

PATIENT CARE

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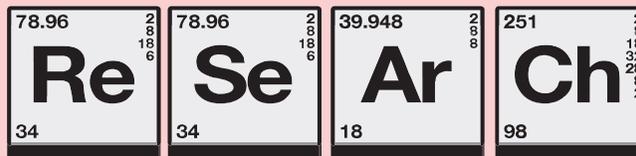
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BOARDING PASS

*Crossing Borders,
Breaking Boundaries.*



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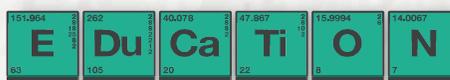
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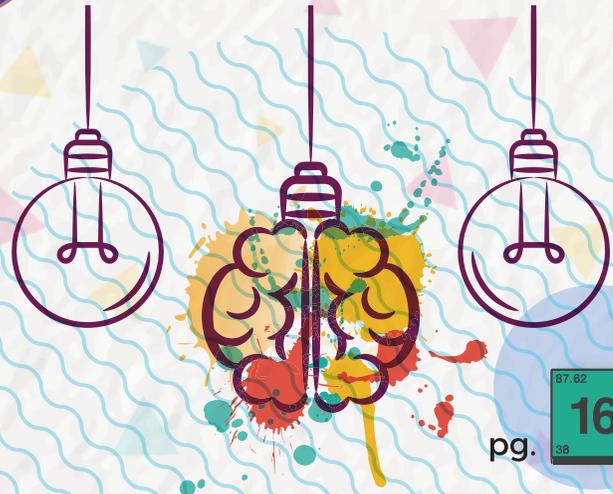
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RAISING BRAIN AWARENESS IN THE HEARTLANDS

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Raising
Patient Care
Standards through
**BENCH
RESEARCH**



RAISING

BRAINS



AWARENESS
IN THE HEARTLANDS

Better Minds. Better Lives. Better Tomorrow.



Over one weekend in **May**, residents in the eastern part of Singapore had a chance to **learn more about neurological diseases** through the National Neuroscience Institute's (NNI) first large-scale heartland outreach initiative.

Stroke is an **EMERGENCY**.
Recognise stroke symptoms and act **FAST**.



Important to Increase Public Awareness

On 20 and 21 May 2017, doctors and staff from NNI headed out from their hospitals to Our Tampines Hub. They shared with residents more about neurological conditions and how best to prevent, identify and manage them.

The public education programme was aimed at providing residents with information about brain, spine, nerve and muscle diseases in a carnival-like atmosphere.

Gracing the event as Guest-of-Honour was Minister for Finance, Mr Heng Swee Keat. In his opening address, Minister Heng shared his experience recovering from a stroke.

He said that during this time last year, he was in hospital recovering from his stroke. Among those involved in his care was the NNI team.

"During my time in the hospital, I had a chance to learn more about the brain. It was both frightening and fascinating. Frightening in the sense of the many things that could go wrong, and fascinating in the sense of the wonderful things that the brain was capable of doing," said Minister Heng.

He added that the event provided a good platform for the public to learn more about what could go wrong with the brain and how to better protect themselves from brain diseases.

He cautioned however that even with the best preventive measures, things could still go wrong. "I, myself, was considered at low risk of stroke. I am therefore an advocate of greater awareness of symptoms in order to enable early treatment," said Minister Heng.

BRINGING CARE TO THE COMMUNITY

Over the two-day event, residents listened to talks by medical professionals, watched skits and performances, and participated in activities aimed at raising awareness of neurological conditions such as stroke, dementia and Parkinson's Disease.

NNI also brought research to the heartlands. Residents learnt about the importance of neuroscience research and how it helps to treat and improve quality of life for those with neurological conditions.

At the opening ceremony, NNI's Medical Director, Associate Professor Ng Wai Hoe shared that the event was in line with the Ministry of Health's goal to provide care beyond the hospital to the community. "Likewise, we aim to not only provide optimal healthcare services for you but to promote a healthy lifestyle to prevent and detect diseases early and to bring care to the homes and community.

"Today's Brain Awareness carnival is an excellent avenue to achieve these goals. Through fun and engaging activities, we want to spread the word - that you can play a part in preventing some neurological diseases," said A/Prof Ng.

Group Chief Executive Officer, Singapore Health Services, Professor Ivy Ng, said that it was timely that NNI was organising such an event as neurological disorders were no longer uncommon concepts. "With our ageing population, we are seeing more and more people grappling with such conditions."

Bedok resident, Mdm Ruzila Binti Ali, who happened to be having breakfast with her family in the area, shared similar sentiments: "I've learnt many informative and useful tips about brain diseases here, such as what are the symptoms to look out for and what are the healthy things to eat.

My father is now 81 years old, and I've become more conscious about diseases such as strokes. When I go to the park nowadays, I notice more and more elderly residents. Community awareness is really very important."

PATIENT CARE



NNI specialists holding health talks



Guest-of-Honour Minister Heng Swee Keat speaking at the Opening Ceremony



Table Tennis players from the Table Tennis Association for the Disabled (Singapore) in action

**Better Minds.
Better Lives.
Better Tomorrow.**



Choir from the Singapore National Stroke Association with the opening performance



Mr Peter Seah, Chairman, SingHealth, Prof Ivy Ng, Group Chief Executive Officer, SingHealth, Mr Heng Swee Keat, Minister for Finance, A/Prof Ng Wai Hoe, Medical Director, NNI at the launch





Chess players from the Singapore Chess Federation engaging the public



Memory and Parkinson screening session



Finding out more about neuroscience research and education



TTSH Physiotherapists on stage for the High 5 for Brain Health workout



Guests doing the High 5 for Brain Health workout



SGH Physiotherapists in action with their Dance Fitness exercise session



Health Exhibition featuring information on prevalent neurological conditions

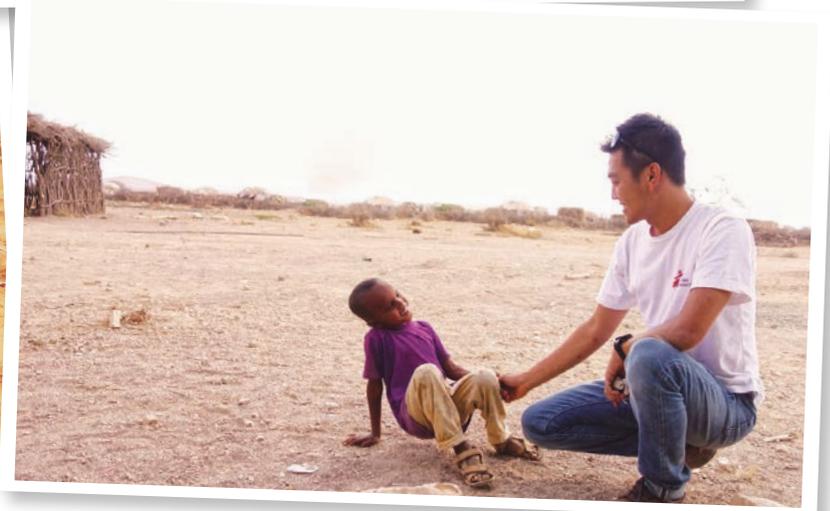
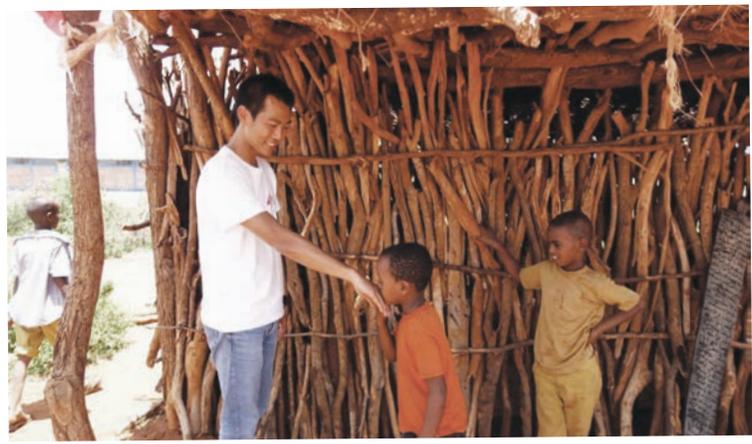


Co-chairpersons Dr Carol Tham and Dr Wee Chee Keong giving out the lucky draw prizes

Humanitarian Missions @ NNI

The spirit of volunteerism is strong at NNI. This issue, NeusLink chats with the doctors and nurses of NNI to learn more out about the various overseas humanitarian missions that they're involved with.





Man on a Mission

In the 12 months Dr Koh Yeow Hoay spent on a humanitarian mission near the borders of Ethiopia and Somalia, he saw three outbreaks of measles plague the small village of Dolo.

The highly contagious infection is easily prevented by vaccination in many parts of the developed world, including Singapore where the vaccination is mandatory. But in arid Ethiopian deserts where food and water are scarce, the disease can be a death sentence for already-malnourished children.

Besides treating patients at the town's only hospital, Dr Koh also travelled with a mobile clinic to reach less accessible parts of Dolo. Sometimes, they would commute for up to six hours across unpaved roads and tea-coloured rivers to administer vaccines, diagnose patients, and ferry critically ill ones to hospital.



While it was not his first Doctors Without Borders mission – Dr Koh went to Swaziland over ten years ago on a HIV project – living in rural Ethiopia was still a culture shock. Armed violence between rebels and the local army made the area unsafe after dark, so Dr Koh had a 6 pm curfew every day.

“I went to Ethiopia to make a difference, but I also learnt to appreciate life much more.”

Fresh produce such as vegetables, eggs and fruits were also in short supply. “Whenever we wanted things like cheese or apples, we had to ask people coming from Ethiopia’s capital Addis Ababa,” says the Associate Consultant in the Department of Neurology at NNI.

When he thinks back on the experience, Dr Koh is pensive. “We shouldn’t take health care for granted. Some people in Ethiopia with malaria, tuberculosis or typhoid might walk for more than ten hours to a hospital that doesn’t even have a working x-ray machine,” says the 38-year-old.

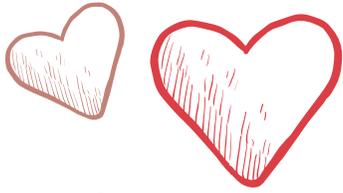
Still, there were bright spots amidst the physical and emotional toll, like the children who recovered and the healthy babies he delivered. Dr Koh is grateful for all aspects of the experience, as well as to his bosses who supported him through it.

“Because we have so many patients, it is not easy to get sabbatical leave for a year,” says Dr Koh, whose colleagues helped take over his clinics while he was away.

He adds: “I went to Ethiopia to make a difference, but I also learnt to appreciate life much more.”



PATIENT CARE



A Voice for the Forgotten

On the Thailand-Myanmar border, near the town of Mae Sot, lies a clinic that's been serving the needs of Myanmar refugees for the past 20 years. Growing from a one-room makeshift clinic in 1989 to a comprehensive healthcare facility serving the needs of over 150,000 patients today, Mae Tao Clinic's ability to sustain has been largely due to the support of volunteers.

Professor Tchoyoson Lim, a Senior Consultant Neuro-Radiologist at NNI, first heard about the needs of Mae Tao Clinic through personal friends. He went on to share these needs with Associate Professor Tham Kum Ying, Assistant Dean at Lee Kong Chian School of Medicine, who thought that an overseas trip to Mae Tao for students would be a good way to get involved.

Professor Lim said that even though the duration of the trip was only one week, it gave medical students exposure as to how medicine was practised in a frontier-type situation.

"A bit to my surprise, there were a lot of generous individuals and students who signed up for this. They were interested in the practice of humanitarian

medicine in a challenging environment," says Professor Lim.

After the trip, Professor Lim realised that there were still many more needs that needed to be fulfilled and hence planned a return trip, asking for other volunteers to join him.

Associate Professor Kevin Tan, a Senior Consultant Neurologist at NNI, was one of these volunteers who stepped up. He's been to Mae Tao twice since 2016 and plans to make these visits a regular thing. Part of the work A/Prof Tan does at Mae Tao includes sharing his medical

"I feel that as long as we are able to share some of our expertise in clinical care or training, then the time spent there is worthwhile."



knowledge with the local medics, who he says are the true lifeblood of the clinic.

"They go through a two-year course on basic medical skills and have the equivalent training of community health workers. They are trained to a certain level where they can take care of most patients, but when cases get too complex, that's where we try and support them with additional medical expertise," says A/Prof Tan.

In terms of challenges, A/Prof Tan shares that something he missed at Mae Tao was not having access to many of the medical tests that he was used to having in Singapore.

"Besides blood tests, we can't really do x-rays or scans. We

have to make clinical decisions based on bedside clinical evaluation, which is how things were done before these tests were invented. We have to go back to basics," he says.

Despite having to face these challenges, Professor Lim believes strongly in the work that they do. "As Singaporeans, we've been very blessed with good circumstances. Very often we take it for granted."

A/Prof Tan agrees: "This clinic is serving a population that will not have access to healthcare otherwise. I feel that as long as we are able to share some of our expertise in clinical care or training, then the time spent there is worthwhile."



Knowledge Exchange with Neighbours

A team consisting of healthcare professionals from NNI has been faithfully volunteering their time and services to raise the level of stroke care for patients at Yangon General Hospital in Myanmar since 2015.

One of these volunteers is Advance Practice Nurse (APN) Tan Il Fan who has so far been on two of these missions. APN Tan shares that on these trips, she collaborates with the other doctor and therapist volunteers to share knowledge and insight on various aspects of stroke care. Her focus includes stroke education for caregivers, hyper-acute stroke management, and the use of stroke assessment tools.

Explaining her impetus for volunteering, she says: "As Singapore's national centre of neuroscience excellence, there's a strong mindset that if we have a good thing we must share it."

It clearly goes beyond a sense of duty though, as volunteers often have to pay their own way and use their annual leave for such missions. There's also a certain

"Through this partnership, we're really learning a lot from each other on how to raise the standards of patient care."

level of commitment required for these kind of collaborative projects. "We can't do everything in one trip. We need to make follow-up trips to ensure that whatever we've shared is successfully implemented into their local setting," explains APN Tan.

Another member of the team is Consultant Neurologist, Dr Carol Tham, who went on her first trip in Yangon this year to share her expertise on stroke and in particular hyperacute stroke treatments such as intravenous thrombolysis. That's a type of medication that can be given to patients who seek help at hospitals within the first few hours of an ischaemic stroke to improve their chances of recovery.

She shares that Yangon General Hospital was just starting to incorporate intravenous thrombolysis as part of their acute stroke care programme, while NNI had already been doing it for some time. "I feel

that since we have the knowledge and expertise, it's only right that we share this with our neighbours."

However, it wasn't just a one-way exchange. Dr Tham shares that the experience in Yangon also helped the Singapore team to broaden their mind towards alternative approaches of doing things. "The social and cultural situation in Myanmar is very different from Singapore and we had to be mindful of this when discussing approaches to stroke treatments. We had to think of how to adapt the treatments to their situation," she says.

A positive takeaway from the Myanmar trip, APN Tan notes, was observing the attitude of patients' families with regards to bedside care. "A lot of their patient care is delivered by the family members. I think that is definitely something that Singaporeans can learn from."

Dr Tham agrees: "Through this partnership, we're really learning a lot from each other on how to raise the standards of patient care."



Award-Winning Spirit

Advance Practice Nurse (APN) Tan Il Fan was recently presented with the Healthcare Humanity Award, as well as Outstanding Nurse Award (SingHealth Excellence Award). Despite these accolades, Il Fan remains level headed and is quick to downplay her achievements.

Going Beyond

As an APN, sub-specialising in stroke at NNI, Il Fan has her days occupied, attending to patients from the stroke unit and outpatient clinics. She plays an active role in the stroke activation process and is one of the key members involved in planning initiatives to standardise care.

Nevertheless, she still manages to find the time to volunteer her services to raise community awareness about stroke. In addition to giving talks, Il Fan has also travelled to hospitals in the region to exchange knowledge with inter-disciplinary teams to improve stroke care.

At work, Il Fan also goes out of her way to help patients and their families. One such patient that Il Fan helped had Motor Neurone Disease, which left him unable to move his limbs.

Despite his condition, the patient shared that he did not want to go to a nursing home. "The problem, unfortunately, was that he required a lot of care. Of the two sons who were living with him, the younger one was studying and working part time, while the older one had low mental ability," says Il Fan.

However, she respected the patient's wishes and started exploring care options with physiotherapists and social workers



to see if it was possible for him to return home. It was eventually agreed that the elder son would become the patient's main carer, and Il Fan commenced caregiver training for him.

Subsequently, Il Fan maintained home visits on a voluntary basis. "I wanted to ensure that all possible safety measures were in place even if the patient was home alone," she shares.

Wearing Multiple Hats

One of Il Fan's challenges is juggling multiple roles. Besides her clinical roles, she also plays the role of an educator and researcher. As NNI is a specialised centre for neuroscience, she says it is important to practise evidence-based medicine and train healthcare professionals to meet the needs of the community.

"We regularly attend courses and journal clubs, as well as search for online resources to equip ourselves with the relevant skills and knowledge."

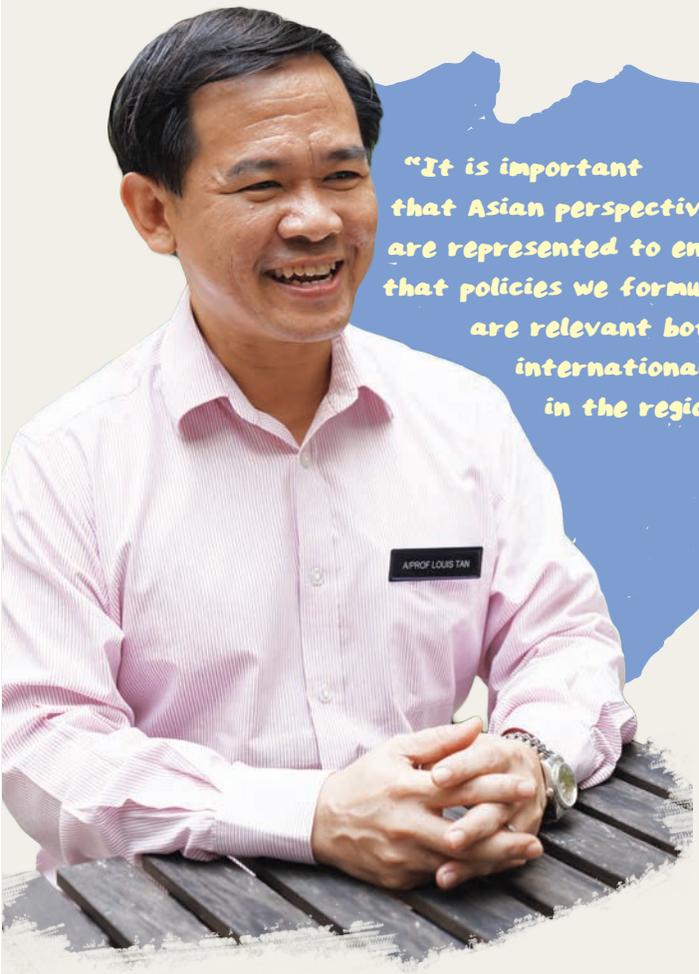
Despite these challenges, Il Fan believes that it is this difficult balance that helps her to excel in her field. "If you're only doing education, you don't know the latest update on clinical rounds. But because we are so closely tied to clinical work, we always teach updated practices. The same goes for research."

Through it all, Il Fan says what keeps her going, is her love and concern for her patients. She adds that she will continue to improve her skills, to provide better care for her patients in their journey to recovery.

A Guiding Hand

Associate Professor Louis Tan believes in educating the next generation of doctors, whether he is overseeing research projects in Singapore or a regional congress for the International Parkinson and Movement Disorder Society.

“It is important that Asian perspectives are represented to ensure that policies we formulate are relevant both internationally and in the region”



A/Prof Louis Tan wears many hats. His daily work involves a combination of treating patients, doing ward rounds, teaching junior doctors and medical students, and overseeing research projects such as a long-term study of the progression of Parkinson’s disease. These are all part of his job scope as a Senior Consultant in the Department of Neurology.

On top of that, Prof Tan also sits on the international executive committee for the International Parkinson and Movement Disorder Society (MDS), a professional society of clinicians, scientists and healthcare professionals within the field.

He has spent 16 years as a member of the society, where he worked with various sub-committees to improve the quality of treatment for movement disorders through education and outreach. For instance, Prof Tan and his team organised conferences in developing countries, bringing in senior doctors to conduct courses for healthcare professionals there.

“We help local doctors, trainees, students and health care workers to update their knowledge and understanding of movement disorders so they can improve treatment of their own patients,” says Prof Tan.

The 51-year-old, who currently serves as Treasurer-Elect, is only the second Asian to be elected as an

MDS officer – a position he takes seriously.

“Asia is the largest and most populous region in the world. It is important that Asian perspectives are represented to ensure that policies we formulate are relevant both internationally and in the region,” he says.

His work at TTSH and MDS keeps the father-of-three busy – but not too busy to ferry his three teenage children to school and co-curricular activity trainings, or to cheer from the stands during their matches. Weekends are spent with his wife and children, at church or gatherings with the extended family.

It is a busy life, but a meaningful and fulfilling one. Prof Tan says, “I enjoy being involved in a leadership role both in NNI and MDS – to raise the next generation of doctors as they establish themselves, and to enhance movement disorders treatment and care through education and outreach.”



A/Prof Louis Tan receiving the President's Distinguished Service Award at the 19th International Congress of Parkinson's Disease and Movement Disorders.

EDUCATION

LEARNING

FROM THE

BEST

This issue, NeusLink continues our profile on two doctors who recently completed their Health Manpower Development Programme (HMDP) overseas stint. We learn more about their time away and how they're using this knowledge to raise patient care standards at NNI.

HMDP is a programme co-funded by SingHealth and the Ministry of Health, whereby doctors are sent overseas to further their specialist training.

Broadening Horizons

Dr Lin Xuling

Following Dr Lin Xuling's two-year Neuro-Oncology fellowship at Memorial Sloan Kettering Cancer Center (MSKCC), NNI's Neurology department now has a specialist dedicated to seeing brain tumor patients. Indeed, it is this sense of purpose that drove Dr Lin to become a doctor in the first place.

Dr Lin relishes her two-years away at MSKCC, not simply because of the high-level of clinical training she received, but also for the exposure and opportunity to broaden her horizons. She shares that some of the interesting aspects that she was exposed to during her time at MSKCC included honing communication skills, as well as thinking about concepts such as burnout, which she felt was not something commonly discussed in an Asian context.

Before sub-specialising in Neuro-Oncology, Dr Lin says that she did not often have to see cancer patients. As a Neuro-Oncologist, however, she shares that patients with glioblastoma, the most common malignant brain tumour in adults, have a poor prognosis with median survival of less than two years.

"At some point in my two years away, I realised that perhaps I wasn't prepared to deal with the emotional aspects. That's where being with people trained in the specific area of neuro-oncology was especially helpful."

Being in one of the top cancer centres in the world exposed Dr Lin to cutting-edge laboratory research and clinical trials. There she also got to interact with some of the most famous and prominent neuro-oncologists in the world.



"Instead of being hands-off doctors who were only into research, they were surprisingly down to earth and patient-centred. It was a humbling experience to see how they work."

"These are the people you see during conferences. What struck me, however, was that instead of being hands-off doctors who were only into research, they were surprisingly down to earth and patient-centred. It was a humbling experience to see how they work," shares Dr Lin.

Back in Singapore and in the full swing of things, Dr Lin has no regrets about her choice to be a doctor. "I honestly don't know if I would feel as rewarded or satisfied doing anything else. If I had to choose again, I would definitely still want to be a doctor."

Healthcare with a Heart

DR WEE CHEE KEONG

When Dr Wee Chee Keong applied for HMDP in 2014, his objective was clear. He wanted to work at Perth's Sir Charles Gairdner Hospital (SCGH), observing their treatment methods for acute stroke patients. These include the CT perfusion, a scan that differentiates damaged and salvageable brain tissue.

Although he had read many papers on CT perfusion, he wanted to observe the procedure first hand as it is not routinely performed in Singapore. Dr Wee hoped to work under the mentorship of prolific neurology professor Graeme Hankey.

He got all that and more. Besides observing procedures and seeing patients of his own, the 39-year-old also learnt how the hospital's integrated healthcare system worked. From paramedics, to accident and emergency doctors, to neurologists, every member of the system collaborates to provide the best possible care.

"There is a lot of joint decision making throughout the whole chain of healthcare professionals, which is only possible when all parties trust and understand each other's considerations," says Dr Wee.

After spending a year in Perth, Dr Wee returned to Singapore in October 2016 with these experiences in mind.

"I learnt that we should give more responsibility to people who can handle it, and I do so with junior doctors and registrars. I still keep a watchful eye on them from behind, but I let them sort out problems themselves because that is the only way they will learn," says Dr Wee.

He combines these soft skills with the knowledge he has garnered from his time at SCGH, and shares this experience with others as they introduced multiphasic CT imaging – a similar way of assessing patients with acute stroke.

As much as he has learnt, however, one of Dr Wee's most memorable takeaways is a simple phrase from Prof Hankey: "I don't know."

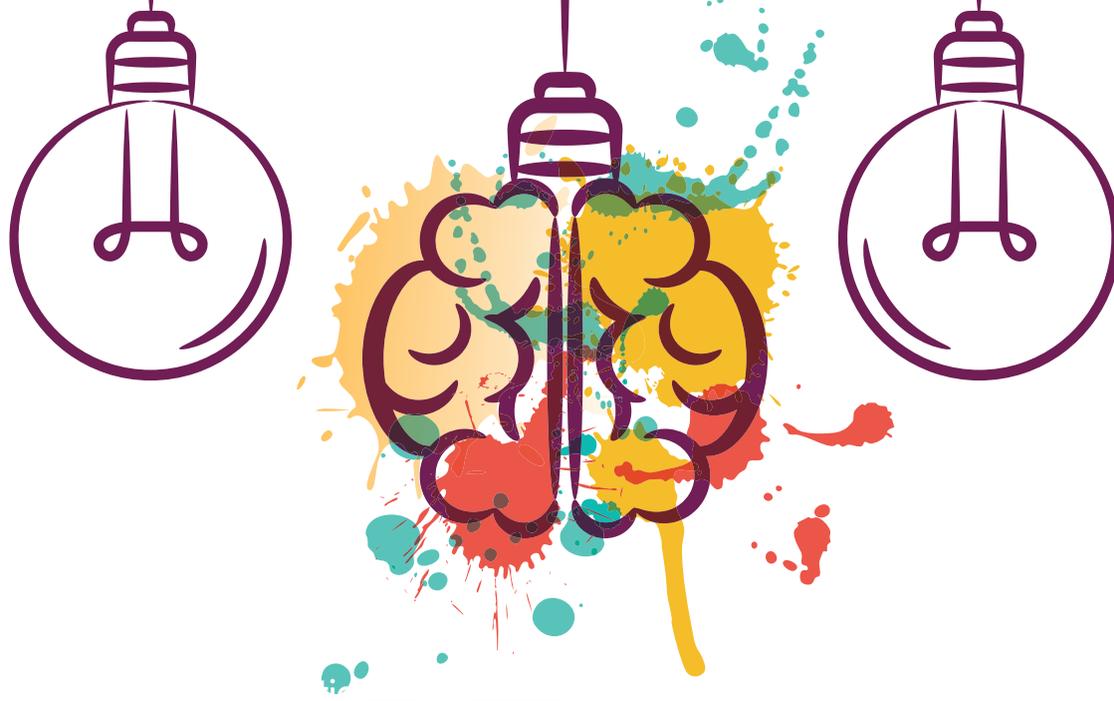
"I asked him how best to manage a difficult condition, and Prof Hankey said 'I don't know, let's find out,'" recalls Dr Wee.

He adds, "As doctors we often feel we have a need to know everything, and feel uneasy when we reach the limits of our knowledge; but Prof Hankey taught me it's ok to say I don't know, because that's the first step to learning."



"As doctors we often feel we have a need to know everything, and feel uneasy when we reach the limits of our knowledge; but Prof Hankey taught me it's ok to say I don't know, because that's the first step to learning."

EDUCATION



A SMART WAY TO COPE WITH STROKE

NNI's Stroke Memory Rehabilitation Programme, which was launched at the 5th Singapore International Neurocognitive Symposium, helps stroke patients slow or prevent the onset of dementia.

After Alf suffered from two strokes in 2016 and 2017, he could not recall the names of approximately 50 security guards working under his charge.

At the time, he did not know the two strokes he suffered had led to dementia.

"I felt frustrated and depressed, and lost confidence in myself because I could not remember things or perform my duties like I used to," said Alf, who is a professional in the security industry.

But the six-week Stroke Memory Rehabilitation Programme (SMaRT) carried out by the National Neuroscience

Institute (NNI) helped Alf re-learn and maintain his daily functions. For instance, Alf learnt to break down names and sentences into segments that were easier to recall, in a technique known as chunking.

As his memory returned, so did his confidence. Today the 65-year-old is back at work, carrying out the same tasks he used to.

"The SMaRT Programme gave me the motivation to update and improve myself, and cope better with dementia," he said.

Preventing dementia

The SMaRT programme, which was launched at the 5th Singapore International Neurocognitive Symposium in March 2017, targets stroke patients who are at a high risk of developing dementia.

Approximately one in six people will have a stroke during their lifetime, and several studies conducted by the NNI show a close link between stroke and dementia, according to Associate Professor Nagaendran Kandiah, a Senior Consultant in the Department of Neurology at NNI.

A/Prof Nagaendran, who chaired the organising committee of the symposium, said: "With early intervention, we can delay the onset of dementia and better manage its symptoms. The sooner the intervention, the better the treatment outcomes."

NNI staff running the programme teach patients strategies to cope with their symptoms, such as carrying a notebook to write down things they cannot remember.

They also encourage patients to adopt a healthy diet, sleep routine and exercise programme to delay the progression of dementia.

"We are trying to create good habits in patients and make these three brain essentials second nature to them," said Senior Psychologist Ms Eveline Silva from the NNI's Department of Neurology.



"With early intervention, we can delay the onset of dementia and better manage its symptoms. The sooner the intervention, the better the treatment outcomes."

SMaRT in the community

A pilot was held for the SMaRT programme in February 2017. There are plans to bring it to the community over the next three years. To do so, NNI will be working closely with Community Care providers, with support from the Agency for Integrated Care. When fully implemented, this is expected to benefit around 2,500 stroke patients each year.

"The programme will cater for patients within the first year after their stroke, to help them transit back to the community and their workplaces," said Senior Minister of State Dr Amy Khor at the opening ceremony of the symposium.

Ultimately, it is a collaborative effort among patients, caregivers, healthcare professionals and the community to help set their recovery on the right track.

Ms Silva said: "When patients get dementia they often hide behind their own walls of insecurities. We encourage them to step out.

With the SMaRT programme, more will soon be able to.



RESEARCH

DIAGNOSING POST-STROKE COGNITIVE IMPAIRMENT

*By Russell Jude Chander
National Neuroscience Institute*

About 1 in 25 adults above the age of 50 in Singapore will have a stroke in their lifetime¹, and while patients are usually keen to resume their old routines, post-stroke cognitive impairment (PSCI) is a potential challenge during recovery. PSCI is the development of cognitive impairments after a stroke, and can range from mild impairments to full-blown dementia.

If we can identify stroke patients at risk of developing PSCI, they can start therapy and/or medication to prevent its onset, and manage it from an early stage. But diagnosis can be tricky, as there are several factors at play.

Our Neurocognition and Memory Disorders research team at the National Neuroscience Institute (NNI) derived a prediction score to assess a patient's risk of PSCI within 18 months of a stroke. This score achieved 73% accuracy. It takes into account factors such as a patient's age, education level, brain atrophy, location of large new strokes, number of old strokes and white matter disease.

We believe that this risk score will help stroke teams streamline their patient management workflows, and help them to identify otherwise undetected patients at risk for PSCI.



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¹Ministry of Health, Singapore (2009). Stroke and transient ischemic attacks: Assessment, investigation, immediate management and secondary prevention. http://www.moh.gov.sg/content/moh_web/home/

Advancing Treatment Techniques for Parkinson's Disease

Scientists are now a step closer to developing better treatment methods for Parkinson's disease, thanks to a new study on the optimal stage for cell replacement therapy.

Till today, Parkinson's is unfortunately a disease that has no cure.

While medication can help to slow or improve symptoms, patients ultimately face progressive degeneration of their nervous system, which is often characterised by tremors as well as movement loss.

Beyond medication, there have been talks of using cell replacement therapy to treat Parkinson's disease. Since the disease is characterised by the loss of dopaminergic (DA) neurons, transplant of healthy brain cells derived from human embryonic stem cells could potentially help patients to regain their physical functions and movement.

Professor Tan Eng King, Research Director at the National Neuroscience Institute highlights, however, that up to this point in time, no systematic comparison analysis had been conducted to determine which stage of cell development was most ideal for transplantation.

"It is essential that we determine this before proceeding to clinical trials in human patients," he says.

Professor Tan and scientists from NNI and the Agency for Science, Technology and Research (A*STAR) thus decided to embark on a study, which was funded by the National Medical Research Council-Translational and Clinical Research (NMRC-TCR) Flagship Programme, to examine cell development stages. Their research focused on three stages of DA cells that were going through differentiation - a process whereby embryonic stem cells develop into different type of cells with specialised functions.

Through this study, co-lead investigator Dr Steve Oh, Director of Stem Cell Bioprocessing at A*STAR, shares that they have been able to identify immature DA neurons, differentiated for 25 days as the most suitable cell source for future Parkinson's disease cell therapy. "Cell types at earlier or later stages are not suitable



From left to right: Dr Liao Mei-Chih, Dr Steve K W Oh, Prof Tan Eng King, Dr Zeng Li, Dr Qiu Lifeng

due to their immaturity and reduced ability to survive in vivo," he says.

Dr Zeng Li, Senior Research Scientist at NNI, adds: "This study provides valuable guidelines for standardising the differentiation stage of the transplantable cells used in treating Parkinson's disease."

"The next step is to develop a more scalable production method for DA cell population to ensure consistency, efficacy and safety of the therapy."

RESEARCH



Applying Research for Better Patient Care

Research Is A Team Effort Dr Tu Tian Ming

Like many young doctors, it wasn't always clear to Dr Tu Tian Ming, a Consultant Neurologist at NNI, what his eventual specialisation would be in. All these changed during his Medical Officer posting to NNI in 2008.

"It was because of the people at NNI, the subject matter, the patients we saw and how much we could help them that made me realise that neurology was the field for me," shares Dr Tu.

Incidentally, it was also at this time that his interest in research was sparked, as he worked with Associate Professor Nigel Tan, Education Director at NNI, on an epilepsy research project.

One thing that Dr Tu appreciates about working in NNI is the supportive research environment. Dr Tu says that doctors at NNI have access to mentors who are well-informed in research, and who are able to nurture junior doctors to become researchers. Additionally, Dr Tu says that because NNI is a busy clinical centre, "we have many patients whom we can recruit to participate in studies".

To further pursue his research interests, in 2013, Dr Tu embarked on a Clinical Investigations Masters programme to hone his skills in clinical research. This was made possible thanks to a research training grant which he received from the National Medical Research Council (NMRC). In addition to the research training grant, NMRC also supported Dr Tu in pursuing an overseas research fellowship from 2015 to 2016 at Duke University in North Carolina, USA.

"It's a long road ahead. You must be mentally prepared. But if you have an undying interest, you'll be able to go through with it!"

During Dr Tu's overseas fellowship, he had the chance to work in a prominent neurovascular lab. He shared his experience: "I got to know my mentor very well, and we worked together on a project and successfully published a paper. The key thing for me during my fellowship was the relationships that I built with these overseas counterparts. This helped me to develop many new research ideas."



Today, Dr Tu and his research team are busy working on a project to look at clinical features that support selecting patients who are predisposed to pneumonia. "Using scales, we are able to implement interventions in high-risk patients before they fall sick with pneumonia. This is one of the most meaningful projects we've done so far," says Dr Tu.

Acknowledging how much he has benefitted from the guidance of his predecessors, Dr Tu has some words of advice for aspiring clinician-scientists: "It's a long road ahead. You must be mentally prepared. But if you have an undying interest, you'll be able to go through with it!"

Patients Keep Him Going Dr Ng Kok Pin

That it's a challenge to balance his time between clinical and research tasks for Consultant Neurologist, Dr Ng Kok Pin, is perhaps a bit of an understatement. In addition to ward rounds at Tan Tock Seng Hospital (TTSH), providing blue letter services to Khoo Teck Puat Hospital (KTPH), conducting general neurology clinics, and running a sub-specialty dementia clinic, Dr Ng is also involved in several research projects.

Prior to joining NNI in 2012, Dr Ng knew little about research. It was his mentor at NNI, Associate Professor Nagaendran Kandiah, a senior consultant in the department of neurology, who initiated him into the world of research, showing him how research could translate into real clinical successes.

In addition to A/Prof Nagaendran, Dr Ng also received support from organisations such as the National Medical Research Council (NMRC) in his research journey. Through grants, Dr Ng was able to pursue a Masters of Clinical Investigators course in 2014, and a research training fellowship programme at McGill University Research Centre for Studies in Aging (MCSA) in 2016.

Dr Ng attributes his time away at MCSA for pushing him to the next stage. Under the guidance of his supervisors, Professor Serge Gauthier and Dr Pedro Rosa-Neto, Dr Ng was introduced into the world of positron emission tomography (PET) imaging.

"There, I had the opportunity to lead and run PET imaging studies. I was trained in the various steps of PET, including tracer production, scanning protocols, in vitro and in vivo quantification of PET tracer binding, and its application in research and clinical studies," says Dr Ng.

"We're now able to understand the pathophysiology underneath abnormal protein in a living human brain. In the past, this could only be done in pathology studies after the patient had passed away. We can now see progression, and that's very important for us to understand the disease further."

"When we see young patients or patients in the early stages who are motivated to join our studies, it definitely keeps us motivated to try and find the causes and treatment."

Even though NNI supports researchers with time to do their research projects, Dr Ng often continues his research work at home after hours. To sustain himself, Dr Ng says that passion is a must.

Dr Ng says that this passion comes from the patients that he sees. He explains: "Dementia, unfortunately, is still a degenerative disease with no cure. When we see young patients or patients in the early stages who are motivated to join our studies, it definitely keeps us motivated to try and find the causes and treatment."

Having only come back from MCSA in June this year, Dr Ng is already planning his next step. "In the first few years, the mentorship of Dr Nagaendran and my colleagues were vital. The next step for me is to try and develop myself as an independent researcher. Grants such as NMRC's CS-IRG New Investigator Grant will certainly help young researchers like me to continue down this path."





Team Expansion

NNI's Neuro-Oncology Research Laboratory has been running for 12 years. Dr Tang shares that the lab's strength lies in the cell lines that they've been able to establish from patient material, as well as their animal models which are able to accurately reflect the patient's molecular makeup. This has enabled them to be able to validate the efficacy of different drugs, as well as various bench discoveries.

"However, our limitation at NNI is patient load. We don't see too many brain tumour patients in a year. This is where the synergy of working with Siriraj Hospital comes in. They have a huge patient load with impressive research infrastructure," says Dr Tang.

Equally important in making the collaboration work is neuro-oncologist at Siriraj Hospital, A/Prof Sith Sathornsumetee, who coordinates efforts from the Thai side. A/Prof Sith's credentials are impeccable, having trained at Duke University in Durham,

North Carolina, and done a post-doctoral fellowship in neuro-oncology bench research with eminent brain tumour physician-scientist, Prof Jeremy Rich.

"Because of Sith's deep training in bench research, he understands the kind of molecular profiling required in recruiting patients for clinical trials," says Dr Tang.

A/Prof Ang adds that NNI's dream is to collate a recurrent malignant glioblastoma database. "For specimen collection, you want a matched pair. You want the tissue from the patient's first surgery, and then from subsequent surgeries when tumours recur. If one can achieve this type of data bank - a tissue bank with clinical information - that will be the gold mine."

Patient-Centred Care

Even though bench research may sound cold and remotely clinical, Dr Tang reminds us that the work they do is driven by the desire to improve patient survival rates.

"Unlike other cancers such as breast cancer which is treatable if detected early, the survival period of brain tumour patients has not improved over the past decade. It's a devastating disease where the quality of life progressively drops with each repeat surgery. There's therefore a lot of room for improvement and non-invasive monitoring that take into account the molecular profile," says Dr Tang.

She believes that the next frontier lies in molecular profiling. "We are seeing hints of why different patients are responding differently to the same drug. That's because the molecular patterns are different. This kind of new knowledge is not yet common in most hospitals, as it requires the establishment

of pathological diagnostic methods to match the recently revised W.H.O. classification scheme."

Despite a long and arduous research journey, A/Prof Ang is positive that results can soon be translated into the clinical setting. "Given what we've found in our lab and what other like-minded labs are doing around the world, it may not be very long before we can effect some type of precision medicine strategy that helps us to match patients to the right drugs," he says.

Dr Tang agrees: "Ultimately, our goal is two things: a reduction of chemotherapeutic side effects, and a reduction of financial costs, due to the prescription of more suitable drugs."



MOU Between NNI and Siriraj Hospital

On 26 January 2016, A/Prof Ang Beng Ti and Dr Carol Tang made a trip to Siriraj Hospital, to formalise the relationship between the two institutions through the signing of an MOU. Representing Siriraj Hospital at the signing was A/Prof Sith Sathornsumetee, and Prof Prasit Watanapa, Dean and Professor of Surgery at Mahidol University, of which Siriraj Hospital is a part of.

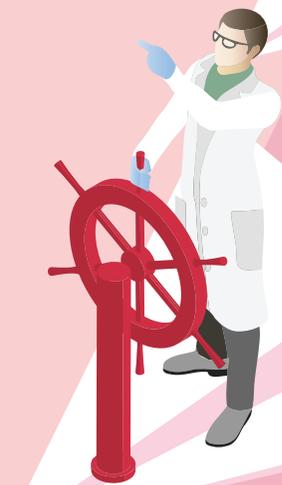
This MOU allows both parties to explore clinical information for the purpose of advancing research collaborations, such as exchange of patient clinical data, research findings and exchange of manpower and training, and recruitment of brain tumour patients for precision medicine-based clinical trials.



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