

# MediCine

A PUBLICATION OF THE YONG LOO LIN SCHOOL OF MEDICINE

ISSUE 41 FEB 2022

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## LOVING, LIVING AND LETTING GO

Joy and heartbreak in caring for  
an autistic child

*p.08*

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## NEXT-GENERATION VACCINES

Much needed enhancements in  
anti-COVID-19 fight

*p.14*



# BUTTERFLIES, BURNOUT AND THE POWER OF TRANSFORMATION

The Determination to Not Only Survive But Thrive

# Contents

## Dossier

**02** MEGICal Highlights from NUS Medicine Educators' Day 2021

**05** NUS MED Camp 2021

## In Vivo

**06** Helping Our Senior Citizens Grapple with Health Assistance Schemes

**08** Loving, Living and Letting Go

## Ethically Speaking

**11** Does Singapore Seem More Anxious about COVID-19 Deaths than Any Other Causes?

## COVID-19 Special

**14** Next-Generation Vaccines Much Needed Enhancements in Anti-COVID-19 Fight

## Science of Life

**18** Singapore Research Team Uses Indoor Air Sampling Surveillance to Sniff Out COVID-19

**20** New Purpose to Old Drugs: NUS Researchers Discover Possible New Treatment for Aggressive Forms of Breast Cancer

**22** New Glaucoma Implant Reduces Eye Pressure and Preserves Vision

## Insight

**24** Butterflies, Burnout and the Power of Transformation

**28** Slaying a Serial Killer – The Decade-long Quest by an NUS and Glaxosmithkline Team

**31** Tuberculosis Alert!

**34** Why We Teach

## All in the Family

**38** Family Matters

## People of NUS Medicine

**42** Toh Chin Kiat: Art as reflections on life

## Alumni Voices

**46** A Conversation with Marianne

**49** Not Forgotten

## The Banyan Tree

**52** What Adult Learners Want

**56** Foundations in Health Professions Education

**57** Take 5 Breakfast: Q&A with Our NUS Medicine Continuing Education and Training Faculty



## MediCine

MediCine is published quarterly by the communications office of the NUS Yong Loo Lin School of Medicine.



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# Dean's Message

Dear Reader,

"It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of light, it was the season of darkness, it was the spring of hope, it was the winter of despair." Charles Dickens' famous opening lines in his novel *A Tale of Two Cities* may well sum up 2021 for many of us struggling to cope with the unprecedented changes and upheavals brought about by the pandemic.

I am glad and grateful therefore to report that 2021 has on the whole, been another good year for the Yong Loo Lin School of Medicine. We graduated the Class of 2021, many of whom found themselves quickly drawn into work alongside their very busy healthcare colleagues in hospital wards and clinics. We are well advanced in the development and use of digital technology to enhance the teaching of undergraduate and postgraduate courses. Some of this innovation is being done in partnership with internationally renowned tech companies and I will share more about this in my next message.

We also celebrate the drive and ingenuity of our students, in this instance, that of Mr Joseph Zhao, Mr Teo Chong Boon, Mr Benjamin Tan and Mr Dominic Yap. Using a novel algorithm that they devised, the students and researchers here and at the National University Cancer Institute, Singapore, have identified a group of stomach cancer patients who may not benefit from undergoing joint immunotherapy-chemotherapy treatment. The NUS Medicine team's finding means such patients can potentially be spared unnecessary treatment side effects as well as high treatment costs, even though recent clinical studies indicate that patients with stomach cancer treated with a combination of immunotherapy and

chemotherapy have a higher survival rate compared to those who were treated with chemotherapy alone.

In the study published in the *Journal of Clinical Oncology*, fifth-year medical students Joseph, Chong Boon, Benjamin and third-year medical student Dominic, led by Assistant Professor Raghav Sundar, Consultant, Department of Haematology-Oncology at the National University Cancer Institute, Singapore, and the Department of Medicine at NUS Medicine, developed KMSubtraction to retrieve unreported subgroup survival data of patients who derived no benefit from adding immunotherapy to their cancer treatment options. Immunotherapy is a new class of drugs that have shown significant benefit in some cancer types. It redirects the body's own immune system to target cancer cells in the body, harnessing the body's innate ability to distinguish between cancer and healthy cells.

KMSubtraction effectively streamlines the process of having to reach out to senior authors of major studies to request for new analyses to be performed. To demonstrate the robustness of the new algorithm and explore its limits of error, the algorithm was validated with over 500,000 simulations. The implementation of KMSubtraction in these trials resulted in new findings confirming that more than 20% of the patient population will not benefit from the addition of immunotherapy into chemotherapy regimen. Instead, they could possibly be enrolled into clinical trials with newer agents, and spared the side effects and high costs of immunotherapy drugs.

Joseph says that, "As medical students, we learn to treat patients with various diseases, focusing on helping them at the individual patient level. Conversely, research utilising such biostatistical coding techniques allows us to contribute to patient care on a larger scale."

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The team's supervisor, A/Prof Raghav Sundar affirms the efforts and enterprising spirit of the students in coming up with this new algorithm and says, "The students have demonstrated phenomenal drive, ingenuity, innovativeness and the willingness to learn throughout this project. Eventually, the team hopes that the derived data from KMSubtraction will be fit for use in other fields as well as to inform clinical decision-making to benefit patients and improve the overall cost-effectiveness of care."

It was a good year also for our scientists: congratulations to Professor Barry Halliwell (Citation Laureates 2021 for Chemistry), Associate Professor Too Heng-Phon (President's Technology Award 2021), and Associate Professor Christopher Chen, Professor Dario Campana, Professor Goh Boon Cher, all Singapore Translational Research Investigator Award 2021 winners.

Darkness and light, despair and hope. Looking back at 2021, I am glad to be able to share the good that has been achieved by our students and staff here at NUS Medicine. Their accomplishments have helped to push back against the gloom, and along the way, they remind us that better days lie ahead.

Yours sincerely,  
*Yap Seng*

# MEGICAL Highlights from NUS Medicine Educators' Day 2021



*In conjunction with Teachers' Day, NUS Medicine organised online events to celebrate our educators' achievements, particularly in driving education innovation and in rising to the challenges of the COVID-19 pandemic.*

**T**wo lunchtime seminars offered the opportunity to showcase how clinical teaching has been successfully adapted and enhanced under COVID-19 restrictions.

Dr Benjamin Goh from the National University Hospital shared how the Department of Surgery has pivoted and adapted their teaching through two new programmes: EXCEL (EXploration, Clinical Examination and

Lateral Thinking) and PECCS (Professionalism, Ethics, Communication in Consent taking in Surgery). These programmes are designed to strengthen students' ability to apply their knowledge in clinical settings, as well as to improve communication skills and collaboration.

Adjunct Associate Professor Samuel Chew described how the Geriatric Medicine Student Internship programme at Changi General Hospital addressed the

challenges of the COVID-19 pandemic. The experience proved the educators' adaptability, particularly in ensuring everyone's safety while maintaining focus on the importance of clinical training and responsiveness to the needs of students, trainees and tutors.

Dr Janthorn Pakdeethai and Dr Ira Sun also shared about efforts at Ng Teng Fong General Hospital to adapt and adopt practices to work around challenges arising from segregation, access restrictions and other COVID-19 measures, as well as efforts to boost effective communication and promote collaboration with partner institutions.

Dr Clement Chia and Dr Shaun Chan spoke about the work done at Khoo Teck Puat Hospital to promote interprofessional collaboration and independent learning in medical undergraduates through "Learning Oriented Teaching in

Transdisciplinary Education" (LOTTE). This programme brings together surgeons, physicians and students in a transdisciplinary effort to manage patients holistically and maximise opportunities for learning, knowledge-sharing and communication.

**NUS Medicine Educators' Day: celebrating innovation and resilience**

The advances and innovations in medical education came under focus during the NUS Medicine Educators' Day, which was conducted online on 15 October 2021. Adjunct Associate Professor Yip Chee Chew, Education Director of Khoo Teck Puat Hospital and Head of the Department of Ophthalmology and Visual Sciences, delivered the keynote address on "Supporting Impactful Learning During the COVID-19 Pandemic", showcasing the wide-ranging efforts of his team to seek continued improvement in their teaching of medical



8

MEGIC finalist teams presented their work

students despite the challenges of COVID-19.

In addition, the NUS Medicine Educators' Day event saw eight of the 15 teams who participated in the Medical Education Grand Innovation Challenge (MEGIC) presenting their proposed solutions to address unmet needs and opportunities to enhance medical education. These teams are made up of members from different professions, disciplines and institutions, exemplifying multidisciplinary collaboration.

The eight finalist teams presented their work to an esteemed panel of judges who included Vice Provost Associate Professor Erle Lim, Vice Provost for Teaching Innovation & Quality; Associate Professor Lee Kooi Cheng, Director of the Centre for English Language Communication and Dr Dujeepa, Director of the Centre for Development for Teaching and Learning and Director of the Centre of Medical Education.

**Grand Prize**



Grand Prize Winners, Team EMART, represented by: Dr Cyrus Ho, Ms Cherine Fok and Dr Goh Yong Shian. Not pictured: Mr John Yap, Mr Mak Hon Keat, Mr Ong Loong Siang, Ms Cecilia Chng, Ms Tricia Ng, Mr Ernest Yang and Dr Cheryl Chang.

Team EMART won the **Grand Prize** for their "Application of VRAM (Virtual Reality in Agitation Management) in students and healthcare workers". The virtual reality (VR) software developed by the team simulates an agitated patient in a ward, providing students with opportunity to practise their communication choices and actions in a safe, controlled environment. The VR software trains learners to manage agitated patients with empathy and in the least coercive manner possible.

2<sup>nd</sup> Prize



Second Prize Winners, Team EMERGE, comprising: Dr Lee Shu Woan, Dr Dillon Yeo and Mr Wu Duoduo.

Team **EMERGE** won the **Second Prize** for their project titled “RSI – Rapid Sequence Induction”. The project uses a board game as an educational tool to address gaps that emerged in the learning journey of students posted to Emergency Medicine during the COVID-19 pandemic.

3<sup>rd</sup> Prize



Third Prize Winners, DREAM Team from Changi General Hospital, comprising: Dr Li Wei-quan, Dr Joel Yee and Dr Anindita Santosa. Not pictured: Dr Lydia Li.

**DREAM** Team won the **Third Prize** for their project “Deconstruct-Reintegrate Educational Assessment in Medicine (DREAM) Model for Clinical Reasoning in Medical Students”, which sought to make the DREAM model of teaching available on digital platforms.

Best Video



Best Video, Team DrawAnat, represented by: Mr Matthew Chew and Ms Victoria Leong. Not pictured: Mr Daniel Chew, Ms Kim Haejin, Mr David Chew, Dr Satish R.L., Mr Chua Yun Da and Mr Nicholas U Jin.

Team **DrawAnat** won the **Best Video** award for their project that teaches students how to draw simple anatomy diagrams to promote visual understanding.

Special Mention

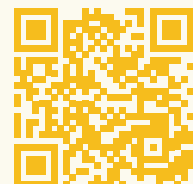


Special mention to Team Comm-petent, represented by: Koh Ying Ying, Caitlin O'Hara, Chia Eik Chao, Winston Ng and Dr Victor Loh. Not pictured: Dr Ann Toh.

Team **Comm-petent** won a **Special Mention** award for their project on “Communicating with patients with disability: a ground-up approach”, which proposed improved platforms to enhance communication with patients with disabilities.



Scan to see the e-exhibition of the MEGIC 2021 projects here:



# NUS MED Camp 2021

*Young people who aspire to pursue a career in healthcare are often motivated by a sense of altruism and a desire to make a meaningful contribution to society.*

To help them make an informed career decision, the Medical Executive Education team (MEDEx) organised its annual NUS MED Camp in December 2021. This experiential career exploration programme exposes students from pre-tertiary institutions to various facets of the medical school experience and provides them with an insight into the broad spectrum of careers available in healthcare. While the plan had been to host a series of on-campus activities for participants, these had to be adapted into a virtual format due to the ongoing COVID-19 situation. Despite this, the team worked hard to plan an engaging, interactive

programme that would maintain the same rigour of an in-person, on-location camp.

From 8 to 10 December 2021, 185 students from various pre-tertiary institutions in Singapore were hosted by NUS Medicine via Zoom. Throughout the 3-day camp, the students participated in a blend of lectures, tutorials, discussions, quizzes, case studies, sharing sessions, and Q&A sessions, giving them a taste of what it is like to be medical and nursing students. By attending university-style lectures presented by teaching staff, the participants were able to build up a knowledge base of some fundamental medical concepts. They interacted with healthcare and physician mentors, gaining



## 185

students from various pre-tertiary institutions joined the 3-day NUS MED Camp 2021

a better appreciation of the importance of patient-centric and value-driven outcomes in healthcare.

The positive response from the participants to the NUS MED Camp 2021 was heartening. Hopefully, this experience has inspired them to embark on a career in healthcare and will help them to be more intentional and discerning in their career choices. The MEDEx team is grateful to the academic teaching staff, various healthcare professionals from different disciplines, as well as the NUS Medicine students who were very generous in sharing their experiences about the rewards and challenges of working in the various healthcare professions.



# Helping Our Senior Citizens Grapple with Health Assistance Schemes

BY SHAMILL UDONWA, PHASE II STUDENT, NUS MEDICINE

*I remember the first time I was deployed as a Silver Generation Ambassador (SGA). It was a nerve-wracking experience as one never knows what to expect at the front gate of each household. Thankfully, that early Saturday morning, I was greeted by wide smiles, as residents recognised our distinctive red and white uniforms. Since that first encounter, I have learnt so much from people from all walks of life, especially in the context of healthcare.*

Shamill with his SGA partner on a break.



**A**s a Silver Generation Ambassador, I visit the seniors who live in my neighbourhood, especially those from the Pioneer and Merdeka generations. On our door-to-door visits, we check up on many different aspects of their lives beyond just physical health. For instance, we may look into their financial situation and social state, as well as talk about government and community programmes and policies affecting them.

As a second year medical student, I am aware that my perception of the healthcare system is somewhat rose-tinted. I am optimistic. I am assured. I am hopeful. This is not to say that the reality is the opposite but rather more nuanced; different people have different experiences. In school, I learn that policies like Medisave and Medifund serve as safety nets for those who need it. When I conduct my visits, I realise the intricacies of these schemes and how their effects manifest. It opened my eyes to how linear my views about these measures were.

These complexities may pose a challenge to seniors who are trying to understand them so I prepare myself with the lingo and phrases that are simple yet essential.





I realised how daunting information, or the lack thereof, can be. In a rapidly evolving society, seniors who need help to clarify their understanding of policies and programmes may not always have their needs met.

As a newbie ambassador, I found myself blathering on about new schemes they heard about in passing either from friends or the news. In one instance, I could tell that the elderly man I was talking to was hoping that I could help him make sense of all the information. However, I could only repeat the jargon that I had heard.

Now that I have become more skilled in communicating, I am sensitised when conversing about anything new with them and I have found a way that helps people contextualise details—What does this mean for you? How is this different? Why should you consider this? These trusty rhetorical questions have enabled me to paint pictures for these seniors.

Back when CareShield Life was announced in August 2020, I was puzzled as to what it meant. So I can only imagine the confusion the seniors felt. For those aged 41 and above in 2020, they would have already been under pre-existing insurance policies such as ElderShield 400. Thus, when I found out that the Silver Generation Office was planning to get seniors on board this new scheme when it opens for sign-ups from end 2021, I knew I had to do my own research. Being able to break down the information I have gathered from different sites about eligibility, payouts, premium differences, etc., has



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been extremely helpful and it has been heart-warming to see the faces of seniors light up with understanding after my explanation. It has also made me understand how the decision to receive healthcare is a rather complex one with many factors to be considered by an individual.

In future, when I see patients, I hope to be able to appreciate the steps they have taken in their healthcare journey even before stepping foot into the hospital. Most importantly, I hope to urge future medical professionals like myself to constantly remember to view healthcare from the other side.

# Loving, Living and Letting Go

BY FAYE NG YU CI, PHASE IV STUDENT, NUS MEDICINE

*As a fourth-year medical student, I recently completed my paediatrics posting as part of my clinical rotations.*

**A**t the hospital I was posted to, I met many patients who inspired and taught me with their stories.

Here, I share the story of Benny\*, a teenager with autism spectrum disorder on long-term follow-up for a childhood condition, and his mother, Mrs Lim\*.

The encounter was an illuminating one, where I witnessed the depth of a parent's love, along with the joys and burdens of being your child's keeper.

It was a rainy afternoon, when we sat in one of the paediatrics clinics.

The doctor enquired about whether Benny had taken his COVID-19 vaccination and Mrs Lim was showing her a video on her mobile phone, demonstrating how she readied him for the exercise.

"He was already familiar with the procedure," Mrs Lim beamed, gesturing. "We rehearsed the entire scene at home."

The video showed Benny sitting on the living room couch with his sleeves rolled up, the deltoid muscle of his upper arm exposed. Mrs Lim was beside him. "One, two, three," she counted, "take a deep breath." She depressed the plunger of the makeshift syringe.

"We repeated this over and over again until he was calm enough." Mrs Lim explained to us as she gestured at the screen.

She then turned to Benny, whose fringe fell over his eyes as he stared vacantly into space.





**A life is changed by each diagnosis, but this is even more so in paediatrics, where every diagnosis affects multiple lives, given how closely these are intertwined.”**

“When we took him to the community centre for his jab, he knew what to expect.”

“Was he good?” the doctor asked.

“To a fault,” she beamed. “He was cool as a cucumber.”

No sooner had her words left her mouth than a shout upended the room. “No!” Benny caterwauled. “Get me out of here!”

“Darling...” Mrs Lim watched in dismay as Benny worked himself up into another tantrum. His arms flailed about as he thrashed in his wheelchair, a stark contrast to the golden boy she described just moments ago.

“He’s in quite a mood today,” the doctor observed, as she took her stethoscope from her neck and proceeded to examine him.

“Let’s take a look at you, Benny,” she extended her hands, an invitation.

“No,” Benny sulked as he receded further back into his wheelchair, folding up his arms and legs. He regarded each of us in turn with hostility and suspicion—we were the enemies on the frontline of an imagined battle, colluding to bring about his demise.

“We’re here for your medical appointment, darling. The doctor needs to check on you.” Mrs Lim’s eyebrows pinched together, unsure if he would understand.

Benny was decided he would not be examined. He kicked out against the doctor every time she approached, keeping her at arm’s distance.

Mrs Lim rubbed the back of her son’s neck to soothe him, only to have him spit at her as he shoved

her away. Eventually, she had to pin down his limbs while the doctor performed a hurried examination.

“No, no, no!” Benny sputtered, as he squirmed in his mother’s grasp, his grunts and breathing laboured, his voice growing desperate.

I watched Mrs Lim’s small frame shake as she mustered all her strength to calm her raging 70kg son. When it was finally over, she let go of the combative boy, collapsing back into her seat.

The rest of the clinic that day passed by in a blur.

I kept thinking of Benny and his mother—the accusation and distrust in his eyes, the vivid fear in hers. I imagined the heartache that must come with taking care of a child with autism, the exhaustion and perpetual worry.

Even something seemingly simple, like taking the COVID-19 vaccination, requires ample forethought and planning.

“How are you coping yourself?” the doctor turned to Mrs Lim. There was a pause. Finally, the first tears came.

In paediatrics, there are two kinds of heartbreaks: seeing your child go, as in the case of irreparable congenital defects, or being the first to let go. A life is changed by each diagnosis, but this is even more so in paediatrics, where every diagnosis affects multiple lives, given how closely these are intertwined.

As someone in her early 20s, the paediatrics posting was a prelude to adulthood and parenthood.

I sat in for consultations expecting to learn more about common paediatric conditions and approaches, refine my development assessment and build rapport with young children. However, besides these, I emerged with greater takeaways.

In the clinics, I appreciated the love and labour poured into building a family, and the dilemma and complexities behind every decision made on a child's behalf. I recognised what it meant to assume responsibility for another life—one that is not fully grown and often helpless, and as dear as your very own.

I met parents at every stage of the parenting journey, from newly minted to seasoned mums and dads. Yet no matter where they were along the spectrum, the experience of bringing up each child was brand new. With every child comes the experience of being a particular parent for the first time, learning to negotiate a fresh set of roles and dispositions.

Raising a child is as much a process of maturation for the child as it is for the parent. Just as a child opens his curious eyes to the world for the first time, the parent figures out how to feed and soothe him to sleep. Just as a child grows up and discovers his place in the world, the parent learns how to gain the child's trust and build a home.

The paediatrics posting also gave me a newfound appreciation of living, by making me realise how small and fragile life is, yet how resilient and awe-inspiring it



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can be. Even in the neonate barely a few weeks into existence, there is so much strife and will to *live*. In our children we see ourselves, and we are compelled to hold onto hope. In every situation we buffer optimism, because a young life embodies possibility, and we give our utmost to protect and nurture it.

Mrs Lim glanced across at Benny, now sitting placidly in his wheelchair. He was playing with his hands, twisting his fingers around each other and forming a structure to cover his face.

He peeped out from the gaps in between his fingers, observing us watching him. "No," he murmured, "no, no, no." Whether he was speaking to us or himself, we no longer knew.

"I don't know what will become of him... how long I can keep doing this for," Mrs. Lim bowed her head, her palms clasped so tightly the rims of her nails were turning white.

The doctor reached across and placed her hand on Mrs Lim's. The two women sat like this for a while.

When the consultation ended, Mrs Lim got up from her seat to unlock Benny's wheelchair.

"Thank you," she said to the doctor.

"No!" Benny suddenly lurched forward, grabbing onto the edge of Mrs Lim's shirt. His head swiveled around, his eyes darting wildly.

"We're leaving, darling," Mrs Lim smiled, a little exasperatedly. "Say thank you to the doctor," she tilted her head.

"Don't go!" he implored, tightening his grip on her.

She sat down again until he relaxed, her shirt's fabric falling loosely by her side as he opened his fists. She sat with him until he was no longer afraid.

"I'm in no way leaving you," she gazed at him. "I'm right here with you, see?"

\* All names and personal details have been changed to preserve patient confidentiality and anonymity.

\*\* A version of this article first appeared on TODAY Online

# Does Singapore Seem More Anxious about COVID-19 Deaths than Any Other Causes?

BY DR VOO TECK CHUAN, DR JANE LIM AND DR CLARENCE TAM,  
NUS CENTRE FOR BIOMEDICAL ETHICS, NUS MEDICINE

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*There is no magic formula to determine how many COVID-19 deaths will be acceptable for Singapore as we learn to live with COVID-19 but comparing it to other causes of death may not be meaningful, say NUS researchers.*



As Singapore eases measures to prepare for endemic living, Health Minister Ong Ye Kung cautioned in August that Singapore has to be “psychologically prepared that the death toll due to COVID-19 will also likely go up”.

Is this an ominous warning or a sombre reminder of reality?

These tensions are coming into sharper focus as infections and deaths mount. Singapore recorded 215 COVID-19 deaths as of 16 October 2021, with nearly 80% of these occurring in the recent two months.

There was a sharp uptick in cases from August 2021, resulting from community spread of the more transmissible and virulent Delta variant, despite 83% of the population being fully vaccinated. No doubt the recent spike in deaths has provoked a range of reactions.

Some see the COVID-19 death toll as part and parcel of living with the virus, but such reactions often get chastised for being insensitive to the pain of those who have lost loved ones to COVID-19.

Others insist every death is one too many and at the extremes, clamour for stricter policies to reduce our shared vulnerability—even a return to a zero-COVID strategy that countries like New Zealand have abandoned.

### Why are COVID-19 deaths seen differently?

Pandemics are as much psychological as epidemiological events. How we respond to the disease and the kinds of public health measures we accept are influenced by our beliefs, fears



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and perceptions of the existential threat to self and society.

About 60 people die in Singapore every day on average. Cancer, pneumonia and ischaemic heart disease—the top three causes—account for about two-thirds, or around 40 deaths a day, according to the Ministry of Health. Influenza accounts for an estimated 600 to 800 deaths here each year.

So why do we seem especially anxious about the toll of COVID-19?

Behavioural experts attribute this to “salience bias”. Our sensitivity to COVID-19 risks has been heightened by its prominence in our lives.

COVID-19 is almost all we ever read or talk about today—with daily updates, regular government press conferences, constant reminders of social responsibility—and experience in our own disrupted work and social lives.

An extreme example is “COVID-19 stress syndrome”, in which individuals suffer from a fear of getting infected and a compulsion to continually seek out information and reassurance.

For others, continually hearing about the rising number of COVID-19 cases and accumulating deaths despite more stringent restrictions may increase their feelings of helplessness about infection risk. This perceived lack of control and subsequent passive acceptance of the state of affairs can make it more challenging for some to keep up and comply with ever-changing control measures.

At the other end of the spectrum, some have questioned whether prevailing restrictions are justified when we look at the relatively low death toll. After all, we have learnt to live with dengue and flu—not looking at elimination but also not panicking when numbers tick up.



But pitting COVID-19 against other causes of death is too narrow a perspective. Many more COVID-19 deaths would undoubtedly have occurred without the public health measures implemented over the past 20 months.

In the US, COVID-19 has been in the top three leading causes of death for most of the pandemic, briefly surpassing cancer and heart disease as the top killer. And the UK experienced 10% more deaths during the pandemic compared with previous years.

Even under continuing restrictions, some COVID-19 deaths in Singapore are potentially avoidable, for example, by vaccination, and we should care about what we can do better to prevent them.

### Considerations for endemic living

The more pertinent question is which precautionary measures are justifiable and reasonable as we transition to living with COVID-19.

Pandemic fatigue is straining our motivation to accept prolonged restrictions, particularly if, COVID-19 is expected to become endemic. But there are some important issues to consider.

Children too young to be vaccinated still depend on the rest of us exercising prudence to reduce their risk. This will hopefully change soon as evidence accumulates about vaccine safety and efficacy for them. Globally, the pandemic situation is still highly volatile and countries have experienced dramatic resurgences, even with high vaccination levels. Ongoing virus transmission

could give rise to new variants against which we might be less protected even with vaccination, as happened with the Delta variant.

COVID-19 deaths elsewhere should thus concern us as much as deaths at home. Many of these deaths are preventable, but globally less than half of the population have had at least one dose of a life-saving vaccine.

### Learning to live with COVID-19 will be difficult

Living with COVID-19 is a societal decision not to continue the pursuit of disease elimination—even if it were theoretically possible—because the burdens of such a strategy outweigh the benefits.

As restrictions ease and borders reopen, we must be prepared for severe cases and deaths to rise—this is an inevitable consequence of easing the societal and economic toll of the pandemic.

Unfortunately, there is no magic formula that tells us what number of deaths from COVID-19 would be acceptable. This is something that every society, including Singapore, must grapple with.

Until we do, we can expect to live with a great deal of uncertainty, with periodic changes to our collective and individual freedoms.

What is certain is that with vaccines and increasing treatment options in our arsenal, we are in a much better position to emerge from this pandemic.

To live with something means to accept and experience a difficult, undesirable situation that may continue for a long time.



<50%  
of the world  
population have  
at least one dose  
of vaccine

We must accept that we will be living with COVID-19, and that this will impact some of us more severely than others because of differences in social and economic circumstances. Effective communication, as well as public health and social interventions to minimise these impacts will be crucial as we adjust to this new relationship.

Equally important as we transition to living with the virus is to continue resisting tendencies that divide us—the younger from the older, the vaccinated from the unvaccinated, the local from the foreign. Living with COVID-19 should signify a new phase in which we collectively make some trade-offs—taking on some risks in exchange for greater freedom.

If we are all willing to accept the risks, then we should strive to ensure that we can all have a share of the benefits.



### About:

Dr Voo Teck Chuan is an assistant professor and Dr Jane Lim is a research fellow at the NUS Centre for Biomedical Ethics, NUS Medicine. They are members of the Epidemic Ethics project which is funded by the Wellcome Trust and the UK Department for International Development, in collaboration with the World Health Organization. Dr Clarence Tam is an assistant professor at the Saw Swee Hock School of Public Health, National University of Singapore.

# Next-Generation Vaccines Much Needed Enhancements in Anti-COVID-19 Fight

BY DR KHOR ING WEI, STAFF WRITER

*As we move into our third year of living with the pandemic, life still hasn't returned to "normal." This is despite the fact that we have several very effective COVID-19 vaccines. The reason that we're still wearing masks and social distancing can be summed up in one word: variants. And the pandemic-sized question now is: How effective are the current and new vaccines against these SARS-CoV-2 variants?*

**I**n the developed world, the "big three" COVID-19 vaccines are the Pfizer and Moderna mRNA vaccines, as well as the Johnson & Johnson viral vector vaccine. In developing countries, where these vaccines have been harder to come by, vaccines from China and Russia are more commonly used. So how are the first-generation and next-generation vaccines performing against SARS-CoV-2 variants?

## **What are viral variants and which ones should we be concerned about?**

Viral variants arise as a virus infects increasing numbers of people and populations. RNA viruses such as SARS-CoV-2 naturally mutate over time. Most of these mutations

don't significantly impact how the virus behaves. However, when the occurrence of a mutation confers an advantage on the virus, such as allowing antibodies induced by a vaccine to escape, these mutated viruses will be able to reproduce. These viruses are called variants.

In response to the rapidly changing landscape of SARS-CoV-2 variants, vaccine manufacturers have been testing the efficacy of their first- and next-generation vaccines against the predominant variants of concern or variants of interest at the time of testing. When the first of these "variant" trials were conducted in mid-2021, four main variants of concern were identified by the World Health Organization (WHO) as affecting the world's

populations: 1) the B.1.1.7 lineage (called the Alpha variant) that was first identified in the United Kingdom; 2) the B.1.351 lineage (called the Beta variant) that was identified in South Africa; 3) the P.1 lineage (called the Gamma variant) that was identified in Brazil; and 4) the B.1.617 lineage (called the Delta variant) that was first found in India.<sup>1</sup>

All variants of concern identified to date have multiple mutations. For example, the Alpha variant has mutations in the receptor binding domain, the N-terminal region, and near the furin cleavage site of the S protein.<sup>1</sup> In addition, these variants share a mutation called D614G, which increases the ability of the virus to infect people.





In the last months of 2021, the Omicron (B.1.1.529.1) variant started to spread around the world. It has many more mutations than previously identified variants, most of which are in the gene coding for the spike protein. The Omicron variant also appears to be more contagious than other variants. However, the net effect of Omicron's many mutations on the severity of the disease that it causes is still unclear. A small study conducted by the Centers for Disease Control and Prevention, the results of which were reported on 8 December 2021, found that 79% of Omicron infections occurred in people who had received at least one dose of a COVID-19 vaccine.<sup>2</sup> The study did not report any deaths due to Omicron. Since then, deaths from Omicron have been reported in various countries, but the death rate appears to be much lower than previous waves of infection with other variants.<sup>3</sup>

### The next generation of COVID-19 vaccines

#### Novavax subunit vaccines

Arguably the frontrunner in this wave of second-generation vaccines is the one developed by the US-based Novavax. The company did not release a first-generation vaccine, and its NVX CoV2373 is a subunit vaccine consisting of the SARS-CoV-2 spike protein incorporated in a nanoparticle and administered together with a substance called an adjuvant that helps to further stimulate the immune system.

The Novavax vaccine showed 90% efficacy in Phase 3 clinical trials and, importantly, a high efficacy (86%) against the Alpha variant of SARS-CoV-2 (B.1.1.7).<sup>4</sup> In another study (PREVENT-19), the vaccine showed 93% efficacy against variants of concern (Alpha, Beta, Delta, and Gamma)



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and variants of interest (Epsilon, Iota, Kappa, and Zeta) at the time of the study.<sup>5</sup> NVX CoV2373 was approved by WHO for emergency use on 17 December 2021 and by the European Medicines Agency (EMA) on 21 December 2021. Novavax also expects to apply to the US Food and Drug Administration for emergency use authorisation by the first quarter of 2022. Since NVX CoV2373 is one of the vaccines that will be distributed to developing countries by the non-profit organisation Covax, these approvals are an important step forward in increasing vaccination in the developing world, which is far behind richer countries in vaccination rates.

Currently, NVX CoV2373 is the only vaccine that has shown efficacy (>90%) against Alpha, Beta, and Delta variants in Phase 3/4 clinical trials. Novavax is currently developing another vaccine featuring a spike protein that has been modified to resemble the Omicron variant.<sup>6</sup> It expects to manufacture this Omicron-specific vaccine in early 2022.

#### Pfizer-BioNTech mRNA vaccines

The mRNA vaccines produced by Pfizer and Moderna were the first to be approved and distributed in developed countries. Showing more than 90% efficacy at combating the original SARS-CoV-2 strain, the vaccines have helped to slow the spread of SARS-CoV-2 infections and reduce the rates of

severe disease and death due to COVID-19. Another advantage of the mRNA vaccines is that they are more easily adaptable than other vaccines that use part or all of the virus or viral proteins. The most important step in developing a new mRNA vaccine is modification of the DNA template that is used to produce the mRNA.

Pfizer has adapted its COVID-19 vaccine (BNT162b2) to produce a next-generation vaccine that specifically addresses the Delta variant and is working on another next-generation vaccine to address the Beta variant. However, the company did not release these new vaccines because its original vaccine appears to be reasonably effective against the Delta and Beta variants.<sup>7</sup>

A small study conducted in Hong Kong, published in MedRxiv on 14 December 2021 showed that only 20% to 24% of the 25 people who received two doses of the BNT162b2 vaccine produced neutralising antibodies against Omicron.<sup>8</sup> Pfizer has already started developing a next-generation vaccine against the Omicron variant and is watching how Omicron infections respond to the current vaccine to determine whether this new vaccine needs to be released. According to the CEO of Pfizer, Albert Bourla, the company can develop a new vaccine within 100 days.<sup>7</sup>



The Novavax vaccine showed

**93%**

efficacy against Alpha, Beta, Gamma and Delta variants in the PREVENT-19 study

The Pfizer-BioNTech mRNA vaccine showed over

**90%**

efficacy at combating the original SARS-CoV-2 infections and reducing severe diseases

### Moderna mRNA vaccines

Similarly, Moderna has also been testing its mRNA vaccine, mRNA-1273, against the Beta and Delta variants, with preliminary results indicating strong efficacy against these variants. Moderna is also developing a vaccine specific for the Beta variant and started testing it in a Phase 1 trial in March 2021. To address infections from the Omicron variant, the company is focusing on increasing the levels of neutralising antibodies to SARS-CoV-2 by means of a booster shot to its initial two-dose vaccine.<sup>9</sup> In addition, Moderna is working on developing a booster that is specific for Omicron. According to Moderna, preliminary results indicate that the booster increases the level of neutralising antibodies against Omicron by 37 to 83 times (depending on the booster dose); these results have not been published yet.

### Janssen/Johnson & Johnson viral vector vaccines

Johnson and Johnson's first-generation COVID-19 vaccine, Ad26.COV2.S, is a viral vector vaccine (an adenovirus vector into which the spike protein of SARS-CoV-2 has been introduced). A single dose of Ad26.COV2 (single doses are typical for viral vector vaccines) showed 52% efficacy at 14 days and 64% efficacy at 28 days.<sup>10</sup> At the time of the trial, 95% of the South African participants (who comprised 15% of the total number of participants) were infected with the B.1.351 (Beta) variant, suggesting that Ad26.COV2.S may offer some protection against the Beta variant. However, the efficacy of the vaccine against SARS-CoV-2 variants was not specifically tested. Although the company is said to be working on a next-



Moderna's preliminary results show that its booster increases the level of neutralising antibodies against Omicron by

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A single dose of Johnson and Johnson's vaccine shows

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efficacy at 14 days and

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efficacy at 28 days against the Beta variant

A study on Sinopharm's vaccine found that

**78.1%**  
of research subjects who received a third dose of the vaccine had some neutralising antibodies against Omicron

generation subunit vaccine, not much is known about it.

### GSK and CureVac mRNA vaccines

Like Novavax, the British pharmaceutical giant GSK and German company CureVac are combining forces and hoping to leap past competitors by releasing a second-generation COVID-19 vaccine without first putting out a first-generation one. GSK and CureVac expect to start clinical trials on their frontrunner second-generation vaccine candidate, an mRNA vaccine called CV2CoV, in early 2022. Preliminary data indicates that CV2CoV has 10 times the ability to stimulate the immune response in animal models, compared with the first-generation vaccine that CureVac has stopped working on for the time being.<sup>11</sup>

### Sinopharm and Sinovac inactivated whole-virus vaccines

The Chinese vaccines Coronavac (produced by Sinovac) and BBIBP-CorV (developed by Sinopharm) are widely used in China, South America, and Africa. In the same study in Hong Kong mentioned above, researchers found that none of the 25 people who received two doses of the Coronavac vaccine produced detectable neutralising antibodies against the Omicron variant.<sup>8</sup> Another study, published in BioRxiv in December 2021, showed that BBIBP-CorV and the Russian

vaccine Sputnik V did not produce detectable neutralising antibodies against Omicron.<sup>12</sup>

Researchers at Shanghai Jiao Tong University and a lab in Shanghai that specialises in respiratory infectious diseases are conducting a study of BBiBP-CorV in 292 healthcare workers who received a third dose of the BBiBP-CorV vaccine. The researchers reported that 78.1% of subjects had some neutralising antibodies against Omicron, but they have not published their findings yet.<sup>13</sup>

### What do we do now?

According to the results we have so far, two doses of current vaccines such as the Pfizer and Moderna mRNA vaccines seem to be somewhat effective against the Delta, Beta and Alpha variants but appear to be less effective against Omicron. Although a third booster may enhance effectiveness against Omicron, next-generation versions of these mRNA vaccines may be needed.

Among the next-generation vaccines, NVX CoV2373 appears to be highly effective against Delta, Beta and Alpha variants, though a newer vaccine may be needed against Omicron. The silver lining is that, although the variants are more contagious than the original virus, they do not seem to be causing severe disease in vaccinated people.<sup>14</sup>



**The important thing now is to slow viral transmission, by expanding vaccination coverage and maintaining preventive measures, to provide valuable time for drug development and distribution.”**

In the meantime, while the next-generation vaccines are being developed and tested, countries need to continue vaccinating their populations to reduce transmission of the virus and slow the emergence of new variants. Experts also recommend maintaining fundamental public health measures, such as masking, physical distancing from other people, having good indoor ventilation, and restricting gatherings where people are in close proximity in confined spaces.<sup>14</sup>

Another strategy in combating the new and emerging viral variants is to supplement vaccination with drugs that

attack the virus through other mechanisms. Many companies have developed or are in the process of developing drugs that bind to the spike protein or to other proteins on SARS-CoV-2. For example, Pfizer's PAXLOVID blocks the viral protease to disrupt replication of the virus in cells. Since this addresses a different protein from the spike protein that is targeted by most current vaccines, it could help to block viral variants that "escape" antibodies produced by vaccines. According to Pfizer, the drug binds to a key protein in the Omicron variant.<sup>15</sup> Other therapeutics that are in earlier stages of development include drugs and vaccines that will be administered via intranasal

spray. These intranasal therapeutics may be more effective at blocking SARS-CoV-2 at the sites of entry and initial infection in the body, i.e. the nasal passages and lungs.<sup>16,17</sup>

In 2022, additional new SARS-CoV-2 variants will undoubtedly arise, but researchers and pharmaceutical companies have learnt crucial lessons about the virus and are poised to quickly develop and test new vaccines and drugs. The important thing now is to slow viral transmission, by expanding vaccination coverage and maintaining preventive measures, to provide valuable time for drug development and distribution.

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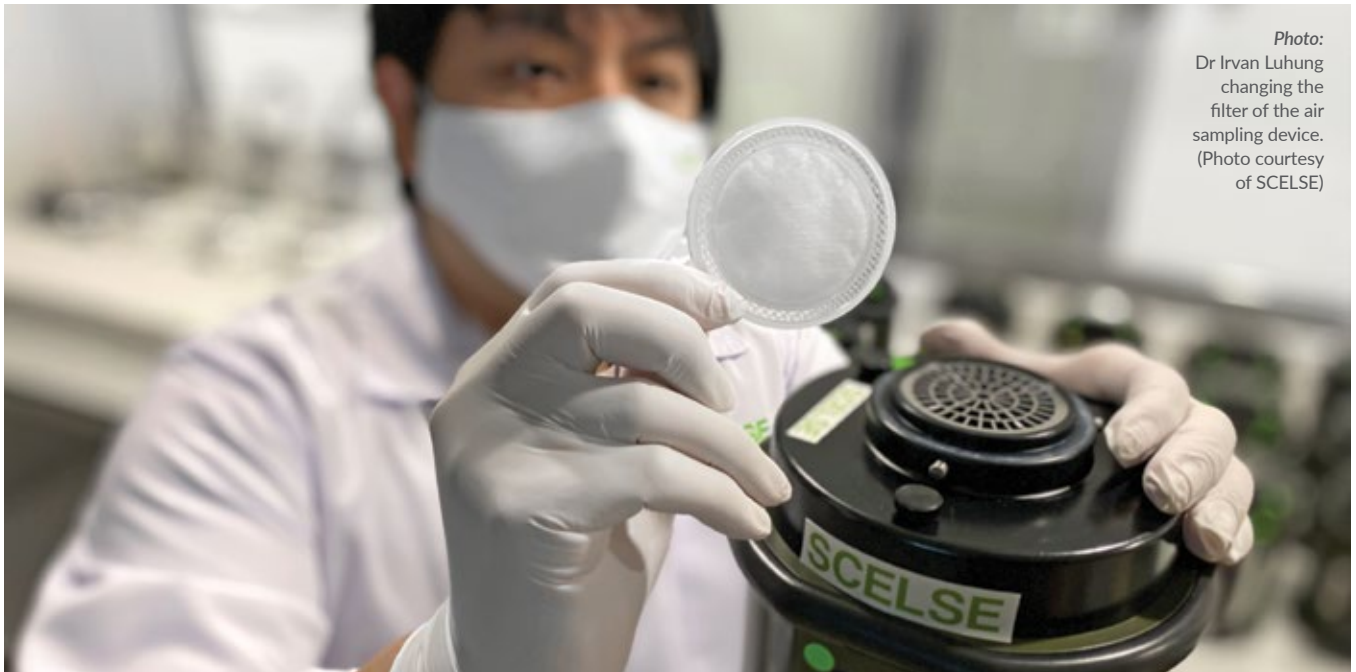


Photo:  
Dr Irvan Luhung  
changing the  
filter of the air  
sampling device.  
(Photo courtesy  
of SCELSSE)

# Singapore Research Team Uses Indoor Air Sampling Surveillance to Sniff Out COVID-19

*A team of scientists and doctors from the Singapore Centre for Environmental Life Sciences Engineering (SCELSSE) at Nanyang Technological University, Singapore (NTU Singapore) and NUS Medicine has developed a capability to detect airborne SARS-CoV-2 RNA—the nucleic acid coding for the virus that causes COVID-19—indoors through air sampling.*

**W**hen trialled in two inpatient wards of a major Singaporean hospital caring for active COVID-19 patients, the air surveillance approach produced a higher detection rate of environmental SARS-CoV-2 RNA, compared to surface swab samples collected in the same area.

The COVID-19 Delta variant's rapid spread in Singapore and globally underlines the need for rapid identification of the presence of SARS-CoV-2 in the environment. While wastewater testing is a reliable indicator of the presence of virus in sewage discharge, the retrospective nature of this approach means pre-emptive action is not possible.

The findings, described in a study published in *Indoor Air* on

14 September, indicate the potential for an airborne surveillance system that monitors for the presence of the virus and provides early warning of infection risks, especially valuable in hospitals and nursing homes, and enclosed places where large numbers of people congregate, said the research team.

Professor Paul Tambyah, Deputy Director of NUS Medicine's Infectious Diseases Translational Research Programme and President of Asia Pacific Society of Clinical Microbiology and Infection, highlighted, "The results of this air sampling study are encouraging, with the potential for the simple monitoring for the presence of COVID-19 in possible hotspots. This will allow for timely intervention where necessary to prevent the emergence of clusters.

Hopefully this will prove useful as the country gradually transitions into recognising the disease as endemic and everyone learns to live as normally as possible with the virus.”

Dr Irvan Luhung, SCELSE senior research fellow and study co-lead author, pointed out, “This study demonstrated the versatility and sensitivity of air sampling for monitoring SARS-CoV-2 in hospital settings, something that was previously not thought possible due to the high ventilation rate of hospital wards. Such an air surveillance capability could make a valuable contribution towards keeping frontline medical staff safe in this pandemic. In hospitals with a high daily number of COVID-19 patients, employing a routine air surveillance programme with high sensitivity could be beneficial in detecting the virus early and help keep frontline medical staff safe.”

Associate Professor David Allen from NUS Medicine’s Infectious Diseases Translational Research Programme and an infectious diseases clinician at the National University Health System (NUHS), said, “The paper’s findings expand our knowledge of the extent to which the virus may potentially be transmitted in different types of wards—this impacts safety and needed precautions for healthcare workers. The findings also advance the potential use of different methods for detecting virus in the environment, providing additional tools for mass screening (other methods are screening each person, sampling sewage, etc)—in our case a device which samples the air for the presence of virus.”

Professor Stephan Schuster, Deputy Centre Director at SCELSE, and genomics professor at the School of Biological Sciences, NTU, and Associate Professor David Allen, led the joint study.

### How the study was conducted

In ventilated indoor settings with a large air change rate—an industry standard measurement that indicates how often the air in a room is replaced by outdoor air—it can be difficult to detect a viral agent in the air. For instance, the air change rate in an hospital isolation ward can be up to 14 times per hour.

To overcome this challenge, the scientists deployed air sampling devices in combination with an ultra-low biomass analysis approach developed by the team from SCELSE at NTU. The analysis approach consists of a series of steps tailored for successful RNA extraction from air samples.

The extracted RNA is subjected to real-time quantitative reverse transcription polymerase chain (RT-qPCR), which has the same sensitivity as the standard nasopharyngeal swab test which tests for the presence of SARS-CoV-2 in the sample.

Two types of hospital wards were tested between February and May 2020: a naturally ventilated, open-cohort ward and a mechanically ventilated isolation ward. Air sample collectors with varying flow rates were deployed for eight-hour periods in different areas in the ward, such as the PPE donning area in the open-cohort ward, the windowsill in the isolation ward, and the toilets of both wards. A total of 27 air samples were collected.

Alongside the air samples, 73 surface swab samples from the patient care, staff, and toilet areas of the two ward types were collected and analysed for comparison. The chosen swab sites were not cleaned for at least eight hours prior to swabbing.

## The findings indicate the potential for an airborne surveillance system that monitors for the presence of the virus and provides early warning of infection risks, especially valuable in hospitals and nursing homes, and enclosed places where large numbers of people congregate.

The scientists found that their devices operating at the higher air sampling flowrate of 150L/min (compared to the lower flowrate of 50L/min) improved the chances of successful airborne SARS-CoV-2 surveillance.

Among the samples collected by the high flowrate sample collectors, 72% were found to contain the SARS-CoV-2 virus. This is in comparison to the surface swab samples, which showed a positive detection rate of 9.6%. These results highlight the potential of air sampling as a tool to detect the presence of SARS-CoV-2 in the environment, said the scientists.

Future air surveillance studies will need to be tested in locations outside of hospital environments—where mass gatherings occur—for rapid and sensitive high throughput communal testing at the population level, said the research team.

The study was funded by a National Medical Research Council grant to NTU, and an alumni gift to NUS by Freepoint Commodities Pte Ltd.

# New Purpose to Old Drugs: NUS Researchers Discover Possible New Treatment for Aggressive Forms of Breast Cancer

*Findings suggest that drugs used to treat diabetes could have efficacy against some difficult-to-treat types of breast cancer.*

**W**omen diagnosed with the biologically aggressive triple-negative (TNBC) and endocrine-refractory subtypes of breast cancer confront a bleak prognosis because they respond poorly to conventional chemotherapy. Researchers from the NUS Yong Loo Lin School of Medicine have discovered that combining one of the most widely prescribed medication class for type 2 diabetes mellitus known as thiazolidinediones (TZD), with an emerging class of cancer drugs known as histone deacetylase inhibitors, elicits robust anti-tumour responses in preclinical models of these breast cancer subtypes.

In the study led by Assistant Professor Alan Prem Kumar from the NUS Centre for Cancer Research and published in *Cell Death and Discovery*, the NUS

researchers leveraging on big data analytics of 3,992 human breast cancer specimens found that cellular levels of PPAR-gamma were associated with survival outcomes in breast cancer. Higher levels seemed to correlate with better prognosis. This led the study authors to hypothesise that activating the PPAR-gamma pathway could represent a novel therapeutic strategy against breast cancer.

They also observed that levels of PPAR-gamma in cancer cells were inversely correlated with expression of certain histone deacetylases (HDACs). Further experiments revealed that this is because HDACs, proteins that regulate the expression and activity of genes by altering DNA compaction, led to reduced PPAR-gamma levels in cancer cells. Interestingly, prognostically-poor breast cancer subtypes such as triple-negative breast cancer and

endocrine-resistant breast cancer, were found to have high levels of HDAC activity and lower levels of PPAR-gamma.

Consequently, drugs which “turn on” the PPAR-gamma receptor have very limited efficacy for treating cancer when used alone. This is likely because there are few of such receptors in cancer cells to begin with. The researchers found that individually, TZDs and HDAC inhibitors had limited anti-tumour effects when used as single agents. However, when both classes of drugs were administered concurrently, the combination treatment was synergistic and greatly stalled disease progression in mouse models of triple-negative breast cancer and endocrine-resistant breast cancer.

One of the clinically important aspects of this study is the “repurposing” of existing, US



Food and Drug Administration approved drugs. Drug repurposing, also known as drug repositioning, refers to a strategy of redeploying 'old drugs' in drug discovery.

"This is an attractive proposition because 'older drugs' usually have well-known and established safety profiles, which de-risks the drug development process and can shorten approval timelines," according to Dr Nicholas Syn, one of the lead authors of the study.

Dr Loo Ser Yue, another of the lead authors in the study added, "This anti-tumour effect was mediated not only through the direct effect of combination therapy on restraining cancer cell proliferation, but also by curbing the growth of blood vessels which supply nutrients and oxygen to cancer cells (also known as 'angiogenesis'). Remarkably, we also found that although HDAC inhibitors potentiate the cytotoxicity of TZDs against aggressive breast cancer cells,

## **Drug repurposing, also known as drug repositioning, refers to a strategy of redeploying 'old drugs' in drug discovery.**

normal healthy cells were spared from the cell-killing effect of this combination drug regimen."

"The 'tumour-selective' nature of this combination treatment—whereby cancer cells are exquisitely vulnerable to the combination of drugs, while normal non-cancerous healthy tissue are spared—is of clinical significance to us oncologists, because it implies a wide therapeutic window with little overlap between drug concentrations required to have anticancer effects and concentrations that cause systemic toxicity",

said Professor Goh Boon Cher, Senior Consultant, Department of Haematology-Oncology, National University Cancer Institute, Singapore. Prof Goh is also Deputy Director at the Cancer Science Institute, NUS, and had initiated the project with Asst Prof Kumar.

"Overall, these findings merit further validation in clinical trials, and may offer a new and scientifically-cogent strategy against women with aggressive types of breast cancers that otherwise respond poorly to conventional chemotherapy," said Asst Prof Kumar.

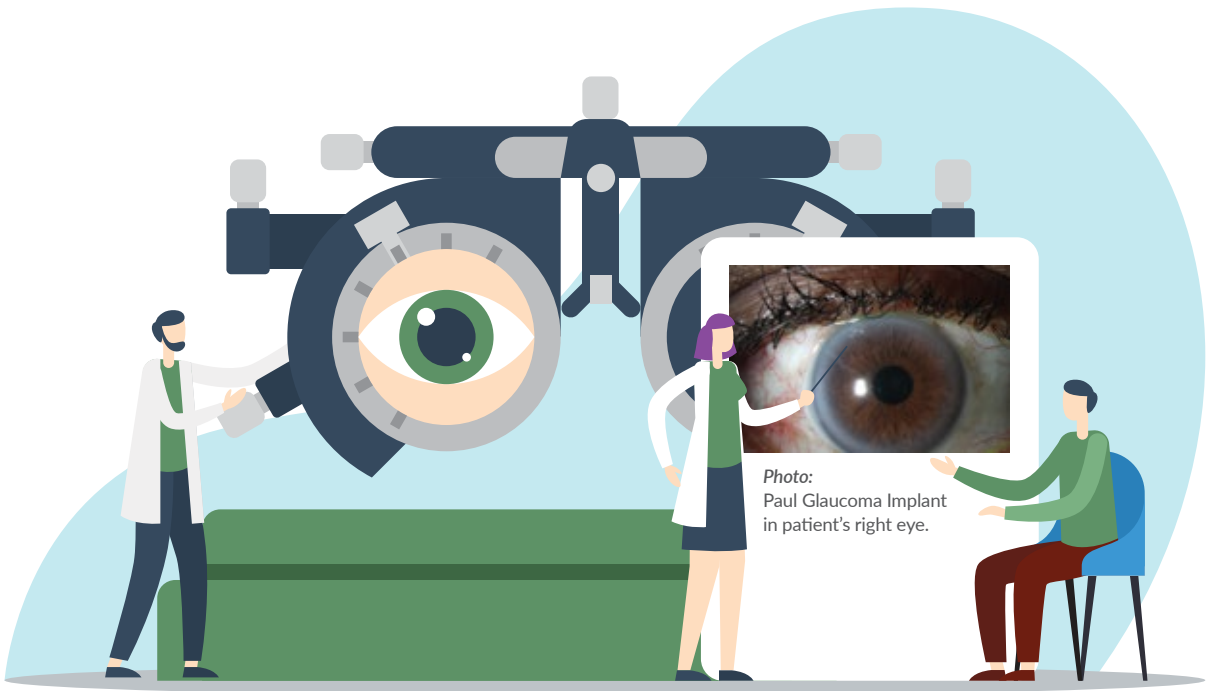
### *About the NUS Centre for Cancer Research*

Cancer is a leading cause of death and illness worldwide, and represents a present and growing challenge in Singapore. As such, the NUS Centre for Cancer Research (N2CR) aims to develop innovative new ways to detect, cure and prevent cancer by undertaking internationally leading fundamental research that advances the understanding of cancer, and by translating these research discoveries into clinical practice to benefit patients. Research aspires to further understand key genetic and epigenetic changes that drive the

origin and progression of cancer in different tissues, particularly those forms prevalent in Asia; develop new therapies to target specific cancers in specific patients; and gain insights into the genetic and environmental variations that underlie cancer susceptibility.

N2CR is carefully organised to motivate interdisciplinary collaborations—spanning from bench to bedside and back again—to drive research in key areas. The programme empowers fundamental and clinical researchers from NUS Medicine, the Cancer Science

Institute, the National University Cancer Institute Singapore and the National University Health System to work together, alongside scientists and technologists from other disciplines, to address major challenges. The work is enabled by cancer site-specific resources which include the collection of patient samples and databases with clinical information. It will focus on three cross-cutting themes that promote powerful interdisciplinary collaborations between fundamental researchers, enabling technologists and clinical investigators.



# New Glaucoma Implant Reduces Eye Pressure and Preserves Vision

*Glaucoma affects about 3-5% of the elderly population in Singapore, and the risk increases with age. The non-surgical treatment options available for most patients are medications to reduce pressure in the eye and laser trabeculoplasty, which targets the drainage angle of the eye.*

**A**lthough the use of minimally invasive glaucoma surgery has become popular, many patients with advanced glaucoma or complex secondary glaucoma are not suitable for such procedures. In these circumstances, trabeculectomy is a reasonable option but it is effective largely in carefully selected patients without significant risk factors for surgical failure.

On the other hand, aqueous tube shunts have a much broader range of efficacy, working to some degree even in patients with the highest risk of failure. Choosing the appropriate treatments and tube shunts requires in-depth understanding of each patient's condition and surgical requirements—tube shunt implants are versatile and effective for most types of glaucoma even in severe ones like refractory glaucoma.

A new glaucoma implant developed by a National University Health System team reduces patients' eye pressure (also known as intraocular pressure, IOP) for a longer period of time and enables less reliance on eye drops. The Paul Glaucoma Implant (PGI) is a glaucoma drainage device which regulates IOP and prevents further progression of the disease that leads to blindness.

With a higher efficacy and safety profile in reducing IOP, this medical technology innovation advances the treatment of glaucoma. In patients with medically uncontrolled glaucoma, the PGI offers a viable option in the management of refractory glaucoma, a severe form of glaucoma that has a high risk of failure from conventional trabeculectomy surgery.

Led by Professor Paul Chew from NUS Medicine and Senior Consultant at the Department of Ophthalmology, National University Hospital (NUH), the research team involved in the development and design of the implant comprises Adjunct Associate Professor Chelvin Sng, Visiting Consultant from the Department of Ophthalmology, NUH, and Medical Director, Chelvin Sng Eye Centre, as well as researchers at the National University of Singapore.



“We designed this implant to give higher successful eye pressure control and consistent safety and efficacy. It is a more reliable device than current standard devices in use today. The ability to predictably manage severe glaucoma is the result of this new implant,” said Professor Chew.

Manufactured using medical grade silicone, the implant has two distinguishing features—a smaller tube calibre compared to other similar tube shunts, and an end-plate optimised to have a larger effective surface area. Co-inventor of the implant, Associate Professor Chelvin Sng, emphasised, “The implant has undergone rigorous safety and biocompatibility studies in the laboratory and in animal studies before being implanted in patients.”

A clinical trial with the PGI conducted in December 2017 to 2018 led by Associate Professor Victor Koh, Head, Department of Ophthalmology in NUS Medicine and NUH, has shown that surgery with the implant has successfully reduced the eye pressure in 93% of its participants after a one-year follow up. The results also suggested that it is effective, safe and the dependency on anti-glaucoma eye drops after surgery is much less compared to published reports for other implants. The results of the trial were published in *Ophthalmology Glaucoma* on 11 May 2020 and 74 patients from Singapore, United Kingdom, Thailand, Hong Kong and Malaysia were recruited for follow-ups.

“The clinical outcomes from the multi-centre study validated the novel design of the PGI. Compared to published outcomes of other glaucoma tube shunts, the study suggests that the PGI is able to optimise eye pressures for

refractory glaucoma with lower dependency on anti-glaucoma eye drops,” said Associate Professor Victor Koh.

The implant is licensed to a start-up company Advanced Ophthalmic Innovations Pte Ltd (AOI) and has been used for glaucoma treatments in Singapore, Europe, South Africa, Middle East, and Asia-Pacific. The innovation team received the Conformité Européenne (CE) Mark and Health Sciences Authority (HSA) approval for the Paul® Glaucoma Implant in 2017, and Therapeutic Goods Administration (TGA) certification was obtained in 2018. AOI recently commenced clinical trials in China in order to secure the National Medical Products Administration (NMPA) approval for clinical sales in China. Further, AOI also plans to undertake the US Food and Drug Administration regulatory filing soon. Patents were granted in the US, China, Singapore, and Japan.

The implants are now used by leading hospitals and established eye centres in the United Kingdom, Ireland, Germany, Holland, Finland, Italy, Portugal, France, Spain, Belgium, Saudi Arabia, South Africa, South Korea, Malaysia,

Australia and New Zealand as well as the National University Hospital.

“An important aim that we have achieved with the PGI is to design a shunt that is less invasive inside the eye, with its much smaller tube than conventional implants, without compromising efficacy across the spectrum of recalcitrant glaucomas,” added Professor Keith Barton, a glaucoma specialist with Moorfields Eye Hospital in the United Kingdom and a visiting Professor with NUS Medicine. He was also involved in the design phase of the PGI.

Professor Lee Tian Tee, a Singaporean music professor at the Sichuan Conservatory of Music, received the implants at the National University Hospital in 2018 and 2019. “I had gone for an eye check-up in 2016 to seek help for my cataract. It was then that I found out that I was also suffering from glaucoma. After a detailed assessment with Prof Chew, who was my eye doctor, I received the PGI on both eyes. It has substantially relieved the pressure in my eyes without the need for any eye drop medication.”



Glaucoma affects about **3 to 5%** of the elderly population in Singapore

The team behind the Paul Glaucoma Implant.



Image was taken before implementation of COVID-19 safety measures.

**Butterflies,**

**Burnout and**

**the Power of**

**Transformation**

*BY DR NOREEN CHAN, HEAD & SENIOR CONSULTANT, DIVISION OF PALLIATIVE CARE,  
NATIONAL UNIVERSITY CANCER INSTITUTE, SINGAPORE*





*Recently, on a day off that was rare for not being packed with “catch up” activities and errands, I found myself gazing at a butterfly drying its wings after emerging from its pupa. It bore no resemblance to the fat caterpillar that had made short work of my pomelo shrub, and the first thought that crossed my mind was “Wah, just like we were taught in school”.*

**T**he next thought was about the trials of the last two years of living with COVID-19, especially from the perspective of healthcare workers grappling with exhaustion and burnout. It might seem like a tangential connection, but bear with me...

The term “burnout” came to prominence during the pandemic, and it was probably the first time that many members of the public heard about this phenomenon amongst healthcare staff and frontline workers at the coalface of the battle against COVID-19. It was also the first time it was discussed in earnest amongst senior political and healthcare leadership, as it related to maintaining healthcare capacity as wave after wave of infections crashed upon us.

**COVID-19 has forced us to accept that change is the only constant, and that we have to adapt, to grow and transform. Perhaps nothing so drastic as the butterfly, whose creation depends literally on the destruction of its former self, but always with self-awareness and mindful intention, and a determination to not only survive, but thrive.**

What is burnout (or burn-out) exactly? It is a term from occupational psychology and is defined in the ICD-11 (the WHO International Classification of Diseases) as “syndrome conceptualised as resulting from chronic workplace stress that has not been successfully managed. It is characterised by three dimensions: 1) feelings of energy depletion or exhaustion; 2) increased mental distance from one’s job, or feelings of negativism or cynicism related to one’s job; and 3) reduced professional efficacy. Burnout refers specifically to phenomena in the occupational context and should not be applied to describe experiences in other areas of life.”

One might argue that one does not have to be in a formal occupation to feel burnt out, but be that as it may, burnout is more common than we may like to admit. A related, but separate, phenomenon is compassion fatigue (or secondary traumatic stress, or vicarious traumatisation), which may arise as a result of repeated exposure to other people’s suffering and distress. Compassion fatigue may occur in the “helping professions”—healthcare workers, first responders and similar professions—and in severe cases, may even lead to

PTSD (Post-Traumatic Stress Disorder).

What data do we have on local prevalence of stress and burnout? My colleague Dr See KC and his group, surveyed senior and junior doctors in a Medicine Residency programme (Stress and Burnout among Physicians: Prevalence and Risk Factors in a Singaporean Internal Medicine Programme, See KC et al, *Annals of Acad Med Singapore* Oct 2016). What they found was that while stress was common amongst both groups, burnout was twice as common among the more junior doctors (71.8% vs 31.1% in senior doctors).

Many assume that burnout would be very common among palliative care professionals, due to the nature of our work and frequent exposure to suffering, death and dying. A study conducted in 2013 (Burnout, psychological morbidity and use of coping mechanisms among palliative care practitioners: A multi-centre cross-sectional study, M Koh et al, *Palliative Med* 2015) actually found that a third of those surveyed met criteria for burnout, which is lower than figures quoted in various studies of different staff groups.

Coping mechanisms that helped with burnout could be



Survey showed burnout among  
**71.8%**  
of junior doctors  
compared to  
**31.1%**  
of senior doctors

divided into two parts: On the personal front, respondents felt that the following were beneficial—physical well-being, hobbies, transcendental practice (meditation, reflection), having passion for one’s work, having realistic expectations. Organisations also had a part to play by enabling clinical variety, rituals like remembering patients, planning activities like team bonding.

A follow-up to the above study (Burnout and Resilience After a Decade in Palliative Care: What Survivors Have to Teach Us. A Qualitative Study of Palliative Care Clinicians With More Than 10 Years of Experience, *Journal of Palliative Medicine* 2020) conducted focus group discussions with senior palliative care professionals, to understand how they coped with challenges and continued working in the field.

The themes that emerged were: Struggling – Changing mindset – Adapting – Resilience. In other words, the earlier days were full of difficulties, but over time, they learnt and grew through the process, eventually reaching a state where they could “bounce back” from and deal with challenges more easily. The core phenomenon was that of transformational growth, and that this journey—rather than the destination itself—was the most important.

So it does appear that dealing with adversity and developing resilience is a process of **transformation**, and while burnout is common—and honestly hard to avoid in our high-stress working environment—it can be prevented or managed by a combination of personal and organisational efforts.

Back to the butterfly: unlike the green caterpillar camouflaged against the leaves, the butterfly's vivid colours are a visual magnet for any bird, and until its wings have dried and it can fly, it is a defenseless target. Transformation can feel like that, there are many times

one feels bare, exposed and vulnerable, having left the protective chrysalis of the old and familiar, yet not fully ready to embrace the "new normal".

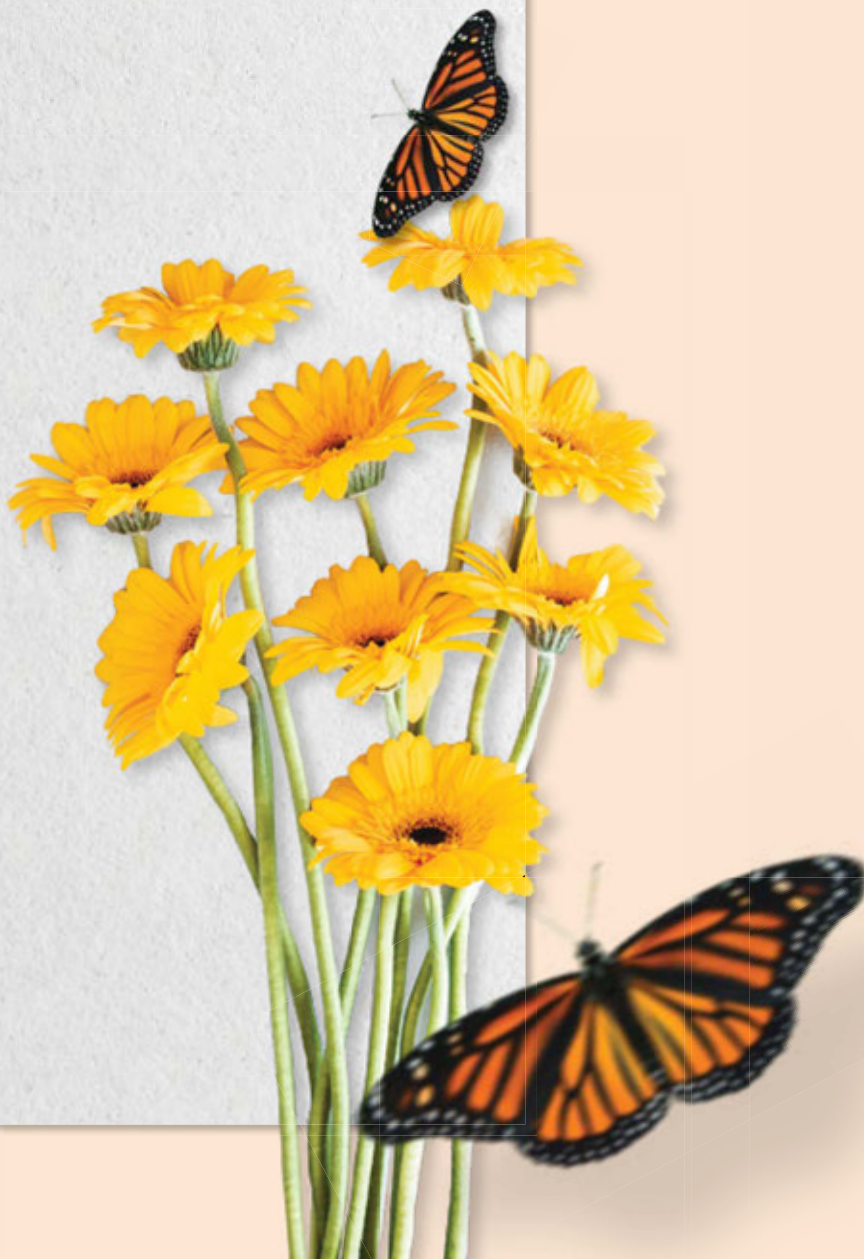
COVID-19 has forced us to accept that change is the only constant, and that we have to

adapt, to grow and transform. Perhaps nothing so drastic as the butterfly, whose creation depends literally on the destruction of its former self, but always with self-awareness and mindful intention, and a determination to not only survive, but thrive.

## *The Journey*

*by Mary Oliver*

One day you finally knew  
 what you had to do, and began,  
 though the voices around you  
 kept shouting  
 their bad advice—  
 though the whole house  
 began to tremble  
 and you felt the old tug  
 at your ankles.  
 "Mend my life!"  
 each voice cried.  
 But you didn't stop.  
 You knew what you had to do,  
 though the wind pried  
 with its stiff fingers  
 at the very foundations,  
 though their melancholy  
 was terrible.  
 It was already late  
 enough, and a wild night,  
 and the road full of fallen  
 branches and stones.  
 But little by little,  
 as you left their voice behind,  
 the stars began to burn  
 through the sheets of clouds,  
 and there was a new voice  
 which you slowly  
 recognised as your own,  
 that kept you company  
 as you strode deeper and deeper  
 into the world,  
 determined to do  
 the only thing you could do—  
 determined to save  
 the only life that you could save.



# Slaying a Serial Killer – The Decade-long Quest by an NUS and Glaxosmithkline Team

BY ASSOCIATE PROFESSOR KEVIN SW TAN, HEAD, DEPARTMENT OF IMMUNOLOGY AND MICROBIOLOGY,  
NUS MEDICINE

*A decade-long unpredictable journey of malaria cell death research—from bench to industry and back.*

In October 2021, a team at the NUS Laboratory of Molecular and Cellular Parasitology realised a cherished dream of publishing a major study based on a collaboration with GlaxoSmithKline's (GSK) Global Health Discovery Incubator Unit<sup>1</sup>. The project involved the use of an advanced imaging protocol developed by the group to screen GSK's drug library for drugs that kill malaria parasites through disruption of the cell's calcium balance. The NUS team performed the screen, while the GSK team

in Spain carried out detailed characterisation of the effective compounds. The method resulted in the identification of potent antimalarials with a unique mode of killing action, providing the global malaria community with invaluable starting points for drug development. The featuring of the study on the cover of *ACS Chemical Biology* was certainly a bonus.

The origins of the work go back a decade, when an eager PhD student published, in 2010, a seminal study on drug-mediated suicide in malaria parasites.

Associate Professor Kevin Tan (left) discussing the data from the AMNIS ImageStreamX Mk II imaging flow cytometer with post-doctoral researchers Dr Wannii Chia (centre) and Dr Trang Chu (right).



Cellular suicide, also called apoptosis or programmed cell death (PCD), is a genetically encoded feature of multicellular organisms and serves the vital function of deleting unwanted, damaged or infected cells, so as to preserve the health and integrity of the organism. In contrast, the field of PCD in single-cell organisms was, and continues to be, controversial.

The existential question is ‘why would a single cell kill itself, as this would result in the death of the entire organism’. Yet, there are numerous reports of single cell organisms that exhibit molecular and cellular features of PCD, so much so that there exists an international journal dedicated to the study of PCD in unicellular organisms (<https://microbialcell.com/>). The malaria parasite, a single-cell eukaryote, was reported to exhibit some features of cellular suicide when exposed to specific antimalarials. However, other reports concluded that no such features were discernible.

Dr Ch'ng Jun Hong, then a PhD student with our department, reconciled the controversy by showing that the suicidal signatures were evident depending on the concentration of the drug used<sup>2</sup>. In quick succession, he reported that these death signatures occurred early during drug exposure and involved calcium ion leakage from a specific cell compartment<sup>3</sup>. This made sense. Cellular calcium, as an ion, is vital for cellular processes, but is highly reactive. Hence, cells need to store calcium in specific compartments (lysosomes, mitochondria, etc.) to prevent activation of calcium responsive enzymes, leading to cell death. Some antimalarials cause calcium ions to spill out of their



### **The malaria parasite, a single-cell eukaryote, was reported to exhibit some features of cellular suicide when exposed to specific antimalarials.**

stores, activating enzymes that essentially digest the parasite from within. Importantly, he went on to report that these calcium-mediated cell death features were physiologically relevant and could be observed in mouse models of malaria infection<sup>4</sup>.

Around this time, a new type of imaging technology was gaining popularity. The flow-based imaging platform exploited improvements in computer processor speeds to enable split-second image capture and analysis of several thousand cells flowing past a high-speed camera. Because we could measure calcium location within a cell using calcium-sensitive fluorescent probes, this imaging technology seemed ideal for screening drugs that disrupted calcium balance in large numbers of parasites; malaria parasites that succumbed to such drugs

would reveal images of calcium spilling out of their stores and into the cytosol, on a large scale. This was achieved on a small panel of drugs<sup>5</sup> and served as a proof of concept for screening a larger collection of compounds.

In 2014, the Department of Microbiology and Immunology purchased the latest flow-based imaging platform (Amnis ISX MKII), which enabled many more compounds to be screened in a short span of time. Fortuitously, and around this period, I met with GSK Singapore's strategy and partnership development manager, Dr Yasuji Matsuoka, during a networking session at an enterprise convention. He highlighted our capability to GSK's malaria team, and we were subsequently engaged to screen their antimalarial library of compounds for calcium disrupting effects.



Dr Wannii Chia (first author, post-doctoral researcher) doing malaria cell culture.

Our GSK-Spain collaborator was Dr Maria de Gracia Gomez-Lorenzo, an affable, professional and responsive investigator. Over \$100,000 of research funds were allocated, which allowed us to hire Dr Chia Wannan as a postdoctoral fellow, to manage the project for a year. The methodology was further refined during her time on the project, which was published in a leading methods journal<sup>6</sup>. Around this time, Dr Tong Jiexin, then a PhD student, validated the utility of the method by screening a different compound library<sup>7</sup>. Her work branched out into several smaller projects, one of which led to an unexpected finding, which I hope to share on another occasion.

Another study is presently undertaken by our current PhD student, Claudia Carrera Bravo, who is seeking to shed light on the cellular and immunological consequences of calcium destabilisation in drug-treated malaria parasites, in collaboration with Prof Laurent Renia from A\*STAR. So that's where we are today. It has been a long but productive journey, filled with twists and turns.

### *Looking Back at My Decade-long Research Journey*

Research usually takes on an unpredictable trajectory. Dead ends are common, but sometimes, the stars align, and things work out. The journey becomes clearer on hindsight, so it is good to keep an open mind, and leverage on opportunities when they present themselves.

Impactful work, especially in the biomedical domain, doesn't happen overnight. It takes years of committed and strategic focus for projects to bear fruit.

You need a talented research workforce to deliver high quality data and publications. Drs Ch'ng Jun Hong, Chia Wannan and Tong Jiexin were instrumental to the success of our projects.

Networking is crucial for expanding our opportunities. My chance meeting with Dr Matsuoka gave birth to an industry collaboration that most academics would dream of. When a pharmaceutical giant takes notice of your work, it is proof that your research is impactful and relevant.

Never, never, give up. Our featured paper<sup>1</sup> was rejected by several journals, partly due to the controversial nature of PCD in malaria. In recent months, our new colleagues, Drs Rajesh Chandramohanadas and Trang Chu, both malaria experts, joined our efforts to reshape the project and add new data to further strengthen our work. This strategy worked, and the rest is history.

<sup>1</sup> Chia W, Gomez-Lorenzo MG, Castellote I, Tong JX, Chandramohanadas R, Thu Chu TT, Shen W, Go ML, de Cozar C, Crespo B, Almela MJ, Neria-Serrano F, Franco V, Gamo FJ, Tan KSW (2021) High-content phenotypic screen of a focused TCAMS drug library identifies novel disruptors of the malaria parasite calcium dynamics. *ACS Chem. Biol.* 16:2348-2372.

<sup>2</sup> Ch'ng JH, Kotturi SR, Chong AGL, Lear MJ and Tan KSW (2010) A programmed cell death pathway in the malaria parasite *Plasmodium falciparum* has general features of apoptosis but is mediated by clan CA proteases. *Cell Death Dis.* 1 e26.

<sup>3</sup> Ch'ng JH, Liew K, Goh ASP, Sidhartha E, Tan KSW (2011) Drug-induced permeabilization of parasite's digestive vacuole is a key trigger of programmed cell death in *Plasmodium falciparum*. *Cell Death Dis.* 2 e216.

<sup>4</sup> Ch'ng JH, Lee YQ, Gun SY, Chia WN, Chang ZW, Wong LK, Batty KT, Russell B, Nosten F, Renia L and Tan KSW (2014) Validation of an alternative antimalarial mechanism of chloroquine for clinical use against malaria. *Cell Death Dis.* 5 e1305.

<sup>5</sup> Lee YQ, Goh ASP, Ch'ng JH, Nosten FH, Preiser PR, Pervaiz S, Yadav SK and Tan KSW (2014) A high-content phenotypic screen reveals the disruptive potency of quinacrine and 3',4'-dichlorobenzamil on the digestive vacuole of *Plasmodium falciparum*. *Antimicrob. Agents Chemother.* 58(1): 550-558.

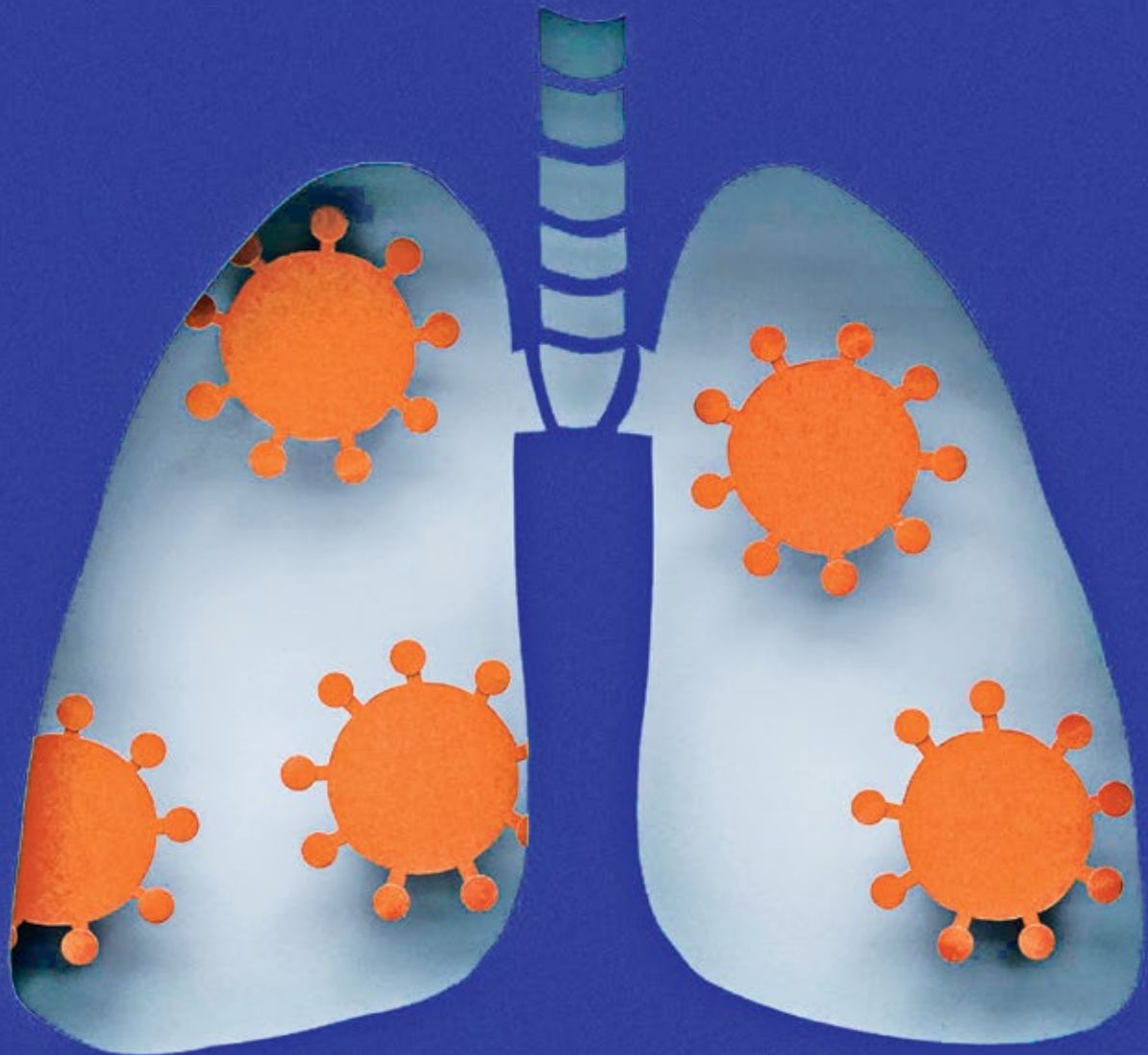
<sup>6</sup> Chia WN, Lee YQ, Tan KSW (2017) Imaging flow cytometry for the screening of compounds that disrupt the *Plasmodium falciparum* digestive vacuole. *Methods* 112:211-220.

<sup>7</sup> Tong JX, Chandramohanadas R, Tan KSW (2018) High-content screening of MMV Pathogen Box for *Plasmodium falciparum* digestive vacuole disrupting molecules reveals valuable starting points for drug discovery. *Antimicrob. Agents Chemother.* 62(3): e02031-17.



# Tuberculosis Alert!

BY DR ALICIA ANG AND DR CATHERINE ONG, DEPARTMENT OF MEDICINE, NUS MEDICINE



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*Tuberculosis (TB) was the leading cause of death from an infectious disease, only to be surpassed by the new kid on the block, COVID-19, in the past two years.*

While both infectious diseases share many things, including being endemic in Singapore, COVID-19 has unfortunately disrupted TB services and set-back the End TB Strategy, which strived to reach the following goals by 2035.

- 1) Reduce TB deaths by 95%
- 2) Reduce new TB disease by 90% between 2015 and 2035
- 3) Ensure no family is burdened with catastrophic expenses due to TB.

The World Health Organisation's latest annual Global TB Report stated that TB deaths have increased to 1.5 million in 2020, with projected further increases in new TB disease and mortality beyond 2022. Our study of 43 TB centres over 19 countries<sup>1</sup>, showed a significantly reduced TB disease notification and decreased drug-resistant TB treatment in 2020 compared to 2019, which corresponded with national lockdowns during the pandemic. A resurgence in TB disease is thus expected in the very near future, as societies start to open up, and resources need to be urgently re-prioritised.

What are these resources? These can be broadly categorised into two: healthcare-related and socioeconomic resources. Within healthcare-related resources, TB preventive strategies targeting at-risk groups need to be scaled up. These population groups include HIV-positive patients, patients receiving kidney dialysis, transplant recipients,

and patients receiving immunosuppressive therapy such as anti-tumour necrosis factor therapies. Healthcare providers should also be on the alert to promptly diagnose TB disease, as a substantial proportion of patients may not have symptoms, but have chest-X ray abnormalities indicative of infectious TB. They should be promptly initiated on effective TB treatment, as a delay in diagnosis and treatment means further transmission of TB within the community.

Socioeconomic resources can similarly be further scaled-up. These include the use of technology, including telehealth to further support patients on preventive and TB disease treatment. The COVID-19 pandemic has accelerated the adoption of digital technologies for health monitoring and contact tracing. These include the widespread distribution of pulse oximeters for home monitoring of oxygen saturation, and the implementation of the *Trace Together* app for contact tracing and easy implementation of vaccination-differentiated measures for entry into

### Goals for End TB Strategy by 2035



#1. Reduce TB by 95%



#2. Reduce new TB disease by 90% between 2015 and 2035



#3. Ensure no family is burdened with catastrophic expenses due to TB

malls and eateries. The use of telehealth has also grown exponentially, with clinical consults for patients with COVID-19 on home recovery programmes, as well as selected medical consults for other patients, done via online secured platforms. The progress made in utilising technology in medicine can be implemented for TB as well.

Policies could be implemented for routine screening and treatment of both TB infection and TB disease at the national level. Healthcare subsidies can be extended for all patients with TB, including migrants.

**Policies could be implemented for routine screening and treatment of both TB infection and TB disease at the national level. Healthcare subsidies can be extended for all patients with TB, including migrants.**

Another ‘pandemic’ that must not be forgotten is the ‘silver tsunami’. 15% of the resident population is aged above 65 years in 2020, as compared to 9% in 2010. Singapore has progressed from an ageing society to an aged society, and is projected to become a super aged society, where more than 20% of the society is aged above 64 years, by 2030<sup>2</sup>.

The elderly population has been disproportionately affected by the COVID-19 pandemic. Between May to November 2021, the proportion of unvaccinated persons infected with COVID-19 requiring oxygen supplementation rose sharply with age, from less than 1% amongst those aged 20–29 years, to 25% amongst those aged 60–69 years, and 47% amongst those 80 years and above. Similar trends are seen among persons infected with COVID-19 who require intensive care, or who passed away as a result of COVID-19<sup>3</sup>.

With tuberculosis, the greatest burden of disease falls among those who are elderly. In 2018, the incidence rate per 100,000 population increased with age, with an incidence rate of 15.5 among those aged 20-29 years, then rising to 74.4 among those aged 60–69 years and going up to 137.5 among those aged above 80 years. As with COVID-19, the mortality rate per 100,000 population also rises sharply with age—with



**While the COVID-19 pandemic has captured everyone’s attention in the past two years, we must not lose sight of the fight against other infectious diseases of public health significance.”**

a mortality rate of less than 1 per 100,000 population in those below 70 years of age, to 5.1 among those above 70 years<sup>4</sup>. These figures remind us that in order to effectively adopt the End TB Strategy, additional emphasis must be placed on TB treatment and prevention among the elderly.

While the COVID-19 pandemic has captured everyone’s attention in the past two years,

we must not lose sight of the fight against other infectious diseases of public health significance. With proven airborne transmission, TB can spread quickly if left uncontrolled, and can cause significant morbidity and mortality. As we raise awareness of TB on World TB Day, let us also not forget about the fight against TB on all other days of the year.

<sup>1</sup> Migliori GB, Thong PM, Alffenaar JW, Denholm J, Tadolini M, Alyaquobi F, et al. Gauging the impact of the COVID-19 pandemic on tuberculosis services: a global study. *Eur Respir J*. 2021.

<sup>2</sup> Department of Statistics, Singapore.

<sup>3</sup> Ministry of Health, Singapore. COVID-19 Statistics. Retrieved on 6/12/2021.

<sup>4</sup> Communicable Diseases Division, Ministry of Health, Singapore. Communicable Diseases Surveillance: Singapore 2018.

# Why We Teach

*The very first tenet of the Hippocratic Oath states: I will respect the hard-won scientific gains of those physicians in whose steps I walk, and gladly share such knowledge as is mine with those who are to follow.*

**Y**oung doctors are uniquely positioned to teach and guide students, as they are able to draw upon their own recent experience in medical school. The Junior Doctor Teaching Award is presented in

recognition of house officers, medical officers and residents who have shown excellence in their teaching of NUS medical undergraduates. Nominations come from a feedback form from the medical students under their tutelage. Award

recipients are then selected with input from the Associate Deans and education leads of each hospital.

Some Junior Doctor Teaching Award winners share their thoughts.





**Dr Reudi Chan Jun Wen**

*Department of Anaesthesia,  
National University Hospital*



**I see my peers and students paying it forward by helping their own friends and juniors. That is how I view what I do; teaching others as an act of gratitude for what my seniors and mentors have done for me.”**

I always strive to follow the examples of the excellent mentors and clinicians who have taught me before. It's not much of a 'eureka' moment, but I often find myself following the oft quoted saying "See one, do one, teach one". Back in medical school, some of the best mentors were always the ones who taught very systematically—they succinctly re-emphasised first principles about the condition or procedure, then demonstrated a clinical example, before getting us to try applying the knowledge ourselves. As this had worked best for me as a learner, I apply the same framework where possible whenever I teach others.

I was pleasantly surprised to receive this award; hopefully this means I have made a positive impact for at least a few of my colleagues! But I would

have to say, the most rewarding part would probably be when I see my peers and students paying it forward by helping their own friends and juniors. That is how I view what I do; teaching others as an act of gratitude for what my seniors and mentors have done for me.

I feel strongly for my peers and juniors (as well as other training healthcare professionals across all the disciplines and allied health services) whose clinical education this past year has been badly affected by the COVID-19 situation. I hope that we will continue to make headway with the necessary adaptations to facilitate living with COVID-19, and that there will be ample opportunities for them to catch up and hopefully have a very positive experience in their clinical learning journey!





**Dr Julia Ng Wei Yi**

*Department of Infectious Diseases,  
Tan Tock Seng Hospital*

I truly was not a star student as a kid. I only got one positive comment in secondary school during a parent-teacher meeting. My mother told me she wept when she heard it, out of relief that there was someone else who didn't think I was a terrible student, for every other review told her I was.

I was infinitely curious (and talkative) in a manner quite unsettling for a system geared towards a 40-children-per-class education system. I desperately wanted to learn, but I just could not do it in the usual way. And so, I struggled through the growing pains of learning unconventionally, and I succeeded purely by the empowerment of those who loved and believed in me.

Since those fond days as the teachers' least liked student, I promised to teach whenever I could—hopeful that I could



**Since those fond days as the teachers' least liked student, I promised to teach whenever I could—hopeful that I could recognise those who learn outside the box too and support them in their journey.”**

recognise those who learn outside the box too and support them in their journey. Then I joined clinicals, and realised I could be another kind of nuisance—now the silent kind—a space-occupying lesion in the tumult that is ward rounds.

No one forgets the awkwardness of being a medical student, shuffling around with your unused stethoscope and new scrubs—hoping desperately for someone to acknowledge you—but also wanting to die when the benevolent senior consultant gives their lengthy welcome speech while the junior doctors wait impatiently to get down to work.

As I struggled through being a House Officer at KK Women's and Children's Hospital's Paediatrics department, COVID-19 restrictions lifted on medical students; and suddenly one day during morning rounds, they appeared.

In all honesty, my first response was dismay.

Then, I remembered the purest principle behind any kind of service, which is also well applicable to teaching—the quality of teaching is

secondary to the willingness to do it. Thus, I started to teach whatever I could, and those days with them were some of the most enjoyable I had in the Paediatrics department.

Failure was and is my best teacher. I am grateful my academic struggles have allowed me to have insight into the sort of confusion a more cerebral person perhaps might not have anticipated.

As a junior, you feel that there is very little you can bring to the table, until someone reminds you that what you do have is potential—that what you are going through now, these growing pains, are to be expected.

I hope I never stop reminding my juniors of that. I hope they know that by letting me teach them they are helping me to grow. I hope that if you are reading this, and we cross paths someday, that you will stop to say hello—so we can struggle together in our desire to be better, for each other and for our patients.

Stay safe everyone, and thank you very much to all who nominated me for this award.





### Dr Pradip Dashraath

*Division of Maternal-Fetal Medicine,  
Department of Obstetrics and  
Gynecology, National University  
Hospital*

I am writing this in between performing a caesarean delivery and crafting questions for an upcoming undergraduate atlas of obstetrics and gynaecology—a personal labour of love that's kept me occupied for the past year. This is the first time I've been asked to reflect on my teaching experiences as a clinician. Truthfully, I never saw the need to celebrate my contributions to undergraduate education (as the Dean's Office can attest to—I've not attended the award ceremonies in the past eight years!).



**I have never forgotten what it was like being a student. So, while deep knowledge and understanding of my subject are critical, acknowledging the anxieties students experience is equally important to me as an educator.”**

Teaching others has always come easily to me—not that it is a simple task or that I believe I am skilled at it, but because it gives me life. For six months, I was a relief teacher to a class of 10-year-olds in the interim between completing national service and the start of my undergraduate medical studies. In the latter half of my undergraduate years, I guided my juniors through their clinical skills and for six years as an obstetrics and gynaecology resident, I taught every batch of Phase IV students who rotated through my department.

Staying back post-call or sacrificing my weekends to teach has never bothered me. Because through it all, I have never forgotten what it was like being a student. So, while deep knowledge and understanding of my subject are critical, acknowledging the anxieties students experience is equally important to me as an educator.

Every student who has come my way has also allowed me to be a better doctor to my patients. I can parse diagnoses and management plans into forms that are easily understood by the layperson—because I have now had years of practice tearing down complex concepts and communicating them simply when I teach. I firmly believe that knowledge empowers: it provides stability and calm amidst the humdrum and treachery of daily living. To provide my students and patients with that confidence is an honour.

As Professor Chew Chin Hin, former Deputy Director of Medical Services, once said, "A doctor never stops learning and never stops teaching the next generation." I will continue until the end. I have never given up on my students, and I hope they never give up on themselves.





# Family Matters

BY PROFESSOR DORIS YOUNG, DEPARTMENT OF MEDICINE, DIVISION OF FAMILY MEDICINE, NUS

*After five years, Professor Doris Young returns to the University of Melbourne. She reflects on her time here as the founding head of the Department of Medicine.*

## The brief

Building and leading a new Department of Family Medicine at National University Health System (NUHS) was my primary focus when I was appointed in February 2018. The main challenge I faced then was how to transform a Division of Family Medicine—with a small number of administrative and faculty staff who were mainly involved in undergraduate teaching—to a world class academic Department of Family Medicine. How could I raise the bar and advance academic Family Medicine when the discipline of Family Medicine was not even recognised as a specialty in Singapore? How could I build capacity and capability in

Family Medicine education and research to enhance Family Medicine; not only in NUS, but more broadly in Singapore and internationally?

To support me in achieving my mission, I received enthusiastic encouragement and collaboration from all levels of NUS and NUHS staff. They wanted the Department of Family Medicine to succeed and immediately offered more involvement in the undergraduate curriculum and research start-up funds. Though only a division within the much-larger Department of Medicine, Dean Prof Chong Yap Seng placed the Family Medicine Head of Department (HOD) alongside the other





Heads of Departments within NUS Medicine, signalling his emphasis on the development and position of the practice in the context of Singapore's future healthcare landscape.

### **Cheering us on**

This enabled me to meet and network with other senior colleagues as well as the Directors of Translational Research Programmes. This interaction enabled the Department of Family Medicine to share its strategic plans, positioning education and primary care research as twin engines to turbocharge the growth and development of Family Medicine in NUHS. We received tremendous encouragement and support



**To support me in achieving my mission, I received enthusiastic encouragement and collaboration from all levels of NUS and NUHS staff. They wanted the Department of Family Medicine to succeed and immediately offered more involvement in the undergraduate curriculum and research start-up funds.”**

from colleagues: National University Polyclinics (NUP) clinicians were keen to engage and collaborate with us to develop an NUHS Family Medicine/Primary Care partnership in education, training, research and service delivery, under the leadership of Deputy Chief Executive Mr Chua Song Khim.

Over the last four years, not only did the Department of Family Medicine flourish and grow in numbers, but individually, each staff member experienced success in achieving their own career goals. For a HOD, that is most meaningful.

The Family Medicine curriculum now spans across four of the five years of the MBBS course and the primary care research programmes are gaining excellent momentum with multiple grants and publications. To engender a research culture amongst our Family Medicine educators, we have established a Family

Medicine Scholars programme for early career Family Doctors. Designated the Junior Academic Foundation Programme, this initiative will build an education and research network within NUS/NUHS, that reaches out to practising Family Doctors.

What the new Department of Family Medicine has achieved in the past four years could not have happened without very active support from many senior colleagues. In particular, I want to acknowledge Prof John Eu Li Wong who persuaded me to take up the role and make an impact on Family Medicine in Singapore, and Prof Yeoh Khay Guan for his generous support and trust in my ability to deliver. I want to acknowledge Mr Chua Song Khim, Deputy Chief Executive, NUHS, for his belief in the value of Family Medicine and Primary Care and the vision to bring NUP and the Department of Family Medicine together to establish One Family Medicine/Primary Care within NUHS.

I am grateful also for the unwavering support of NUS Medicine Dean, Prof Chong Yap Seng for his vision of bringing Family Medicine to a higher academic standing in the medical school, Prof Chng Wee Joo, Vice-Dean for Research, and Assoc Prof Lau Tang Ching, Vice-Dean for Education. NUS, which traces its origins to the establishment of the medical school in 1905, has a proud history and enjoys a great reputation as an outstanding university in Asia. It wants to be one of the best universities in the world and is energetic and dynamic. What makes it special is the mix of local and overseas talents working together to deliver education and research excellence. NUS is outward looking and yet at the same time adheres to a strong Singaporean traditional culture. It is proud of its history and traditions, and values its achievements. It is well resourced and backed by an active and generous alumni community. NUS is constantly seeking improvement and is very strategically focused. The can-do attitude is palpable and it energises and brings staff together.

Many colleagues at NUS and NUHS gave the Department of Family Medicine such generous encouragement and support. They provided the fuel to enable this new Department to charge its twin engines of education and research and move forward on its journey to become one of the finest academic departments of Family Medicine internationally.

It is impossible to thank individually so many other colleagues with whom I have worked closely over the last four years. Through their encouragement, hard work



and friendship they have made my role easier and more enjoyable. The wonderful team in the Department of Family Medicine, with their can-do attitude and their warm friendship—it has been a wonderful journey together.

**Memories are made of these** Singapore is a vibrant and attractive international city in Asia. There are so many good memories out of Singapore that will stay with me. I will not forget the magnificent views towards Marina Bay Sands from our apartment and those amazing tropical thunderstorms that can come and go within an hour. I have enjoyed on numerous occasions the beauty of the Botanic Gardens and its hundreds of orchid varieties, as well as many other walks all over the island. The enjoyment of eating a \$4.50 chicken rice dish in a bustling hawker centre, with the aroma of various foods in the air, can be just as special as a gourmet meal at one of my favourite Japanese or Italian restaurants.

As I leave Singapore, I am grateful to have made so many new friends and cemented old friendships (including medical alumni from University of Melbourne, who were previously my students). Colleagues I worked with closely became friends and many have family connections in Melbourne. I hope to meet them. Other colleagues from overseas who worked in Singapore also became friends, as we often shared our ‘expat’ experiences. Regrettably, if it were not for COVID-19, I think I could have been even more engaged with my staff and formed more and deeper friendships.

I have had many positive professional experiences in Singapore and am very appreciative of the opportunities I have been given. An early experience was when I was invited by CNA to share my views on ‘the future of Family Medicine in Singapore’. I recounted my experience and described my vision of how Family Medicine should develop

in Singapore, along with other key opinion leaders in health. I was very conscious that I came from Australia and that some of my comments could be viewed as being critical of the primary care system in Singapore. That is always a risk when you are candid about how you think any healthcare system can improve, but I hope that my comments were interpreted in the same positive spirit in which they were given.

A second memorable moment was the delivery of a Grand Round 'New Kid on the Block: Family Medicine in Action' to showcase the newly established Department of Family Medicine to other colleagues at NUS and NUHS in October 2018. My goal was to describe the foundation of an academic Department of Family Medicine, with education and research as core functions, to train medical students and residents in Family Medicine and to build primary care research.

Another highlight was delivering the Women in Science and Healthcare (WISH) seminar entitled 'What's a girl like you doing in a place like this?' I was able to share the challenges faced by women academics and proposed the need for a designated leadership position within NUS to promote Equal Opportunity for Women in the Workplace and Career Development.

Memories of a clean, safe, beautiful garden city with amazing architecture and a hot and humid climate. A buzzing tropical city ringing with those ubiquitous acronyms that Singaporeans seem to love throwing out, and which I still have trouble deciphering. The diversity and quality of cuisines that has led to my developing a



**I hope to engage with, mentor and support international medical and health sciences students from Singapore, who are studying in Melbourne. I look forward to establishing collaborative education and research links between NUS and the University of Melbourne where I am Professor Emerita.”**

fondness for chillies. The ease of flying to other international cities from such a central location. Friendships made and cemented, as well as great work colleagues and a sense of achievement as we worked hard together. But not to worry too much about leaving all of this behind, as I plan to come back for regular visits over the coming years!

**There and back again in Melbourne**

I am looking forward to a mini-sabbatical, for walks along ocean beaches near where we live at Portsea on the Mornington Peninsula, about 80 minutes' drive from Melbourne. After taking public transport for seven years in Singapore, I need to learn to drive a car again! I am looking forward to spending unhurried times, catching up with friends and family, whom I haven't seen over the last two years, due to the pandemic and forced closure of international borders. To increase health span, I will NOT retire, but hopefully will work more years, fewer hours a day, and fewer days in a week and fewer weeks in a year.

I can't wait to go on my walking trips and travel with no work emails and no urgent meetings!

Living in Singapore in a condo made us appreciate the convenience of modern apartment living, which is a great alternative to a house which most Australians aspire to owning and living in. I will use public transport more often and spend more time exploring the rest of Victoria and Australia, which I didn't appreciate enough when I lived there.

As for work, I hope to engage with, mentor and support international medical and health sciences students from Singapore, who are studying in Melbourne. Potentially, I can assist with their education needs and connect them back to NUHS and other healthcare clusters to seek job opportunities in Singapore. I look forward to establishing collaborative education and research links between NUS and the University of Melbourne where I am Professor Emerita. Finally, to all my Family Medicine friends and colleagues in NUP, NHGP, SHP, PCNs, Community Hospitals, I wish you all well and look forward to 'One resident - One Family Doctor' becoming a reality in 2022 and beyond.

Images were taken before implementation of COVID-19 safety measures.



## Toh Chin Kiat: Art as reflections on life

*Before the advent of COVID-19, on-site events were an intrinsic part of the School's calendar. Few, however, may know that the man behind the camera at many of such events is the School's official photographer and an avid painter.*

**T**oh Chin Kiat is with the School's Administrations team and handles projects requiring print work, photography and video editing. He is also the creative hand behind the paintings that are on display at the Dean's Office on Level 11 of the NUHS Tower Block. The unassuming 52-year old, who has been with the School since 1997 when Prof Tan Chorh Chuan was the Dean, offered to share his paintings during a team

discussion that sought to enliven the School's working spaces with a collection of artwork from staff.

Motivated by the desire to not only portray his reflections but evoke thought and conversations through art, Chin Kiat first took serious interest in painting in his young adult years when he enrolled in a creative arts programme at his church. More recently, in 2019, he attended an eight-month



*Left:*  
The artist at work.

*Right:*  
Some of Chin Kiat's paintings are on display at the lounge area in the Dean's Office, Level 11, NUHS Tower Block.

class that was taught by a professional artist. Under the tutelage of his instructors, he acquired the techniques of painting that guided his steps in blending, creating texture and finding the right strokes with his paintbrush.

Through the pursuit of his longstanding passion, Chin Kiat has accumulated over a hundred paintings, all carefully stored in a nook of his kitchen. These paintings range from the

'impressionistic' style that captures the broad essence, the 'realistic' style that highlights specific details, to the 'abstract' style which takes an independent composition departing from reality. "I like experimenting with the different styles, as mixing them allows me a greater degree of freedom to express my work. I often paint what comes to mind, and it can be something that is inspired by what I see or read."

Reflecting on his observations of society's male-centricity and seeming adherence to conformity, he produced a work that depicted male passengers sharing almost the same appearance and choice of outfit while each goes about his way. The background shows a blend of old and new architecture, representing the pace of change in the times we live in, where society often pursues progress while holding on to traditions.



**I am glad to have captured the sights and sounds from many of my previous trips. These paintings help remind me of the good memories, as all of us long to travel again someday.”**

Often guided by his faith, Chin Kiat also believes in divine provision. Inspired by a sleeping cat he noticed one day, he created a painting of the slumbering feline on paper plane—representing how he can always find rest and direction in the wings of God. He also painted a dream he had—of a boy flying a kite in a colourful setting—which taught him about not holding on too tightly to the concerns of life. “The image was etched very strongly in my mind, it was as if God was sending me a message to learn to let go—like how one would release a kite’s string while flying it.”

Musing over a beautiful holiday he had in Langkawi a

few years ago, Chin Kiat shares that his favourite painting took inspiration from a photograph he captured of his two sons playing by the beach. “The orange of the sunset was so rich it stayed in my mind—it almost felt like a moment of heaven before my eyes. And I knew I had to capture it in painting too.”

Apart from Langkawi, there were also many scenes that Chin Kiat has observed while he was travelling overseas, and which inspired him to paint. “I am glad to have captured the sights and sounds from many of my previous trips. These paintings help remind me of the good memories, as all of us long to travel again someday,” he added.





Left to right,  
top to bottom:  
Langkawi holiday.

Reflections on  
society.

Catnap.

Dreams take flight.

New Zealand jetty.



# A Conversation with Marianne

*Nursing alumna Marianne Hui (Class of 2014) found her calling in meeting with and tending to the sick and the hurting, in and out of hospitals and the society at large. Nursing, she says, is journeying with people in need and that is something she looks forward to doing wherever she finds herself.*



**Q: In your junior college years, did you think about what you would like to do in terms of a career or vocation? Did the practice of Medicine come to mind? Did you follow up on your choice of studies and what happened thereafter?**

**A:** When I was in junior college, I really enjoyed studying chemistry. I also had a great teacher, and so I considered becoming a chemistry teacher, but I was never really convinced that that was what I was supposed to be. Honestly, I really didn't know what I wanted to be then, and neither did most of my classmates. It was difficult to make a lifelong decision when the only experience we had was in school.

The practice of Medicine only really became a consideration for me after I got my A-Level results, with which I'd be able to apply for the course. Prior to that, I'd thought about being a doctor, but never gave it much thought as I didn't think I'd qualify. Besides Medicine, I began considering other professions in healthcare, which I thought would also be meaningful and fulfilling. There was quite a lot of pressure, in the form of support and encouragement, for me to apply for Medicine, and so I did. Apparently, it would have been a waste of my grades and talent otherwise.

**Q: You wanted to spend a gap year in Africa. What spurred you to want to do this, and why Africa? What did you learn in your time there? Did that year away change you and in what ways?**

**A:** Nearing the end of my junior college studies, I attended a Christian conference about various humanitarian work that was going on around the world. It greatly inspired me, and I longed to be able to be a part of such an impactful work. For years, I had been praying for and giving financial aid to a group of vulnerable people in



Africa, and thought this would be the perfect opportunity to see and serve them in person. My dad also knew of some mission programmes in Africa that would be suitable for me to be a part of, so to Africa I went! I ended up taking a gap year and postponing my university education.

Many people said I would be missing out and falling behind, but actually, I learnt so much in Africa—that I could never have learnt in school. With dire poverty right before me, my grades and academic achievements which had previously defined me faded in importance. At the age of 18, it was my first time meeting and befriending homeless people, trafficked women, street kids, abandoned babies... and the city girl in me realised how sheltered I had been in Singapore, and that the world was very different. To care for others well, I needed to grow in my character and faith—which, by God's grace, I did.

At the end of my year in Africa, I didn't want to come home. I had changed so much and grown to love the people I was serving. I no longer wanted to chase my own prestige, as I'd done all my life. I had learnt to trust God, whose plan for me was evidently the best, way better than any life I could have planned for myself. And so, coming home, I knew that one day I would return to missions, and not just for a year, but for life. Everything else in between would prepare me for that.

**Q: You eventually decided to enrol in a Nursing degree at NUS. What led you to this decision?**

**A:** In Africa, I met many people with great needs, and I often wasn't able to help in a tangible way, besides providing a listening ear and praying for them. I wished I had more skills with



Marianne with her fellow nurses. (Photo taken before COVID-19).

which I could add value to their lives—whether providing health education, or doing something as simple as dressing their wounds. Nevertheless, as I listened to their stories and tried to encourage them in their lives, I realised that I very much enjoyed journeying with people, serving them in whatever capacity I could, and being a part of their lives.

This was ultimately what made me decide to study Nursing. I wanted to be able to journey with people, to be there for their highs and lows, and to be able to provide healing, support, and encouragement on their road to recovery, no matter how long or short.

**Q: How did you find your years at NUS Nursing and when did you graduate? Do you recall any memorable experiences during your student days that helped to affirm your choice of studies?**

**A:** I thoroughly enjoyed my three years at NUS Nursing before graduating in 2014. Learning to be a nurse was stimulating and challenging, and I marvelled at how our bodies were created to function. I particularly enjoyed each skills lab, where we got to learn and practise nursing skills on dummies or on each other. Of course, the camaraderie between all my fellow nurses-to-be was

what made studying so enjoyable and meaningful too!

There were definitely moments of self-doubt when I was a student. Attachments to various hospital wards were not always easy, and I sometimes wondered if I was cut out for the job. I'm thankful that with every struggle, God used it to grow me as a nurse.

While I was doing my Obstetrics and Gynaecology attachment, one of the women under my care had just had a miscarriage. She was resting in the ward, and as I took her vital signs, she started weeping uncontrollably. I didn't know how to respond, so I quickly ran off to look for tissue paper. By the time I came back, a nurse was comforting her, and in that moment... I felt like a failure. Why did I not even know how to comfort someone who was hurting?

When I reflected on this incident with my clinical Instructor, she didn't put me down, but rather affirmed my efforts for wanting to offer practical help by getting a tissue for the lady. Her kind words encouraged me when I doubted myself, enabled me to learn from the experience rather than be defeated by it, and she is only one of many who kept me going in my journey as a nurse.

**Q: What is it about the nursing profession that you think would set it apart from other work?**

**A:** As a Christian, I believe that all work is important and meaningful, and should be done with pride and excellence! As a nurse, that takes the form of being knowledgeable about our patients and their conditions, being compassionate towards those who are hurting, and being capable in the tasks we need to perform. This is no easy feat in a strained hospital system, burdened with the additional weight of a pandemic. But because we give of ourselves so much in Nursing, there is also much room for personal growth—growing in perseverance, patience, grit, tenacity and strength, even as we serve and work in humility. It truly is a privilege!

**Q: Where did you work after you graduated in 2014? What were your roles and responsibilities; did you find your Nursing education and training adequate in equipping you with the necessary skills and knowledge to do your job well?**

**A:** Upon graduation, I worked as a staff nurse in KK Women's and Children's Hospital's (KKH) Children's Emergency (CE), caring for children under observation, administering medical tests and interventions, and also assisting in procedures such as suturing of lacerations and manipulation and reduction of fractures, among other responsibilities. For the most part, my education equipped me with the knowledge I needed to do my job well, but as paediatric emergency is a very niche field, much of my training was on-the-job too! For that reason, I am really thankful that I had tremendously supportive

bosses and helpful colleagues who showed me the ropes and taught me what I needed to know to function efficiently in a fast-paced and dynamic environment.

As I became more experienced in my work, I started documenting resuscitations and was put in charge of the nurses on shift, and then after attending my department's core programme, was equipped to triage patients and play an active part in resuscitations.

**Q: Were there special experiences at work, with patients, co-workers etc, that stand out in your memory?**

**A:** There were great highs and also deep lows in my experience at the CE. One of the highs was when an infant was brought in without a pulse, and after a period of intense resuscitation, he cried! I almost cried at that moment too—never had I been so happy to hear a baby cry.

Another special experience was when I was triaging an infant one day. His toddler brother was asking many questions about what I was doing, and he was really adorable and curious, so I explained what I was doing while I assessed his little brother. With my clinical judgment, I also ordered a minor procedure at triage that eventually saved the parents hours of waiting later. I didn't think much of it, but a few weeks later, my manager showed me an email that the parents had sent to KKH, commending me for my kindness to their older son and my acumen that ultimately made their experience at the CE smoother.

One last experience that I will always remember was the night when we had two simultaneous Code Blues. The night shift



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had just taken over, and the afternoon shift was on the way out of the department when the alert was called. Instead of heading home, half of the afternoon shift stayed way beyond their working hours to help resuscitate the two children, who BOTH eventually walked out of KKH, well and whole! The camaraderie that was displayed that night among my colleagues, and on many other occasions, gave me strength to carry on fighting even when the job got really difficult.

**Q: What lies ahead for you, what are you looking forward to in your Nursing journey?**

**A:** I'm actually currently not practising nursing! As I'd mentioned earlier, I studied nursing to have a skill that I could use in missions. My family is preparing to move to another country for this purpose, but I am unlikely to work as a nurse there. Nevertheless, I know that the skills I've picked up as a nurse will enable me to serve others better in missions on an everyday basis, and I look forward to it!



An on-ground health engagement to migrant workers at Penjuru Recreation Centre.



Student volunteer, Avelyn Aw, on a community service project overseas.



A migrant worker reading a Bengali health booklet, at a participatory health engagement session at his dormitory.

# Not Forgotten

*Moved by the plight of migrant workers caught up in Singapore’s pandemic fight, Dr Tam Wai Jia (MBBS Class of 1987) sought like-minded partners to reach out to the often unseen and forgotten foreigners in our midst who toil away building and tending to Singapore’s infrastructure.*

**T**he pandemic has affected all of us, but it has hit some groups harder than others.

Many healthcare workers haven’t been able to take leave in almost two years. And our migrant worker community, too, experienced the most restrictions in terms of their ability to move around freely.

While some of the measures have been eased, the issues facing migrant workers resurfaced in October when

workers at a Jurong dormitory were frustrated with the lack of care even as COVID-19 cases started climbing again.

We also know that our migrant workers have been grappling with isolation and loneliness.

Pre-pandemic, our interactions with our migrant worker community were probably few and far between. But right now, it feels like they might as well be from another planet. Their problems seem so big and far away...

### Meet My Brother SG

Cometh the hour, cometh the woman—and in this case, a medical alumna of NUS Medicine with an artist’s soul and a heart for the forgotten and the unseen. Moved by the plight of the foreign workers, mother of two, Dr Tam Wai Jia quickly founded My Brother SG and in a short period of time, wove it into a service and outreach network of partners who are passionate about engaging and empowering migrant workers in Singapore.



While that might sound like a broad description, it's precisely this breadth of ambition that sets My Brother SG apart.

A quick look at its Get Involved page shows volunteer positions from social media management, graphic design and video editing; to translation, volunteer management and befriending.

Initiated by Wai Jia through an international non-profit that she founded—Kitesong Global—and partnered by NUS Medicine, My Brother SG brings together migrant worker-related organisations to ensure a nationally coordinated effort in risk communications and community engagement.

“As the pandemic unfolded, it was, strangely, my work as an artist, that opened the door to work with the migrant worker community,” she said.

“Many migrant workers were confused by the many new measures that were put in place to slow the spread of the virus, and those admitted to Community Care Facilities were anxious, so I was asked to illustrate an orientation booklet to help with this.”

Wai Jia admits to being initially disappointed by the invitation to help in the outbreak via her gifts in illustration. But little did she foresee that helping the migrant worker community in this way would help marry her gift in art and her public health background to fulfil a long-time dream of hers.

“When I was 17 years old, I had written in my medical school application that I hoped to work with the World Health Organization (WHO) someday.



While I was at Johns Hopkins pursuing my Masters of Public Health, I desperately sought an opportunity as a doctor. But none presented itself.”

“Because of the booklets, the chairman of the Global Outbreak Alert Response Network, WHO contacted me, showed me a diagram of the key pillars of an outbreak response, pointed to a section called risk communications and community engagement and said, ‘We’ve been lacking this piece of the puzzle and you’re doing exactly it. Let’s work together.’”

And so, along with a growing network of government agencies, healthcare institutions, non-profit organisations and volunteers, My Brother SG was born.

Said Wai Jia, “It was such a great privilege to be able to do this first as a volunteer, and later, with my supervisor’s support, in my professional capacity as Deputy Lead of Global Health & Community Service at NUS Medicine to grow the work. I cannot thank God enough for amazing mentors who fully supported this work.”

Through a research project sponsored by WHO, the team was able to understand the needs on the ground better, which led to a nationwide digital campaign that includes multilingual health booklets, posters, comics, videos and face-to-face engagements for migrant workers.

The committee members currently meet once a month to discuss how they can align strategies to support the health of our migrant workers.

### **No straightforward solutions**

Observing that the morale among migrant workers has been low due to the prolonged lockdown, Wai Jia shared how she had been touched by her interactions with these resilient workers.

“I’m always struck by how grateful they are. Either for the opportunity to work in Singapore or for anyone who shows concern for them, in spite of all the challenges they have faced.

“Even in the situation that they’re in, many of them choose to give of themselves. For example, one of my migrant worker friends, now a health ambassador for My Brother SG,

started a Facebook group for his fellow migrant workers. He creates uplifting content for them. And for what? It's not like he's earning any money from this. It's just his desire to give something back. Many of them are amazing like that."

For young people who feel that they are just on the fringes and watching all of this unfold, Wai Jia wants them to know that there are ways they can help.

"I believe the way forward is to build authentic relationships with migrant workers, recognising that your own gifts are not too small."

"My dream is to have every dormitory adopted by a community group, every worker to be genuinely befriended by Singaporeans."

### **They also serve, who toil at the rear**

This realisation struck Avelyn Aw, who is helping out with leading My Brother SG's student core team as well as inducting new volunteers and coordinating translation work.

While she admits that she didn't always have a clear desire or calling to serve the migrant worker community, she said: "COVID-19 exposed many needs of the migrant brothers and, along with social media, put this vulnerable group in the spotlight.

"Many individuals and organisations stepped up to help, and I was inspired by the goal of My Brother SG: to synergise the efforts and resources between all these different entities that shared the same heart of serving the migrant worker community."

As a medical student at NUS Medicine, Avelyn felt that while community service has always been integrated into school curriculum since young, it is easy to grow up thinking that volunteering and service equates to physical exertion and face-to-face interaction with beneficiaries.

"But in My Brother SG, there is a lot of back-end work, and sometimes it doesn't seem as 'heroic' as our doctors and nurses in Personal Protective Equipment (PPE)

at the dormitories and isolation facilities," she explained.

"This journey has been humbling because it made me realise that there was pride and selfishness in the way that I was serving and volunteering. I am still learning what it means to genuinely serve and love those around me, and not on my own terms."

Adds Wai Jia, "If reading about what migrant workers are going through strikes a chord, don't doubt yourself—head over to My Brother SG's volunteer page to see how you can get involved."

Health-literate, multilingual health booklets produced by volunteers from Kitesong Global.



**Because of the booklets, the chairman of the Global Outbreak Alert Response Network, WHO contacted me, showed me a diagram of the key pillars of an outbreak response, pointed to a section called risk communications and community engagement and said, 'We've been lacking this piece of the puzzle and you're doing exactly it. Let's work together.'"**

*Dr Tam Wai Jia (MBBS Class of 1987)*

*An earlier version of this article was first published in thir.st.*



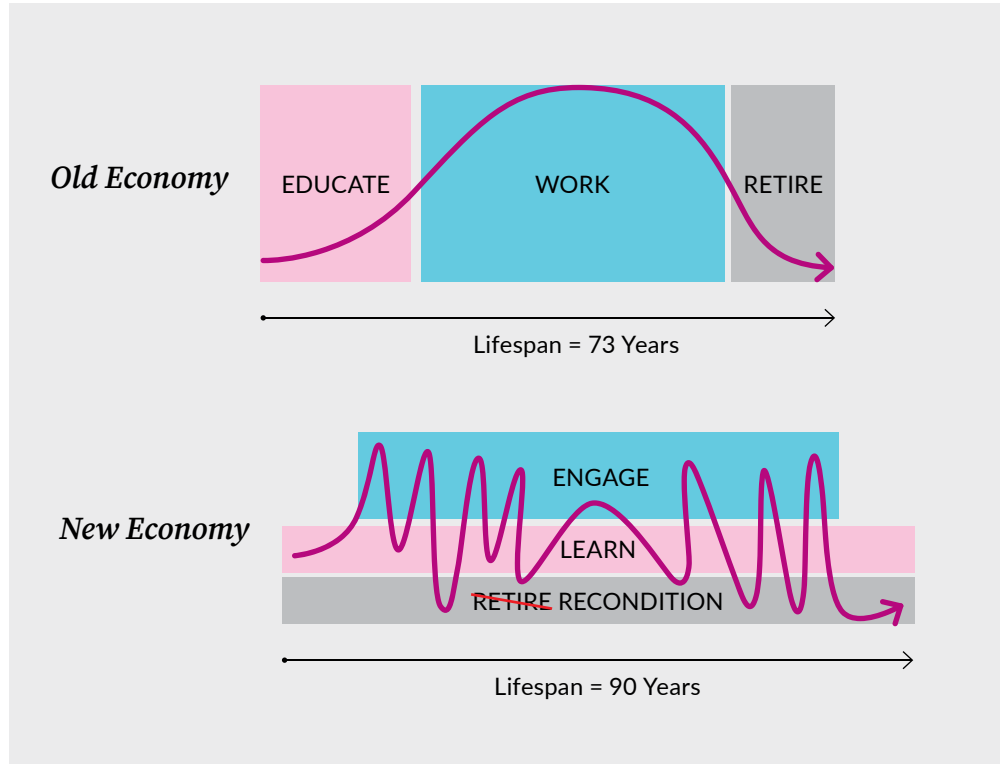
# THE BANYAN TREE

This column is dedicated to the pursuit of continuous learning and development and takes its name from the banyan tree. It has roots that grow deep, anchoring it firmly in the soil. The tree spreads its branches wide and far and provides space for reflection and discussion. We invite you to come and take a seat under its shade.

## What Adult Learners Want

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*“Change is the only constant in life.” This quote, attributed to the Greek philosopher Heraclitus from 500BC, still resounds today. According to Heather McGowan, a Future-of-work strategist, change is coming at us at the highest velocity in human history. To manage change in the new economy, the continuous reinvention of self is critical where the blocks of life—learn, work, retire have shifted 90 degrees.*



Career Arc: New economy shifts life blocks

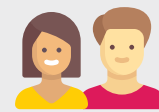
**T**he impact of change cuts across all industry sectors, especially in healthcare. In the new economy, the healthcare workforce has to continuously learn, adapt and reinvent across a much longer career arc in an ever-evolving healthcare landscape.

With change pressing more professionals to pursue lifelong learning through continuous education, training institutions have introduced new and more programmes for adult learners. However, what do adult learners want?



**Child Learners**

- Rely on others to decide what is important to learn
- Accept the information being presented at face value
- Expect what they are learning to be useful in their long-term future
- Have little or no experience upon which to draw—are relatively "clean slates"
- Little ability to serve as a knowledgeable resource to the teacher or fellow classmates



**Adult Learners**

- Decide for themselves what is important to learn
- Need to validate the information based on their beliefs and experience
- Expect what they are learning to be immediately useful
- Have much experience upon which to draw—may have fixed viewpoints
- Significant ability to serve as a knowledgeable resource to the trainer and fellow learners



### **How adults learn – Pedagogy vs andragogy**

The growing interest in lifelong learning has thrust many training institutions to understand better how adults learn and the best practices in teaching adults. At the heart of adult learning is understanding the differences between pedagogy and andragogy.

Pedagogy originates from the Greek word “paidagogos”, which translates as “the act of leading a child”. It refers to the science and practice of teaching that is rooted in dependency. In the pedagogical model, students rely on their teacher to make

all the learning decisions, including content and delivery. This is apt for children since their capacity to direct their own learning remains immature.

However, in the case of adults, their life experiences gravitate them towards a self-directing learning approach. Instead of submissively learning in a pedagogical model, adult learners are actively involved in their learning process, from content selection to how they want to learn. Aware of these differences, educator and researcher Malcolm Knowles, a trailblazer in adult learning, introduced the term andragogy in 1968 as part of his model for teaching adults.

Understanding the differences between pedagogy and andragogy has allowed educators to develop instructional designs to meet the distinct learning needs of each group.

**Having the best-trained healthcare workforce will benefit the public health community through quality patient care. Enhancing and tailoring healthcare training programmes to meet the needs of adult learners lay the foundation for expedited and effective skill acquisition.**





### *The Six Principles of Andragogy*

**Need to know**

Adults need to know why they need to learn something

**Experience**

Adults want to build on their experience in learning activities

**Self-Concept**

Adults want a role in deciding what to learn in their education

**Readiness**

Adults want to learn things they can apply immediately

**Orientation**

Adults want a problem-centred education rather than content-oriented

**Motivation**

Adults respond better to internal rather than external motivators

**Adult learning needs – The six principles of andragogy**

Knowles described andragogy as the art and science of adult learning. His research in andragogy has shaped the way training institutions design courses for adult learners. The differences he defined between andragogy and pedagogy are now referred to as the Six Principles of Andragogy. These principles lay the foundation for any adult trainer to address the expectations and wants of adult

learners from their need to know to their motivation for learning.

**Transformative Learning experience for adults**

Jack Mezirow, an American sociologist, developed the concept of Transformative Learning that addressed the needs of adult learners further by focusing on shaping the way adult learners think about themselves and the world. In Transformative Learning,

trainers guide adult learners on a journey to bring their experiences to the classroom and challenge them through critical reflection and rational discourse.

**Centrality of experience**

All adult learners look at new information through the lens of what they have experienced before. Allowing adults to bring these experiences into the classroom discussion is important, but educators must also challenge adult learners when necessary on their preconceived beliefs.

**Critical reflection**

Adult learners understand well how past actions have an impact on the present. Critical reflection allows them to question current assumptions and accept new possibilities.

**Rational discourse**

Educators must ensure an open conversation about course topics, including the viewpoints of students who may base what they believe on authentic experience. In rational discourse, the insight from critical reflection is put into action.

Having the best-trained healthcare workforce will benefit the public health community through quality patient care. Enhancing and tailoring healthcare training programmes to meet the needs of adult learners lay the foundation for expedited and effective skill acquisition.

<sup>1</sup> Knowles, M. S. (1998). The adult learner (5th ed.). Houston, TX: Gulf Publishing.  
<sup>2</sup> Mezirow, Jack. (2003). Transformative Learning as Discourse. Journal of Transformative Education. 1. 58-63. 10.1177/1541344603252172.  
<sup>3</sup> Koons, Donald Christopher, "Applying Adult Learning Theory to Improve Medical Education" (2004). UCHC Graduate School Masters Theses 2003 - 2010. 51.  
<sup>4</sup> <https://www.linkedin.com/pulse/preparing-students-lose-jobs-heather-mcgowan/>.  
<sup>5</sup> <https://online.pointpark.edu/education/pedagogy-vs-andragogy/>.

# Foundations in Health Professions Education

BY LEE SHUH SHING, CENTRE FOR MEDICAL EDUCATION (CENMED)

*The Foundations in Health Professions Education (FHPE) is one of the Continuing Education and Training (CET) courses organised by the Centre for Medical Education (CenMED) at NUS Medicine. This course is designed to provide foundational knowledge and skills for faculty and administrative staff involved in training and educating the next generation of healthcare professionals.*



Photo:  
Introduction by Prof Kirsty Forrest,  
Dean of Medicine at Bond University,  
Australia in "Leading and Managing in  
Medical Education" workshop.

**T**he course provides best practices in evidence-based medical education to raise the competencies of healthcare educators. The knowledge gained through the course enables healthcare educators to enhance various aspects of their work including curricula development, assessment tools, quality-assurance processes and leading training teams.

The development of this course is underpinned by the Transformative Learning Theory whereby learners from diverse backgrounds are given the opportunities to evaluate their own view of the world



Feedback obtained from learners showed that more than

**82%**

perceived the workshops were valuable and exceeded or greatly exceeded their expectations

regarding educational matters based on their own experiences and expertise as they obtain new information through critical reflection.

At the last run held in September 2021, the course used a blended learning format where learners selected one out of three virtual face-to-face workshops including "Ensuring Quality in Health Professional Education", "Interactive Teaching-Learning Strategies in Small and Large Group Settings" and "Leading and Managing in Medical Education".

These virtual workshops were conducted via mini

presentations, small group case discussions and role playing. As a flipped classroom format, learners had to complete a set of self-directed online modules to prepare for the robust exchanges and experience sharing at the workshops facilitated by well-known local and overseas health professions education experts.

Feedback obtained from learners showed that more than 82% perceived the workshops were valuable and exceeded or greatly exceeded their expectations. Furthermore, the programme also shared that the concepts/skills were very applicable to their own training programmes and workplace.

Take 5 Breakfast:

# Q&A with Our NUS Medicine Continuing Education and Training Faculty



Dr Hussain “force feeding” himself with iceberg lettuce salad.



**About:**

Dr Zakir Hussain is a Senior Lecturer at the NUS Medicine. He teaches medical subjects in the Alice Lee Centre for nursing studies and the Department of Anatomy. He is involved in training medical and nursing students at the Centre for Healthcare Simulation in NUS. He teaches at both undergraduate and postgraduate levels and has received NUH Excellence Teaching Award for his role in clinical education.



**Q: What is your favourite breakfast?**

**A:** My all-time favourite used to be freshly made, hot and crispy, onion prata with fish curry. Times have changed and so has my health condition. Nowadays, I am forced to accept vegetable salads with iceberg lettuce as the main ingredient. Although it's a bit bland, I am getting along with it.

**Q: What is your biggest motivation in delivering continuing education?**

**A:** I was personally affected by the rapid changes in the medical field. During my surgical training in the 90's, I got used to only open appendectomies, open cholecystectomies and open hernia repairs. Then laparoscopy totally revolutionised these procedures. I was totally lost as I didn't have the opportunity to keep myself updated with these developments. Having seen the importance of continuing education myself, now in a teaching position, I want to keep myself updated and also train younger generations of medical professionals in the newer developments in this field.

**Q: What are the main differences between undergraduate teaching and continuing education?**

**A:** The most important difference is the teaching strategy that we use. These two groups are poles apart. Learners who come for continuing education programme courses are mature students. The level of motivation is high and they are very serious about learning. They already have sound basic knowledge. As they already have years of experience in their respective domains,



Dr Hussain's medical students wore reindeer antlers to class to celebrate Christmas.



their expectations are high. And most importantly, as they know their needs and areas of weakness, they are quick learners. Overall, they are usually highly motivated learners.

Undergraduates who come from Junior Colleges are novice students. They need constant motivation and reminders that the medical profession is a very serious business. We have to tailor the contents to their needs, otherwise they get lost in the ocean of medical knowledge

available currently. Despite all these limitations, they lighten up the atmosphere, injecting much-needed fun in our long classes.

**Q: Why do you think lifelong learning is important for healthcare professionals?**

**A:** Although continuously updating knowledge applies to all professionals, it has immense benefits in the medical profession. All patients we treat and manage need to be assured that we are up to date in our knowledge



**Although continuously updating knowledge applies to all professionals, it has immense benefits in the medical profession. All patients we treat and manage need to be assured that we are up to date in our knowledge of medicine and that we are offering them the best and the latest quality care. Medical advances are very fast-paced and rapidly changing; lifelong learning is an important part of a healthcare professionals career.”**

of medicine and that we are offering them the best and the latest quality care. Medical advances are very fast-paced and rapidly changing; lifelong learning is an important part of a healthcare professionals career.

**Q: What is your most memorable teaching moment?**

**A:** Although teaching is serious business, sometimes students make this experience much lighter, full of fun and memorable.

In a very recent experience with an anatomy class for medical students, I was surprised to see all students wearing a reindeer antler headband when I entered the class. With their head movements exaggerated by the antlers, I felt as if I was teaching a herd of reindeer! When I explored the reason, they said Christmas is around the corner and they were ahead in their preparations.

Anyway, I started the class and every time I turned to the projector screen, there were loud sound of the reindeers' munching chips and crackers, tearing open the packs. Their sound was unusually loud to distract my teaching. It gave me a feeling that I was teaching a pack of animals enjoying their hunt on the National Geographic channel. From a student's point of view, I could understand the need for some relaxation during long tutorial classes. So, I made an exception and joined in their party with some snacks. Once in a while, such happy memories energise me and keep me going!

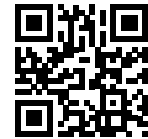
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# THE COVID-19 CHRONICLES

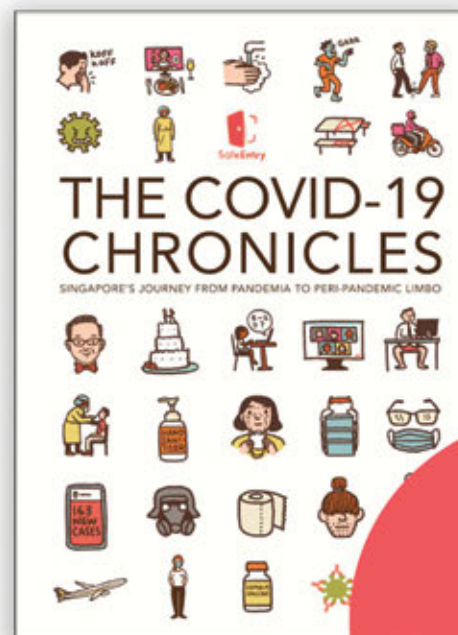
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Sensing a need for a simpler way of communicating with the public, the NUS Yong Loo Lin School of Medicine launched *The COVID-19 Chronicles*, a long-running series of illustrated stories on social media platforms. Offering bite-sized explanations of issues and topics seeded by the pandemic's global march, the *Chronicles* prods readers to stay safe, while also providing a humorous take on Singaporean life in the time of COVID-19.

*The COVID-19 Chronicles* is now available in a book featuring every *Chronicles* story published and telling the story of the work behind-the-scenes, bringing each episode to life.



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