The initiative will also attract foreign talents and help retain some Singaporeans who would otherwise have gone overseas for their medical training. The programme could be affiliated to a renowned US medical school and fees will be benchmarked to overseas universities. This would enable the Government to significantly, though not totally, reduce the subsidy needed to support the training of more doctors.

ISSUE IV: SUPPORT FOR CLINICAL RESEARCH

37. To succeed in the clinical medical hub aspect of a compelling medical hub, the three elements of medical excellence: medical education, clinical research and clinical services, must be developed in tandem. Clinical research is also synergistic with the national thrust to develop the Biomedical Sciences industry as a key pillar of the Singapore economy. In particular, clinician-scientists play a critical role in ensuring that discoveries in the research laboratories are translated into successful solutions for clinical needs in the marketplace.

38. Today, only 160 or 6.4% of public sector doctors in Singapore are involved in clinical research, spending an average of 7 hours per week[11]. In comparison, 228 or 11% of the doctors at Mayo Clinic are involved in clinical research on a full time basis[12]. Traditionally in Singapore, there have been relatively little recognition nor protected time for clinical research.

Recommendation 5: Develop a career track for Clinician-Scientists

39. The system for funding competitive biomedical research is now in place in both the Biomedical Research Council (BMRC) and the National Medical Research Council. HSWG recommends that the Government explicitly encourage and possibly provide more resources to expand existing initiatives to foster a new mindset towards a career in clinical research. These initiatives include:

[11] Source: MOH

(a) BMRC's Young Investigator Award, which provides 3-year individual-based rather than project-based funding to support young doctorates who are likely to make a significant contribution to the Biomedical Sciences industry in Singapore; and

(b) SGH's Clinician-Scientist programme under which doctors are able to focus 75% of their time for research and appraised based on their research output and impact.

Recommendation 6: Physical clustering of Basic and Clinical Research

40. Renowned medical hubs e.g. Memorial Sloan Kettering Institute (MSKI) and Harvard Medical Centre are surrounded by a cluster of basic and clinical research activity. Such co-location stimulates and facilitates interaction between basic and clinical researchers that could result in break-through medical products, and procedures to benefit patients. These clusters have a competitive edge over institutions which only offer clinical services.

41. In Singapore, one cluster is already evolving, which involves clinical research at NUH interacting with basic research in Biopolis and NUS. Another hub of research activities could potentially cluster around existing infrastructure at SGH. Similarly, private hospitals should also be encouraged to attract research activities around themselves. HSWG envisions that these developments would strengthen and ensure the sustainability of our efforts to be the compelling hub for healthcare services in Asia. Equally important, it would maximise the synergies with the development of the research-intensive biomedical sciences industry in Singapore.

CONCLUSION

42. In summary, HSWG is convinced that healthcare services is an attractive market opportunity and that Singapore can compete effectively to become the leading player in this region. This initiative need not militate against our domestic policy objectives, namely affordable healthcare and an even talent spread. Instead, the recommendations above suggest that the drive to be a compelling medical hub can be synergistic with these objectives by developing a more robust and competitive market-based healthcare system. In addition, a vibrant healthcare services sector will go hand-in-hand with an expanding biomedical sciences industry, and ensure that the two together can provide another important engine of growth for Singapore.

43. If HSWG's recommendations are accepted, we would propose that ERC specify a timeframe for the relevant players to act. This is partly in view of the real and growing competition from neighbouring countries. Implementation is thus key. There may also be a need for a Championing Agency to spearhead the national marketing initiative, strengthen industry

competitiveness, and create and support the formation of Healthcare “CASE”.

END

Healthcare Services Working Group (HSWG) members

Dr. Loo Choon Yong (Chair)	Executive Chairman, Raffles Medical Group
Mr. Ko Kheng Hwa	Managing Director, Economic Development Board
Prof. Lee Eng Hin	Dean, Faculty of Medicine, National University of Singapore
Ms. Leong Wai Leng	COO, Raffles Holding Ltd
Dr. Lim Cheok Peng	Managing Director, Parkway Group Healthcare
Mr. Lim Hock San	President and CEO, UIC Ltd
Prof. Lim Yean Leng	Director, National Heart Centre
Mr. Tan Beng Lee	Group CEO, Great Eastern Life Pte Ltd
Prof. Tan Ser Kiat	Group CEO, Singapore Health Services Pte Ltd
Mr. Tan Tee How	CEO, National Healthcare Group Pte Ltd
Dr. Kanwaljit Soin	Consultant Surgeon, Orthopaedic, Spine & Hand Surgery Pte Ltd
Mr. Yeo Khee Leng	CEO, Singapore Tourism Board

HSWG Secretariat members

Dr. Beh Swan Gin	2nd Director, Biomedical Sciences, EDB Head, Biomedical Sciences, EDB
Ms. Loh Chin Siew	Senior Officer, Biomedical Sciences, EDB Senior Officer, Strategic Planning, EDB
Ms. Lynette Lee	Director, Strategic Planning, MOH Dy Director, Strategic Planning, MOH
Ms. Shirley Loo	General Manager, Raffles Hospital Business Development Manager, Raffles Medical Group
Mrs. Phoon Chew Ping	
Mr. Han Kok Juan	
Mr. Lawrence Lim	
Mr. David Lee	

HSWG Sub-Group members

Ms. Karen Koh
Mr. Nicholas Miao
Mr. Tan Wah Yeow
Ms. Hilda Yap
Mr. Art Ouellette
Ms. Tan Keet Yee
Mr. Allan Yeo Hwee Tiong
Dr. Djeng Shih Kian
Dr. Nei I Ping
Mrs. Cecilia Tan
Dr. Richard Ng
Ms. Cecilia Chua
Prof. Soo Khee Chee
A/Prof. P C Wong
Ms. Quay Keng Wah

HSWG Dialogue Session participants

Dr.
Ang Chong Lye

Ms.
Boo Hui Yun

Mr.
Howard Califano

Ms.
Chan Mun Yee

A/Prof.
Chan Yew Weng

Prof.
Charles Ng

Prof.
Chee Yam Cheng

Dr.
Christopher Cheng

Mr.
Cheng Sim Kim

Dr.
Cheng Wei Chen

Mr.
Chi Cheng Hock

Dr.
Allan Chin

Ms.
Annie Chin

Dr.
Lee Suan Yew

Mr.
Leong Yew Meng

Mr.
Liak Teng Lit

Dr.
Lim Kian Peng

Dr.
Lawrence Lim

Dr.
Lim Suet Wun

Prof.
Lim Yean Leng

Mr.
SR Lo

Prof.
Low Cheng Hock

Dr.
Low Cze Hong

Dr.
Nyam Ngian Kwong, Denis

Dr.
Brian O Keeffe

A/Prof.
Ong Kian Chung, Benjamin

Mr.
Chong Teng Kim

Dr.
Vincent Chong

Dr.
William Chong

Dr.
Sandra Chu

A/Prof.
Fock Kwong Ming

Mr.
William Fong

Mr.
Goh Chye Tee

Dr.
Anthony Heng

Dr.
Ho Kee Hang

Dr.
Werner Katzmann

Dr.
Khoo Kei Siong

Dr.
Philomena Koh

Dr.
Kua Ee Heok

Dr.
Prem Kumar

Dr.
Kwa Chong Teck

Dr.
Laslie Lam

Dr.
Lau Hong Choon

Mr.
Augustin Lee

Mr.
Lee Cheow Seng

Prof.
Ong Yong Yau

Dr.
Phua Kai Hong

Ms.
Rosalind Phuan

Mr.
Sia K H

A/Prof.
Sim Kwang Wei, Eugene

Mr.
Peter Sng

Dr.
Arthur Tan

Dr.
Clarence Tan

A/Prof.
Donald Tan

Dr.
Tan Khai Tong

Mr.
Tan Khye Hua

Mr.
Tan Kin Lian

Ms.
Tan Mui Ling

Mr.
Sebastian Tan

Dr.
Tan Yew Oo

A/Prof.
Tay Boon Keng

Mr.
T K Udairam

Dr.
Ellick Wong

Ms.
Yeo Lei Noy

Mr.
Paul Yong