Neurology

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Practical Neurology, **2**, 304–308

In December 2001, I was fortunate enough to be seconded from my position in University College, London, for a period of 2 years, to take up the post of Director of the National Neuroscience Institute in Singapore. After over a quarter of a century at Queen Square, this seemed like an opportunity too good to miss, and so it has turned out. Working in a different society and medical system really blows the cobwebs away, and focuses also on what is good and bad about our own. It has indeed been a life-enhancing experience.

Singapore has a short history. It was a fishing village of 150 people when, in 1819, Sir Stamford Raffles founded a trading station there. The town was ceded to the East India Company in 1824, to the presidency of Bengal in 1830 and

ological letter from Singapore

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to the British government in 1851, and thrived as an entrepot. The invasion by the Japanese in 1942 – the worst military defeat in British history in Churchill's words – marked the psychological end of the British empire in the East. Singapore was retaken by the British in 1945, granted independence in 1963 within the Federation of Malaysia, and became a sovereign state separate from Malaysia in 1965. An Asian Tiger with high rates of development, Singapore now has a GDP per head of US\$ 20 880 (UK GPP is \$23 753), a cost of living slightly less than that of London but ahead of Paris, and a population of 4.1 million on a land area (682 km²) approximately the size of the Isle of Wight. It is a city-state with much the same national identity as had Venice in the 16th century.

What is life like for a neurologist? Medical training and registration are based on the British model. Following the MB degree, aspiring specialists have 1 year as a houseman and then at least a further 3 years of general medical training. Membership of the Royal College of Physicians (or equivalent) is required, and then a minimum of 3 years specialist training in accredited posts, guided by a Specialist Training Committee. Most trainees also spend an additional 1–2 year period of overseas training, funded entirely by the Singaporean Government. These attachments were often spent in Britain in the past, but now the majority are in the US; British neurology departments are missing a trick here, as these young doctors come at no cost, and are enthusiastic and hard

The National Neuroscience Institute was opened in 1999 and is located in a purpose-built modern hospital complex.

working. The registrar's work is very similar to that in Britain, and there is even the equivalent (largely ignored) of a working hours directive. On completion of this training, a Certificate of Specialist Accreditation and entry onto the Specialist Register is awarded by the Specialist Accreditation Board. This probably seems like *déjà vu*, and indeed is very similar to the British training scheme from which it has heavily borrowed. Unsurprisingly, the young neurologist or neurosurgeon is trained to a level roughly equivalent to that in Britain. There is one important difference however, – the trainees are not expected to have acquired a research degree nor to have served any period in research and are much less academically inclined.

The ratio of neurologists to population is better than in the UK (approaching 1 : 100 000), however, primary care is poor in Singapore and the neurologist's work – especially in the private sector – includes consultations that in Britain would be primary care level. The full time consultant is contracted for a clinical commitment roughly similar to that in Britain but has less leave entitlement and less contractual security. Neurology in the private sector is of variable, and sometimes very low, quality. There is a strong emphasis on patient volume – the consultant will see 20 patients in a typical neurology out-patient session – not least because salaries have a significant performance element, and the more patients that are seen the higher is the delta. The take home salaries for neurologists are comparable with those in Britain. The same issues of continuing medical education, audit, clinical governance and even revalidation are on the agenda in Singapore as in Britain, and ties are maintained between the professional bodies in both countries.

The neurological disease profile differs in interesting ways. Meningioma is far more common. Stroke is more likely to be due to intracerebral haemorrhage, and when ischaemic stroke occurs it is less likely to be due to extracranial vascular disease. Dengue fever, Nipah virus and Japanese B encephalitis are seen, and tuberculous meningitis is relatively common. SLE is much more prevalent, MS much less common and different in form, and various rare and exotic tropical disorders are encountered. The healthcare is highly centralized and extensive statistics are kept; Singapore is a goldmine for the epidemiological researcher.

In Singapore, there are six major public hospitals and six National Centres. The National Neuroscience Institute (NNI) was opened in 1999 under the directorship of Prof Richard Johnson from Johns Hopkins, and was designated the national centre for neurology and neurosurgery. It has a clinical, research and teaching role. On the clinical side, the NNI administers 260 beds on two sites and conducts about 85% of all clinical neurology and neurosurgery in Singapore. It has a consultant establishment of 28 neurologists, 16 neurosurgeons, four neuroradiologists and two neuropathologists. There is also an establishment of 21 registrars and 21 medical officers (equivalent to senior house officers), although there are currently not enough trainees to fill these posts. There is in fact a chronic shortage of specialists in Singapore, as medical school manpower planning in the past has underestimated the recent expansion in medical facilities. The NNI runs a neuro-rehabilitation unit of 24 beds, a stroke unit, EEG telemetry beds and two dedicated neuro-ITUs. The NNI records about 46 000 neurology consultations and 14 000 neurosurgical consultations per year (with a

3 : 5 ratio of follow up to new cases), about 8300 neurology and 5100 neurosurgery admissions and about 2000 neurosurgical operations per year. The NNI, like other hospitals in Singapore, is modern, clean and equipped to a high level. The neuroradiology department has two MRI scanners (1.5 and 3T) and access to two others, biplanar 3D digital angiography, spiral CT, a mobile CT scanner (which can be used on the ITU and wards), an excellent PACs system and a high-quality interventional radiology service. The neurosurgical theatres have modern operating microscopes and navigation systems. The ITUs have fully electronic monitoring systems, and the wards are heavily computerized with semicomplete electronic medical records. Thalamic stimulators are funded centrally, and the surgeons run a privately-funded gamma knife service. The management of the public hospitals was recently transferred to non-profit-making government-linked companies (similar to the

UK Trusts), but there is still considerable Health Ministry control over all aspects of practice. The administration of the hospitals is professional and of a high standard.

Singapore has a unique funding structure for healthcare. Co-payment is a buzz word. The government is of the opinion that individuals should contribute to all healthcare costs—and in this way will be more careful of their health and less wasteful of resources. All costs are shared between the patient and government. For in-patients the amount of government subvention depends on the 'class' of the bed. There are five classes, the highest being a private room (all costs due from the patient) and the lowest being a non-air-conditioned 8-bedded ward sharing facilities (15% of costs due from the patient). Out-patients are subsidized to between 0 and 66% of basic costs. Furthermore, the government's contribution is capped for both out-patients and in-patients, for the latter at a level

Biomedical Science in Singapore. The major players are grouped together over a small area in central Singapore forming a biomedical hub.

that depends on the diagnosis [or more exactly the DRG (disease related group)]. All working adults in Singapore also have to contribute to a compulsory government-run savings scheme which includes 6–8% of their salary paid into a personal account (Medisave) which can be used to meet their contribution to the hospital bill. This is a savings-fund and not an insurance scheme, so it can easily be exhausted. The government also runs an insurance scheme for catastrophic illness (Medishield), but discourages conventional medical insurance. The result of all this is extremely confusing, not least to the Singaporean citizen who has to be counselled financially before entering hospital (even in the Accident and Emergency Department). The medical charges are modest and, in practice, the costs are affordable for most individuals. However, for the poor and especially for those with chronic or serious illnesses, medical costs can be a serious hardship. Medisave can run out, and there is no comprehensive safety net. Heavy debt can therefore be incurred, and bad-debt levels at the hospitals are significant (6% of total income for the NNI). The impact of this on medical practice is revealing, at least in the eyes of someone brought up in the UK system, and it introduces some perverse features. For a start, for the average citizen, costs are considered at every point in the medical process. Expensive investigations (e.g. MRI) are often withheld on economic grounds, especially as an out-patient. Perversely, patients are admitted to hospital for investigation, simply because the in-patient subvention from government is more than the out-patient subvention. There is a very limited list of 'standard drugs' for which the government will co-pay, and the patient will have to meet the entire cost of non-standard drugs (in epilepsy, for instance, the list does not include any of the new drugs introduced in Britain over the last 12 years). Pharmacy costs are high and drug supply not so secure as in Britain. Earlier this year, for example, the manufacturers abruptly withdrew primidone from the market and the supply ran out over a period of a couple of weeks. The government has a waiting-time initiative, with targets that would shame the average British hospital. The waiting time for a routine out-patient consultation at the NNI is about 3 weeks, and there are also daily emergency clinics. There are no significant waits for admission to hospital or for investigations. A patient with a headache who is found to have

a meningioma can expect to have had it excised within a week or two of diagnosis.

What about research? The hospital system in Singapore has developed very rapidly in the past decade, and whilst the traditional emphasis has been on clinical care, research is now strongly encouraged. This produces an interesting tension, especially within the senior echelons of the profession, which are very conservative. The attempt to shift from a service-base to a research-based practice is strongly resisted in these quarters, and this is perhaps the greatest challenge to Singaporean neurology. The Singaporean government has however, no such inhibitions. In year 2000, a decision was made to create a biotech industry to replace a perceived over-dependence on electronics. This led to a government-funded and government-orchestrated national development plan (the Biomedical Science Initiative), which has had an impact at many levels of society. An International Advisory Committee for Biomedicine has been formed, cochaired by Sir Richard Sykes and Sydney Brenner, and with Sir Keith Peters and Alan Munro as UK members. US\$ 3.8 billion has been allocated in 5 years to a science and technology board, and a new research-funding council with a 5-year budget of US\$ 800 million created. Major international figures were recruited to head up newly formed Institutes of Genomics and Bio-informatics. A new and highly futuristic campus – Biopolis – with living space for over 1000 scientists, is being built. Changes to the school and university curricula are being made to encourage science and biomedicine with a target of 1000 new PhDs by 2005. The emphasis of the medical research is on genomics, pharmaceuticals, bio-engineering and applied technologies – and neuroscience is seen as a key element. The Biomedical Science Initiative is essentially an economic lever, the main function of which is to increase prosperity – and the bottom-line target is to produce US\$ 7 billion manufacturing output by 2005. It is a remarkable mixture of centralized state-control and capitalism, of social engineering and enterprise, scientific risk and research scholarship. Whether it will succeed is difficult to predict; whatever else, though, it is a golden opportunity for academic and research neuroscience, and there are great opportunities for international collaboration, not least for Britain.