

# MediCine

A PUBLICATION OF THE YONG LOO LIN SCHOOL OF MEDICINE

ISSUE 42 MAY 2022

## GENETIC ANCESTRY MATTERS IN CHILDHOOD LEUKEMIA TREATMENT SUCCESS

**Understanding varying  
outcomes in childhood  
leukemia treatment**

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### MEDICAL EDUCATION GOES HOLOGRAPHIC WITH MIXED REALITY TECHNOLOGY

NUS Medicine partners Microsoft  
to teach medical and nursing  
undergraduates

*p.04*

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### THE SECRET TO MAKING GOOD POPIAH—AND DRAWING BLOOD

Hint: It's all about two "P"s

*p.08*



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# 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,

**W**e are nearly halfway into the third year of a global pandemic. Although the severe constraints in vaccine supply that the world faced last year have now eased, the World Health Organization (WHO) says that we still have a long road ahead to reach the global target of vaccinating 70% of the population of every country.\* That long road has been lengthened by the war in Ukraine.

In Singapore, vaccinations, public health restrictions and safe practices have kept Singaporeans largely safe from the rampaging virus, which has undergone multiple mutations in its worrying dance through the letters of the Greek alphabet to its current manifestation as Omicron. But life goes on. Employees are returning to a once-familiar routine of working in offices; holiday travel is picking up. In these peripandemic times, we welcome the Medicine Class of 2027 and the Nursing Class of 2025. While the shape of the world in which they will graduate to practice is unclear, the School will do our utmost to prepare these future healthcare professionals for the challenges they will face.

Our students are however not just good at biomedical science; many pursue interests outside of their studies that range from music to martial arts to community service. Others, like fourth year Medicine student Faye Ng Yu Ci, write award-winning poetry. Her literary skills has won her the prestigious Regent's Prize in Poetry awarded by the *Annals of Internal Medicine*, a leading American medical journal. The prize is awarded to the best poem published in *Annals* each year.

Ms Ng is the youngest recipient and only undergraduate as well as the first Singaporean and Southeast Asian to receive the Prize thus far. Her entry, titled "A Pink Crease", was inspired by a patient she met during her third year of medical training, during a General Surgery posting to a hospital. "I love writing because it allows me to reflect on myself and my experiences," she remarked. "So often in the wards, we are so overwhelmed – by the deluge of medical information, by



“

*In these uncertain times, our work continues unabated. I hope you enjoy reading about it.”*

expectations from doctors and sometimes patients and their families, that there is so little time to process the emotions and conflicts associated with sickness and suffering, which is such an integral yet often neglected part of medicine.”

While Ms Ng finds expression through poetry, others do so through the search for solutions. On the research front, we have interesting news from our cancer scientists. Working with colleagues at St Jude Children's Research Hospital in the United States, NUH oncologist Dr Shawn Lee has shown that it is important to consider race and genetic ancestry in treating acute lymphoblastic leukaemia in children. He and his colleagues studied the impact of genetic ancestry on childhood acute lymphoblastic leukaemia (ALL) in more than 2,400 children. ALL is the most common type of childhood cancer. The team found that several molecular subtypes were associated with East Asian ancestry (e.g. Chinese children). They also established that South Asian (e.g. Indian) and East Asian children have one of the best survival outcomes in the world because their bodies respond to and metabolise commonly used chemotherapy drugs differently. The findings were published in the March edition of *JAMA Oncology*.

Another piece of good cancer scientific work: In the fight against cancer, the development of efficacious drugs is only half the battle; equally important is how drugs may be delivered efficiently and safely to the diseased sites in the body. The challenge of drug delivery is especially pertinent for RNA therapeutics which target an important immuno-modulatory receptor, RIG-I. When activated by certain types of RNAs, the receptor can initiate immune responses to kill cancer cells. As RNAs are unstable and fragile by nature, RNA-based drugs must be packaged in suitable carriers to prevent

degradation, and promote efficient uptake by target cancer tissues.

NUS Medicine scientists and partners from Lee Kong Chian School of Medicine, and A\*STAR's Genome Institute of Singapore (GIS) have demonstrated that nano-sized vesicles released by red blood cells are a viable platform for delivering immunotherapeutic RNA molecules to suppress breast cancer growth and metastasis. Assistant Professor Minh Le from the Institute for Digital Medicine (WisDM) and Department of Pharmacology at NUS Medicine, who led the study, explained, "With the discovery of these vesicles' ability to deliver therapeutics effectively to targeted receptors, we hope that our research can lead to better treatment outcomes for cancer patients. The correct homing of the therapeutics to diseased cells is also critical in minimising off-target effects that can result in toxicity."

And finally, though certainly not least, Hand, Foot & Mouth Disease (HFMD) is a generally mild, contagious viral infection common in young children that is endemic in Singapore. While most HFMD patients experience common symptoms such as sore throat, fever, ulcers, blisters and lesions on the palms and soles, approximately 36.9% of HEVA71-related HFMD hospitalisations develop neurological complications, of which 10.5% are fatal. Researchers from the Department of Physiology have found that a selective antagonist of the CXCR2 viral protein receptor, is effective in significantly lowering disease severity. This will likely go on to be developed as an effective therapeutic approach to manage the effects of neuropathogenicity in severe cases of HFMD.

In these uncertain times, our work continues unabated. I hope you enjoy reading about it.

*Yap Seng*

\* WHO Director-General's remarks at Session 2 – Potential Opportunities for Innovation and Collaboration COVID-19 Dialogue with Ministers of Health – 3 March 2022.



# Anatomy Marks Its Centenary

*The Department of Anatomy celebrates 100 years of excellence in education.*

**A** century ago, a unit dedicated to teaching medical students about the intricacies of the human anatomy was formed. It was established on 21 February 1922 within the King Edward VII College of Medicine, with Professor J G Harrower as the first Chair of the Department of Anatomy.

One hundred years later on 21 February 2022, staff of the Department of Anatomy gathered at the University Cultural Centre to commemorate its centennial. Guest-of-Honour, NUS President Professor Tan Eng Chye was joined by Professor Ho Teck Hua, Provost,

Professor Yeoh Khay Guan, Chief Executive, National University Health System (NUHS); Professor John Eu-Li Wong and Professor Benjamin Ong Kian Chung, NUS Senior Vice-Presidents and Professor Chong Yap Seng, Dean of the Yong Loo Lin School of Medicine.



From left: Assoc Prof S T Dheen, Head of Anatomy, Prof Ho Teck Hua, Provost, Prof Tan Eng Chye, NUS President, and Prof Chong Yap Seng, Dean of the Yong Loo Lin School of Medicine presenting the Anatomy Centennial Book during the celebrations at the University Cultural Centre.

NUS President Prof Tan Eng Chye lauded the Department’s drive for excellence across areas of education and research through the incorporation of smart technology, such as Anatomy’s unique melding of traditional teaching methods of dissection and prosected cadaveric specimens with modern virtual dissection tables, digitised specimens, and a virtual museum where students could view and examine anatomical specimens.

Prof Chong Yap Seng congratulated the department and expressed confidence that the next 100 years of Anatomy would see the Department transcend hurdles and flourish within a thriving academic environment, empowered by proficient mentors and protégés determined to pass on the NUS spirit to inspire the next generation of students, teachers, and researchers.

Tan Teck Guan Building (left).

The dissection room of the Department of Anatomy in the Tan Teck Guan Building (right).



**I am confident that the next 100 years of Anatomy would see the Department transcend hurdles and flourish within a thriving academic environment, empowered by proficient mentors and protégés determined to pass on the NUS spirit to inspire the next generation of students, teachers, and researchers.”**

*Prof Chong Yap Seng, Dean of NUS Medicine*

Prof Yeoh Khay Guan, Chief Executive of NUHS also inaugurated the 6<sup>th</sup> International Anatomy and Cell Biology Conference, held in conjunction with the centennial celebrations. The three-day event featured lectures by internationally renowned medical educators, anatomists, and researchers working on ageing, neuroscience, cell biology and developmental biology from around the world.

Associate Professor S T Dheen, Head of the Department also announced the inception of the ‘Anatomy Centennial Medical Bursary’, to benefit needy medical students. Prof Chong received a cheque of \$50,000 to institute a Staff Club-Anatomy centennial medical bursary from the club’s Vice-Chairman, Associate Professor Lee Kim Seng.





# Medical Education Goes Holographic with Mixed Reality Technology

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*NUS Yong Loo Lin School of Medicine partners Microsoft to teach medical and nursing undergraduates.*



*From left:*  
Year 2 Nursing student, Kerwin Chia (left) and Phase V Medicine student, Nicholas Sim (right), using the Microsoft HoloLens 2 as a training tool to hone their clinical procedural skills and gain familiarity with the equipment in a safe and controlled environment.

**V**irtual reality (VR) and augmented reality (AR) have seen an increased utilisation in healthcare education in the past two decades. There has been much published in literature about the effectiveness of VR and AR in higher education, especially in areas of anatomy and simulation of hospital environments. Research in this area has been shown to reduce learning time, minimise errors, and lower mental workload of the participants. However, there are significant drawbacks associated with VR and AR. Users are unable to perceive the real-world while using VR devices, and this causes many issues including motion sickness, visual fatigue, lack of realism in the virtual scenarios, and lack of inter-user engagement.

Though a step up from VR devices, AR devices experience some of the same issues faced by VR, including limited user engagement, restricted controls, and the inability to render fully functional scenarios.

Mixed Reality (MR) technology incorporates the best of both VR and AR into a single device. It uses transparent visors to project holographic renderings into the user's eyes, and as the images are projected to both eyes (as opposed to just one eye in most AR devices), it allows for the user to have a full stereoscopic perception of the image, including distance, depth, and spatial orientation. The key advantages of MR are:

- Simulation of the virtual/digital guide – embodiment of VR
- Rich multimodality interaction – hand gesture, hand-object interaction, eye gaze, voice
- Context awareness – make sense of the user interaction with the physical environment, tools and tasks
- Parallel use cases in clinical practice and medical education – collective intelligence of the students who contribute their knowledge and expertise

MR is also able to achieve a greater level of interaction compared to AR as it recognises free hand gesture control and is not limited to a fixed set of control gestures.

Since April 2022, medical and nursing students at NUS Yong Loo Lin School of Medicine started using MR technology to help enhance their learning experience and education journey.

The collaboration, which spans NUS Medicine, the National University Health System and Microsoft adds MR to the learning experience, named Project Polaris. Through holographic

technology, medical and nursing undergraduates would better hone their skills through training enabled by the Microsoft HoloLens 2.

A name derived from the North Star, or Pole Star, Project Polaris focuses on the development of modules aimed at enhancing how procedural skills are taught to students. In Project Polaris, the HoloLens 2 will be used to project three-dimensional holograms to give medical and nursing students a visual appreciation of actual clinical scenarios in practice. Using the already established procedural skills manual, POLARIS will seek to transform the current text-based manual into a fully interactive MR experience with video, pictorial, and audio guidance to enhance the student's learning experience, with the eventual aim of converting most procedural skills, typically done manually, onto the MR platform.

The suite of instructional software developed by the team from NUS Medicine and Microsoft Industry Solutions is broken down into four components, namely learning tasks, supportive information, procedural information and part-task practice. It provides 3D instructional images, which will be used to help students practice clinical procedural skills such as inserting a cannula, as well as inserting catheters in male and female urinary tracts. Separate windows are visible to show recorded videos, as well as step-by-step interactive guides on the procedure at hand. This guide will include a list of all equipment required for the task, equipment familiarisation, indications, and contraindications for the procedures, as well as common pitfalls and tips/tricks on how to avoid or troubleshoot them.



Project Polaris comes with three levels of difficulty, with a goal to train and provide sufficient direction to allow students at varying levels of competence to achieve the highest standards of clinical practice in a safe space, said the School's Assistant Dean for Education and Project Co-lead, Associate Professor Alfred Kow. "We are truly excited to see how far this collaboration with Microsoft can go in terms of offering our students innovative and effective visual aids and teaching mechanisms. With the ongoing pandemic, VR

and MR have been identified as must-have tools for teaching and learning in onsite and remote environments."

At the beginning, students will be allowed access to the complete set of user-assistance guides. As they progress through their learning journey and gain more experience with these procedures, the guides can either be hidden automatically, or the tutor may choose to disable selected guides to provide the student with a more challenging task. Project Polaris aims to

integrate their non-recurrent and recurrent skills by providing an authentic, whole-task experience-based learning module based on real-life tasks.

The COVID-19 pandemic also forcefully brought home the importance of building in versatility in the medical undergraduate curriculum and teaching pedagogy. Social distancing and home-based learning negated much of the traditional teaching modalities, and new methods had to be adopted to adapt to





From left: Year 2 Nursing student Kerwin Chia, Phase V Medicine student Nicholas Sim, Dr Gao Yujia, Co-lead of Project Horizon and Deputy Director of Undergraduate Medical Education, Year 2 Nursing student Lim Hwee Xin and Phase IV Medicine student Sarvananthan Rajragavan are part of the pilot batch of nursing and medical students who have been using the Microsoft HoloLens 2 as part of the nursing and medical curriculum.

the situation. Even so, much of the adaptation involves only the use of online conference tools as a replacement for face-to-face interactions. This still lacks the interaction that is so desired and crucial when building interpersonal skills. Project Polaris provides an avenue for us to create content and teaching methodologies that can transcend distance and space, where students and educators are still able to ‘come together’ in an artificially rendered world regardless of where they are, yet still feel like they are right next to each other. Negating physical distance by ‘teleporting’ participants to the same shared environment provides a much more interactive experience for everyone.

Project Polaris is part of a larger programme called Project Horizon, which consists of more initiatives such as Project Delphinus and Project Mira. These aim to train students in clinical soft skills and clinical anatomy respectively, positioning NUS Medicine as the first institute in Southeast Asia to introduce holographic MR as a teaching tool to train medical and nursing students. The medical and technical expertise of NUS Medicine and Microsoft will pave the way for the development of a niche technological competency, in which clinical training tools can be developed to introduce realistic clinical scenarios for use in medical education.

“We are continually pursuing new and innovative teaching methods to help medical and nursing students better understand the medical curriculum and gain a new

appreciation for healthcare and health, while striving to maintain a balance with time-tested traditional approaches,” said Associate Professor Lau Tang Ching, the School’s Vice-Dean for Education. “This incorporation of holographic mixed-reality learning fits in well with our teaching initiatives and we hope to see this collaboration with Microsoft flourish in the coming years.”

“From delivering better healthcare experiences at the frontlines to helping neurosurgeons keep patients better informed of what could happen during their surgeries, technology has been an empowering tool for healthcare workers as they protect and save the lives of patients. As one of the few hospitals in Southeast Asia that has a tertiary education arm which collaborates with a training hospital, NUS Medicine is in a unique position to use MR solutions and the Microsoft HoloLens 2 to aid in the transformation of healthcare education, for years to come,” said Mr Richard Koh, National Technology Officer, Microsoft Singapore.

Professor Chong Yap Seng, Dean of NUS Medicine, said he looked forward to the impact that technology would bring to medical education, “I’m glad to see that our educators have found like-minded industry partners to work with in educating the next generation of medical professionals. With such interdisciplinary partnerships, we are even more confident that our graduates will be future-ready clinicians.”



**I’m glad to see that our educators have found like-minded industry partners to work with in educating the next generation of medical professionals. With such interdisciplinary partnerships, we are even more confident that our graduates will be future-ready clinicians.”**

*Prof Chong Yap Seng, Dean of NUS Medicine*

# The Secret to Making Good Popiah—and Drawing Blood

BY FAYE NG YU CI, YEAR 4 MEDICINE UNDERGRADUATE

*Just like how a popiah hawker practises to make his dish better, practising drawing blood helps me become better at my work.*

What the uncle did not realise was that I was also scared. We were equally afraid.

I tied the tourniquet tighter and flicked his veins with my finger, waiting for them to become more prominent. Moments passed and they remained as unremarkable as ever, that elusive run of blue underneath his variegated skin.

“Uncle, I’m so sorry. It might be painful. I’ll try to be quick.”

The paunchy uncle on the bed nodded as he put his other hand—the one that wasn’t grasped by me as if I was hanging on to for dear life—behind his head and leaned back. “I’m okay, ah girl, you do whatever you need to do.” He gave me a thumbs up.

I could tell he was feigning a cool facade for me. When I came into the cubicle with the kidney tray and blood tubes, his eyes widened as he admitted to a fear of needles. We were both anxious, but he didn’t want to make me even more so.

After a few more times of flicking his veins with my index finger, I realised the veins weren’t going to distend any further. This was the best I was going to get. I would just have to do it.

I didn’t want to tourniquet the uncle’s hand longer than I had to, depriving it of circulation.

I palpated the course of the vein again just to make sure.

“Deep breath. One, two, three.”

The bevel of the needle found the underside of the skin and pierced through. I got a streak of blood as it entered the vein, retracted the needle and advanced the cannula, a thin tube. His veins were small and hard to see, but rather miraculously, my first attempt at inserting an intravenous cannula for him was a success. An intravenous line allows fluids and medication to be run directly into the bloodstream.

“I’m done, uncle,” I reassured him as I secured the cannula with a transparent film adhesive. The man visibly relaxed as he surveyed the back of his hand, where a tiny blue “butterfly” now sat. He gave me another thumbs up.

“

**It’s all about practice and patience, *xiao mei*. Just like you with the needle. How do you know the vein is there? Because you got see before, right? And you got do.**

***Popiah*-making is the same. I just keep on making *popiah* and, every day, I try to make my *popiah* a little better.”**



“Very good, *xiao mei* (little sister). As you practise, will be *sweet sweet* (perfect) one.”

His eyes crinkled at me from above the blue of his surgical mask. I imagined his broad grin, the gaps between his teeth.

I blushed beneath my N95 mask, gowned in my full PPE (personal protective equipment). There was so much physical barrier between us, yet so much warmth.

It’s a blessing to meet patients like these, who are so kind and understanding.

Offentimes, as we approach a new patient to perform a procedure, there is that hesitation. We carry the medical student’s guilt with us, stammering as we launch into our spiel.

“Hi, my name is \_\_\_\_\_, I’m a medical student. Is it okay if I take your blood for you?”

It’s almost as if I’m saying: *I am a medical student and I am inexperienced. I might potentially hurt you or not do as good a job. Will you, with this knowledge and this understanding, still grant me the permission to try?*

For every patient who nods his or her head, it is a grace and a privilege.

I remember the time when my mum recounted her visit to the hospital to me.

“I was having such a bad headache that day and the whole world was spinning around me. There was this young doctor who asked if she could examine me before her senior consultant came in. She spent a lot of time tilting my head around and covering and uncovering my eyes. She even lay me down on the bed to

perform this unusual head-turning manoeuvre on me.”

“In the past, I wouldn’t have agreed. I was already so dizzy...”

“But then I thought about you in medical school... I thought about you in the hospitals with the patients, how clumsy you always are at home, and how they would still let you do all sorts of crazy things on them. And I told the trainee to go ahead.”

My mum gave me the side eye and I hugged her. I knew this was her way of saying she loved me. It was also a not-so-subtle hint to be more adroit and organised with the housework.

After setting the plug for the uncle, I went back to take his medical history.

He had arrived at the hospital’s Emergency Department in the early morning with acute onset shortness of breath, which he was worried might be another asthma exacerbation.

He had been hospitalised multiple times for recurrent pneumonia, on a background of asthma-chronic obstructive pulmonary disease (COPD) overlap syndrome. This was a disease characterised by persistent airflow limitation, with mixed features of both asthma and COPD.

Besides his condition, we also spoke about his life as a hawker.

The uncle sold *popiah* with his wife in one of the food centres in the heartland. He beamed with pride when he shared that his *popiah* stall was famous, being frequented by ministers and celebrities from time to time. His customers came from all walks of life.

He whipped out his phone and scrolled through the photo gallery, tapping open an old photo taken in front of his stall with the then defence minister.

“Come, take down my stall name. Please drop by if you happen to be around the estate. Bring your family to eat my *popiah*.”

Amused and revived by the uncle’s enthusiasm, I scrawled down the stall’s address, promising to visit if I was in the vicinity.

As he showed me more pictures of his *popiah* – braised turnip, peanut bits and crab meat ensconced in translucent, paper-thin rice wraps – I asked him: “What makes a good *popiah*? Or what do you think makes your *popiah* so great?”

“Practice,” he said decisively. “You practise until you make the perfect *popiah*.”

“I spent 10 years figuring out how to whip up the perfect *popiah*: which type of rice wrap to use, how much *liao* (ingredients) to put and how to pack everything in perfectly. I spent another 10 years experimenting with the sweet bean paste, honing my intuition for the flavour and taste,” he explained.

“It’s all about practice and patience, *xiao mei*. Just like you with the needle. How do you know the vein is there? Because you got see before, right? And you got do.”

“*Popiah*-making is the same. I just keep on making *popiah* and, every day, I try to make my *popiah* a little better.”

I improved on my plug setting and gained some *popiah*-making insights that afternoon.

I thank all the patients I have had and learnt from. You give me the chance to grow into the doctor I hope to become one day.

# NUS Medicine Student Wins International Medical Journal Poetry Competition

*A fourth-year student from NUS Medicine has won the prestigious Prize in Poetry awarded by *Annals of Internal Medicine*, one of the most widely cited medical journals in the world. The prize is awarded to the best poem published in *Annals* each year.*

**M**s Faye Ng Yu Ci is the only undergraduate to receive the Prize since its inception in 2003. Her entry, titled “A Pink Crease”, was selected from among 23 poems published in the journal this year.

“A Pink Crease” was inspired by a patient Ms Ng met during her third year of medical training, during a General Surgery posting to a hospital. The patient was an elderly gentleman in his seventies who had peritoneal metastasis that had spread from end-stage colorectal cancer. The poem details her interactions with the patient, from his taciturn indifference and attempts to evade her gentle probing, to when he finally speaks and shows her his surgical scars.

Interspersed with fragments of Ms Ng’s conversation with the elderly man, “A Pink Crease” presents a tender and authentic image of the relationship between physician and patient. The elderly

gentleman is addressed as “uncle” by the speaker, who reaches out into his past with questions of childhood and circuitry. “Uncle” is at once foreign yet familiar—a Singaporean colloquialism for any older gentleman but also one that carries personal affection. The patient, at first a stranger, is initially reticent and stoic. However, when he reveals his surgical scars, they paradoxically serve as markings of closed incisions, leading him to open himself up to the speaker.

The encounter reveals the elderly patient’s scars run deeper than the corporeal—the disease that plagues him carries with it a world-weariness and loneliness that burdens many patients of his age. Through it all, the physician speaker sits patiently by his bedside, lending a sympathetic ear. As the poem troops to its melancholic end, the speaker reflects poignantly on the way “we grow our tragedies like trees”, with our medical afflictions a natural part of nature.



"Ms Ng's poem was deemed by the judges to be the overwhelming favourite among all of the poems published in *Annals* in 2021," said Michael LaCombe, MD, associate editor of *Annals of Internal Medicine* and editor of the poetry section of the journal. "Considering the impressive volume of poetry submissions we receive each year, just being selected to be published is an honour. To stand out among the elite that make publication is a triumph."

Ms Ng started writing when she was in secondary school. She was a closet writer, she said, and never took formal literature classes in school.

While she enjoyed the sciences, she was deeply moved by the beauty of the English language and its lyrical charm. It took a while before she gained the courage to share her writing in public.

As a student at Hwa Chong Institution, she was selected for the Ministry of Education's Creative Arts Programme, a week-long intensive writing seminar for budding writers. She later joined the Creative Arts Mentorship Programme where she was mentored by Mr Desmond Kon, a local writer and publisher. Since then, Ms Ng's poetry has appeared in an array of literary journals and anthologies both locally and abroad, including *Cordite Poetry*, *Lammergeier*, and *Cha: An Asian Literary Journal*. Prior to this award, she was the youngest recipient of the Top Award for the National Poetry Festival. Her work has received guidance from local literary figures, including Cyril Wong, Alvin Pang, and Theophilus Kwek.

"I love poetry for its brevity—in trying to get the best words in the best order, taking after the English poet, Samuel Taylor Coleridge. I learn so much about how concise and compact, yet how generous and precise language can be."

"I also love writing because it allows me to reflect on myself and my experiences," she remarked. "So often we are so overwhelmed—by the deluge of medical information, by expectations from doctors and sometimes patients and their families, that there is so little time to process the emotions and conflicts associated with sickness and suffering, which is such an integral yet often neglected part of medicine," she added.

Currently, Ms Ng has written a full-length poetry manuscript, which she hopes to eventually publish with a printing press. "In this collection, I explore the themes of love, loss and letting go," she shared. "Very typical motifs I know, but I hope to lend a personal narrative to these, from the lens of a young woman growing up in Singapore, and from my interactions with the patients I meet in the wards."

"I am still very much a baby writer, as I am a baby adult," she admitted. "In many ways, I still very much feel new and blue and fresh. But at the same time, I realise I need to start thinking about how else I can impact others with my words, what more I hope to communicate to the world through my work. I hope to write with curiosity and candour—to go further, deeper, be unflinching. I also want to give credence to how astonishing our world can be despite the brokenness we live

with—to begin from beauty and begin with beauty."

Ms Ng will be donating the full sum of the USD\$500 prize money to the NUH Children's Fund, which provides financial assistance to needy patients of the Khoo Teck Puat – National University Children's Medical Institute (KTP-NUCMI) at the National University Hospital.

"I don't think this gift of writing is mine alone," she says. "I have been so blessed by the patients and mentors I have met, and I want to pass the goodwill on. Whatever joy we receive is multiplied by sharing."

### An excerpt:

the pink line arching  
down your belly  
like a crescent,  
another indentation  
above your groin.  
I didn't grow old  
to be here, you say,  
lifting the water

to your lips. likewise,  
some things  
we do not pray for.  
we grow our  
tragedies like trees,  
tuck the trumpet  
flower buds back  
into themselves.



Scan to read the  
winning poem on the  
journal's website here:

# Is Omicron the Beginning of the End of the Pandemic?

BY DR KHOR ING WEI, STAFF WRITER

*In a few short months, the Omicron variant of SARS-CoV-2 has become the dominant variant around the world. In fact, Omicron is now responsible for all of the COVID-19 cases in the United States, according to the Centers for Disease Control and Prevention (CDC).<sup>1</sup>*

**A**lthough the number of COVID-19 cases has gone back up (>400 million globally as of 9 February, 2022<sup>2</sup>) due to the extremely high rate at which the Omicron variant spreads, the infections appear to be milder than in previous phases of the pandemic. According to the World Health Organization (WHO) COVID-19 dashboard, the number of deaths per week around the world fell by half from 76,000 on 7 February, 2022 to 34,000 on March 7, 2022.<sup>3</sup> In the US, the seven-day average number of hospitalisations due to COVID-19 dropped from 21,091 in January 2022 to 3,152 in March 2022.<sup>4</sup>

## Moving to an endemic infection?

As the new SARS-CoV-2 variants arising in recent months have

caused fewer severe infections than before, some experts predict that we may be moving away from a pandemic and towards an endemic situation where we would live with the virus circulating in the community, the way we do with influenza and the common cold.<sup>5</sup> The milder cases of COVID-19 are at least partly due to the uptake of vaccinations in the developed world and, to an increasing extent, in

the developing world as well. However, modeling or predicting how the pandemic will play out and whether it will transition to endemicity is difficult.

Other experts think it is premature to be discussing a transition to endemicity now. Professor Paul Tambyah, infectious diseases senior consultant and President-elect of the International Society of Infectious Diseases (ISID) said,





## We must work together to bring the acute phase of this pandemic to an end. We cannot let it continue to drag on, lurching between panic and neglect.”

*Dr Tedros Adhanom Ghebreyesus, Director General of the WHO*

“The Omicron variant is now dominant globally and this suggests that the SARS-CoV-2 virus is behaving like all other pandemic viruses in that it is becoming more transmissible and less virulent. Even the deadly “Spanish flu” pandemic virus which killed more than one in 30 people worldwide in 1918-19 simply became the dominant strain of seasonal influenza from 1920 to 1957.

We are likely to see more and more less virulent but more transmissible variants until the virus becomes just like the other seasonal coronaviruses which mainly affect children but occasionally cause outbreaks in nursing homes which can be severe, as seen locally and in various countries such as Melbourne, Australia, the United Kingdom and US at the peak of the pandemic and the subsequent months. I personally think it is too early

to talk about herd immunity until we know more about what is going to happen with the virus in other settings,” Prof Tambyah cautioned.

WHO too warns that this may not be the end of the pandemic after all. For one thing, other variants could arise that are more pathogenic than Omicron.<sup>6</sup>

“It’s dangerous to assume that Omicron will be the last variant and that we are in the end game,” said Tedros Adhanom Ghebreyesus, Director General of the WHO, in a Reuters news article, “Conditions are ideal for more variants to emerge.”

For example, reports have emerged of variants that combine parts of the Delta and Omicron variants.

Another issue is that despite Omicron infections being

milder and associated with fewer hospitalisations, the sheer number of cases could place a large burden on healthcare systems.

### Cautious optimism rather than complacency

Even as the number of COVID-19 cases and hospitalisations decline around the world, the WHO cautions countries against settling into complacency. A case in point is the initial strong success of Asian and Pacific Rim countries such as Hong Kong, South Korea, Japan and New Zealand in controlling COVID-19 cases. More recently, the number of cases in these countries has soared due to Omicron, causing their hospitals to become overwhelmed.<sup>7</sup>

As the US and Europe are gradually opening up again to travel, going back to offices and loosening masking regulations, experts at the WHO and other organisations recommend tempering our eagerness to return to normal with appropriate care.

“We must work together to bring the acute phase of this pandemic to an end. We cannot let it continue to drag on, lurching between panic and neglect,” said Dr Ghebreyesus.



### More Than One Omicron

# 5

different variants named **B.1.1.529**, **BA.1**, **BA.1.1**, **BA.2** and **BA.3**

In US,

# 74%

of COVID-19 cases is due to **BA.1.1<sup>1</sup>**

# 15%

of COVID-19 cases is due to **B.1.1.529**

# 12%

of COVID-19 cases is due to **BA.2**

<sup>1</sup> COVID Data Tracker Weekly Review. March 11, 2022. <https://www.cdc.gov/coronavirus/2019-ncov/covid-data/covidview/index.html>.

<sup>2</sup> Abraham R, Kavya B. COVID cases surpass 400 million as Omicron grips world. Reuters. February 9, 2022. <https://www.reuters.com/business/healthcare-pharmaceuticals/covid-cases-surpass-400-mln-omicron-grips-world-2022-02-09/>.

<sup>3</sup> World Health Organization (WHO). WHO Coronavirus (COVID-19) Dashboard. <https://covid19.who.int/>.

<sup>4</sup> Centers for Disease Control and Prevention (CDC). COVID Data Tracker. <https://covid.cdc.gov/covid-data-tracker/#new-hospital-admissions>.

<sup>5</sup> Adam D. Will Omicron end the pandemic? Here’s what experts say. Nature. 2022;602(20-21). doi:10.1038/d41586-022-00210-7.

<sup>6</sup> Farge E, Roy M. Do not assume COVID pandemic reaching ‘end game’, warns WHO. Reuters. January 24, 2022. <https://www.reuters.com/business/healthcare-pharmaceuticals/who-chief-says-world-critical-juncture-covid-pandemic-2022-01-24/>.

<sup>7</sup> Stevenson A. Hong Kong hospitals can’t keep up with the deaths amid an Omicron surge. The New York Times. February 27, 2022. <https://www.nytimes.com/live/2022/02/27/world/covid-19-tests-cases-vaccine#omicron-surge-covid>.

# The COVID-19 Chronicles: Singapore's Journey from Pandemia to Peri-Pandemic Limbo

NUS Medicine's *The COVID-19 Chronicles* comic series, as seen on social media, are now available in a book! Read on for a flavour of the publication.



## Here is a COVID-19 to-do list: ✕



Avoid nurses in public at all cost.



Stock up on essentials because you never know when you will go out.



Stop shopping online because overseas packages might contain traces of the virus.


Of course, the average Singaporean should know by now to do the complete opposite. Yet this was hardly the case when the virus first broke out here, and public panic was at an all-time high. While experts all over the world were working around the clock to understand the origins of the virus, social media was flooded relentlessly with a deluge of fake news and misinformation, exacerbating public anxiety and uncertainty about the disease.

Enter "*The COVID-19 Chronicles*". The web comic series prides itself on its ability to peg its stories on actual news developments. Anyone too overwhelmed with the news or is confused by the jargon in the World Health Organization's (WHO) periodic statements can tap in and consume, on the go, updates packaged neatly in the form of an online comic strip.



Comic strip #1 | 14 Feb 2020

THE COVID-19 CHRONICLES  
**"TO MASK OR NOT TO MASK?"**



Yong Loo Lin School of Medicine



For the general public not working in a high risk setting, wear a mask only if you are unwell.

Dr Dale Fisher is Professor in Infectious Disease, NUS, and Chair of the Global Outbreak Alert and Response Network, hosted by WHO.

Not only was visual consumption made easy and particularly relatable to Singaporeans, but importantly, the key public health information backed up by science could be communicated in palatable ways to reach a wider demographic

## No fake news, just the facts

The team behind the series worked assiduously to dispel common myths propagated about the pandemic, balancing scientific evidence with down-to-earth humour and public relatability.

With the help of illustrator Andrew Tan, the team dispensed short everyday local narratives with a final takeaway into six simple yet attractive panels. Not only was visual consumption made easy and particularly relatable to Singaporeans, but importantly, the key public health information backed up by science could be communicated in palatable ways to reach a wider demographic.

The series' first comic, *To Mask Or Not To Mask #1*, made its debut on Feb 14, 2020. Apart from providing guidance on the use of masks, it also established Professor Dale Fisher as the series' resident expert.

This comic strip showed an unmasked Prof Fisher joining two masked individuals in an elevator, and telling them there is no need for a mask if one feels well. This was the line taken by WHO at that time as well as the multi-ministry taskforce set up to tackle COVID-19 in Singapore. The advice, based on what was then known about the coronavirus, was that masks were necessary only for those who were unwell, those caring for COVID-19 patients, and healthcare workers. For the rest of the people, washing hands with soap and water frequently would suffice.

The science then was based on early observations that those who had contracted COVID-19 would go on to develop respiratory symptoms such as cough and sore throat. Those around them could get infected if they inhaled droplets containing the virus. Hence masks were needed only when one was sick, or in close contact with those who could be, and were, ill.

On top of that, the global consumption rates of masks seemed unsustainable too. Mr Lawrence Wong, then the Minister for National Development, and co-chair of the multi-ministry taskforce, said that each time a batch of masks was released to retailers, they were "snapped up in hours" despite limiting customers to one box each.

But by April, as new information about the virus emerged, the comic strip's advice about the necessity of masks became obsolete on the discovery of asymptomatic infection. This meant those who had contracted the virus may not show any symptoms, but could still be infectious.

Shortly after Singapore entered an island-wide partial lockdown known as the circuit breaker on Apr 7, 2020, authorities made the wearing of masks mandatory, with fines for those who refused to do so. Evidence that COVID-19 could be transmitted by people with no symptoms changed the approach to prevention globally. This first cartoon has turned out to be incorrect advice but it sits in history as the guidance at the time. *More in the book...*



Illustrated by Andrew Tan • Ann Gee Neo

# THE COVID-19 CHRONICLES

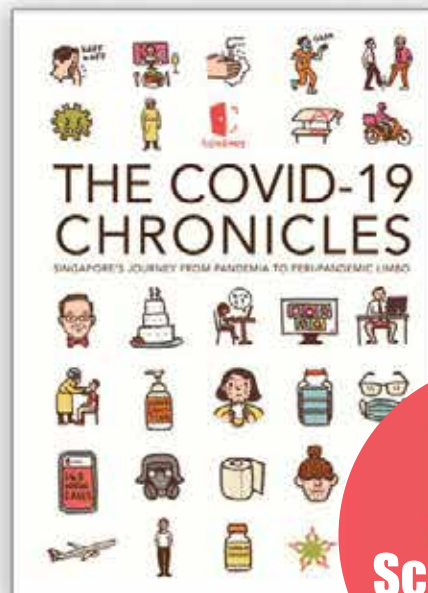
Singapore's Journey from Pandemia to Peri-Pandemic Limbo

Order your  
copy now!

Hardcover : S\$56

Softcover : S\$28

eBook : S\$22



Scan here to  
buy now!

Enjoy **25% off** with the promo code **"Chronicles2125"**  
only valid for a limited period!



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.

#144 – Keep Calm, Keep Safe and Enjoy the Trip




NUS  
National University  
of Singapore

Yong Loo Lin  
School of Medicine

THE COVID-19 CHRONICLES

KEEP CALM. KEEP SAFE.  
AND ENJOY THE TRIP.

**GOARN**  
Global Outbreak Alert and Response Network

When you are fully vaccinated, there is no need to be overly cautious when travelling overseas. You are protected from severe illnesses. Observe the usual safety measures, relax, and enjoy your trip!

Dr Dale Fisher is Professor in Infectious Disease, NUS, and Chair of the Global Outbreak Alert and Response Network, WHO.

Still going strong on social media, check out the latest strips here!

    
@NUSMedicine

  
NUS Yong Loo Lin School of Medicine



#145 – Snakes and Ladders

**NUS** National University of Singapore  
Yong Loo Lin School of Medicine

THE COVID-19 CHRONICLES

**"KEEP CALM (AND CARRY ON)"**

**GOARN**  
Global Outbreak Alert and Response Network

So close to the new normal!

VTL TRAVEL

OMI CR

BOOSTER SHOT

I can't wait to travel...

Wait, do I land on the snake or the ladder?!

OMI CRON

BOOSTER SHOT

So how should I proceed?

OMI CRON

SHOT

If Omicron proves to be more virulent than Delta, you have to slide down the snake. If it turns out to be milder, you can proceed to the ladder!

I'll wait to see what scientists find out about the new variant.

I'll take extra precautions when I travel!

NEW NORM

VTL TRAVEL

OMI CRON

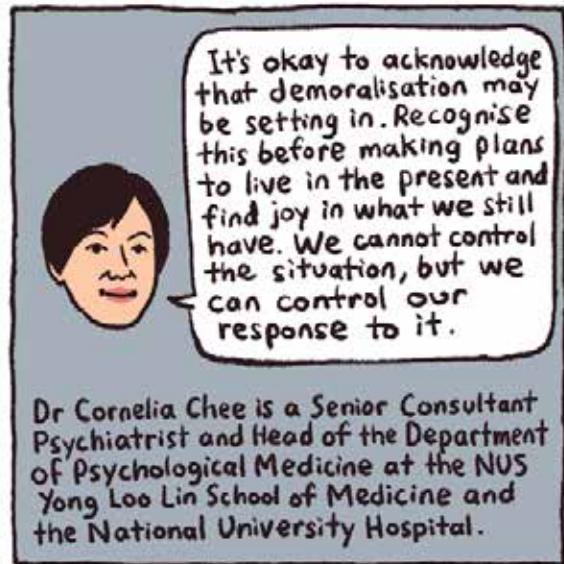
BOOSTER SHOT

I'm still going for my booster!


We don't know enough about Omicron yet, and further research is needed to help us better understand the variant. While we wait and watch, let's stay calm and keep to the safe measures. We've been adaptable and will be able to work together to combat any new challenges.

Dr Dale Fisher is Professor in Infectious Disease, NUS, and Chair of the Global Outbreak Alert and Response Network, WHO.

## #149 – Coping with the Blues



#152 – Is Omicron Really “Mild”?



Yong Loo Lin School of Medicine


THE COVID-19 CHRONICLES

# IS OMICRON REALLY “MILD”?

## GOARN

Global Outbreak Alert and Response Network

Typically, the onset of Omicron symptoms starts around 3 days post exposure.



I'm not a stalker but I wanted to say hi after hanging around for 3 days!

Oh no!

You may experience body aches, weakness, lethargy, brain fog and gastrointestinal problems. Minimise social interactions while symptoms persist!\*



Let's meet when I'm recovered!

But the good news is fever, cough, shortness of breath and loss of smell and taste are less common in Omicron compared to Delta.




Getting Omicron is such a bummer...

but at least I can still smell and taste my favourite ramen!

While Omicron symptoms may be less severe as they present higher up the respiratory tract, it can still be awful to bear.

Some symptoms include:

- o Runny nose
- o Nasal congestion
- o Sore throat





Stay home, rest up, hydrate and take some paracetamol (if suitable for you) to fight the nasty symptoms. Get well soon!



Dr Dale Fisher is Professor in Infectious Disease, NUS, and Chair of the Global Outbreak Alert and Response Network, WHO.

\* <https://askgov.sg/agency/moh>

#153 – Holding On To Our Freedoms



Yong Loo Lin School of Medicine

THE COVID-19 CHRONICLES

# HOLDING ON TO OUR FREEDOMS

## GOARN

Global Outbreak Alert and Response Network

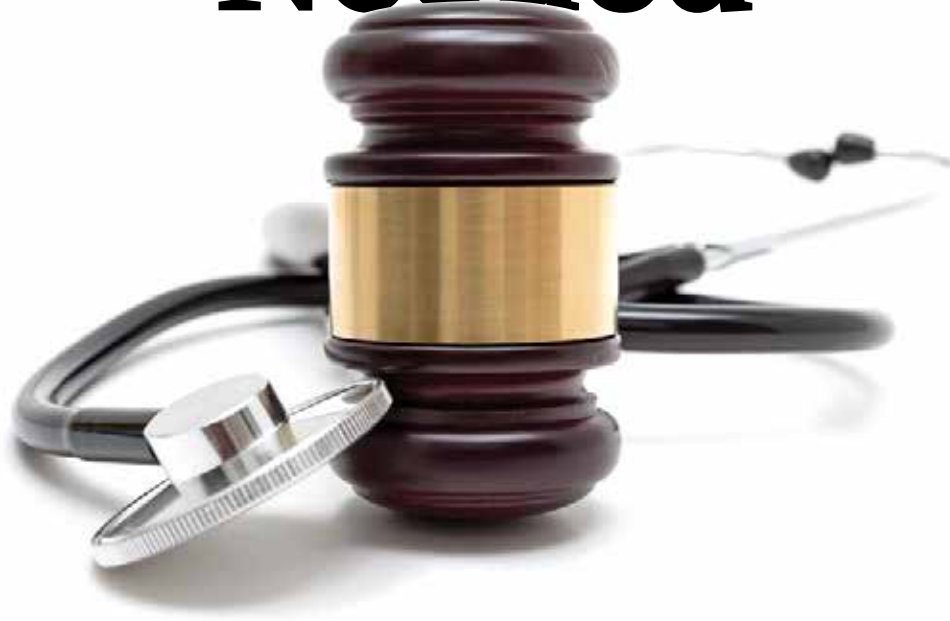



The restoration of many of our freedoms is certainly worth celebrating. But to help us hold on to these freedoms, let's remember to maintain the practice of avoiding crowds, wearing masks indoors, and safe distancing.

Dr Dale Fisher is Professor in Infectious Disease, NUS, and Chair of the Global Outbreak Alert and Response Network, WHO.



# Needed



## A New Paradigm for Ethics Support in Community and Integrated Care

BY ASSOCIATE PROFESSOR MICHAEL DUNN, CENTRE FOR BIOMEDICAL ETHICS

*Ethics support has been an important feature of healthcare in Singapore for over a decade. Clinical Ethics Committees (CECs), previously known as Hospital Ethics Committees, are the bedrock of the local approach. CECs have pioneered ethics support services that offer a sounding board and practical advice to health professionals who identify ethical issues within their practice that they are struggling to resolve.*

**B**road institutional structures have built up around CECs. They are supported by training, capacity development, and professional networking opportunities led by the Clinical Ethics Network + Research Ethics Support (CENTRES) project based in NUS. CECs also pursue their own educational and development work in their local clinical settings. In contrast to other countries, the creation of CECs in Singapore was mandated by primary legislation: the Private Hospitals and Medical Clinics Act. This has led to highly formalised terms of reference for CECs, in terms of the composition of the committee, and in its

management and reporting structure.

In 2021, the regulatory landscape for CECs evolved further. New licensing terms and conditions were issued by the Ministry of Health in advance of the implementation of the Healthcare Services Act. Amongst other developments, these revised terms and conditions extend the remit of ethics review to non-hospital licensees—including nursing homes. Health and care settings outside of hospitals may establish their own CECs if they can meet the requirements or, alternatively, they can refer their cases to an external CEC, if an agreement is put in place.

As CECs continue to develop so does Singapore's overarching strategy for health and care provision. In an ageing society, there is increasing recognition of the central role that integrated, community-based health and social care delivery models will play. As these models are implemented, difficult and entirely new questions arise for the delivery of ethical care. These questions include ethical concerns that arise in home-based care, such as the appropriate use of assistive technologies, monitoring devices, the boundaries between private and public space, and the meaning of person- and family-centred care in the home environment. Ethical uncertainty will likely also arise because of professional and ethical responsibilities being dispersed across a much-wider network of caregiving roles and activities. This important feature of community-based care is discussed further below.

In the face of new ethical challenges and new strategies for delivering healthcare and support within our communities, we must also ask: Does the CEC model remain fit for purpose? In my view, there are good reasons to pursue a new paradigm of ethics support.

Why is this the case? I turn to the features of institutional settings in the community context first. Whilst the new licensing terms and conditions ensure that non-hospital-based care institutions like nursing homes can access ethics committee review of difficult cases, community-based care services differ from acute services in important ways. It is fair to say that a nursing home does not feel very much like a hospital, and such differences are not solely explained by reference to the different services provided.

In contrast to a hospital, it is less common for external professionals to enter nursing homes to provide guidance or advice. There tends to be more scepticism towards 'outsiders' amongst nursing home staff, given the close-knit nature of many professionals working in a single institutional setting. Fear and doubt can also be fostered amongst nursing home staff when there is limited public awareness about their jobs beyond occasional media reports highlighting scandals in care quality.

Encouraging discussions to focus on the good and bad of decision-making is only likely to heighten staff members' concerns that their performance is being subject to external (negative) judgement. The word 'ethics' itself is likely to give rise to confusion and uncertainty. Formalising discussions about ethical issues could also further foster concerns amongst staff members that the ethicist is looking to unearth problems in the nursing home that could have implications for their employment status, or the home's reputation more generally.

Turning next to the broader landscape of health and care delivered in the community, other differences in the approach to providing care in this context draw our attention to further worries about relying solely on CECs.

Integrated community services are diffused, decentralised, and involved a wide range of health and care professionals. Care interventions delivered in the community—within housing blocks and within people's own homes—also increasingly involve paraprofessional caregivers, such as befrienders and foreign domestic workers, and unpaid carers, such as family members and neighbours. A committee model to shape care practice and caregiving is likely to be unfamiliar to these individuals, especially if that committee is based within a hospital and those issuing advice are hospital practitioners with limited awareness of the realities of community-based practice.

Additionally, a larger contingent of migrant caregivers is likely to be present in community settings,





**Ethics support initiatives are likely to have an equally important educational function for caregivers who lack the formal training in ethics received in, for example, medical schools and nursing schools.”**

but the lower skill-base associated with the social care professions means that it is possible that these individuals will have a poorer grasp of shared languages, and therefore find it more difficult to participate in ethical discussions. Just as importantly, current research being undertaken by one of my doctoral students, Kumeri Bandara, is revealing that migrant social care workers in the UK rely frequently on informal networks of support to address the day-to-day challenges that arise in their jobs. This includes friends and family outside of the workplace, in addition to close/trusted colleagues at work.

For all these reasons, seeking advice from a CEC may be looked upon suspiciously, or will simply not be fit for purpose in community-based care settings. If this is the case, opportunities for ethics support will likely be poorly utilised, even though frontline caregivers may be encountering distinctive ethical challenges they struggle to resolve.

Where do we go from here? As I have argued elsewhere, the ideal approach is to foster the development of “a model of ethics support that can be implemented straightforwardly in the different settings in which care is provided, and that can incorporate skill development and training components within a self-reflective and formative approach to addressing ethical issues.” (Hope and Dunn, 2014).<sup>1</sup>

In my view, alternative approaches of this kind will need to be configured, in a bottom-up fashion, as part of the grassroots design of new care delivery models. They will need to be responsive to the perceived ethical needs of caregivers (professional or not) and be largely informal in design—at least to begin with. Informal processes are more likely to be integrated more seamlessly into professionals’ working lives in the community, helping to ensure that ethics advice is welcomed as an adjunct to, rather than a distraction from, the fulfilment of daily routines.

It is also likely that any approach to ethics support of this kind will need to be embedded within existing community institutions, as opposed to being formally attached to, located in and managed by a hospital or other healthcare institution. As the full integration of care services in the community evolves further, informal structures for providing ethics support might even be best configured and organised at the level of the housing block, or within local neighbourhoods.

Any such model will also need to be inclusive, recognising that much of the care and support work in this context is provided by non-professionals. Family, volunteers, domestic workers and neighbours should increasingly be seen as part of a broad team of care providers who may benefit

from ongoing access to ethics support and advice.

Looking at the particulars of this new paradigm of ethics support, a case can be made for the development of networks of community practitioners in ethics, and the use of open, relaxed, and deliberative meetings. Ethics support encounters that enable people with wide-ranging experiences and different responsibilities to adopt a self-reflective but critical stance on the difficult decisions they face, will be important. In this way, ethics support initiatives are likely to have an equally important educational function for caregivers who lack the formal training in ethics received in, for example, medical schools and nursing schools. Ultimately, the appropriateness of any contextual approach to ethics support will depend on how the institutional environment is configured, and the unique dynamics of the community setting within which ethics support activities will be situated.

In conclusion, careful thought needs to be given to a new paradigm of ethics support that is fit for purpose as Singapore increasingly pivots towards integrated and community-based health and care services. Attention will also need to be paid to the resources and steps needed to realise this ‘call to arms’. CECs will undoubtedly remain an important component of any new strategy for ethics support, continuing to provide a formalised mechanism to advise on high-profile dilemmas particularly in the medical setting. But, whilst necessary, they will not be sufficient.

<sup>1</sup> Hope, T. and Dunn, M. (2014). ‘The ethics of long-term care practice: A global call to arms’, in A. Akabayashi (ed.) *The Future of Bioethics: International dialogues*. Oxford: Oxford University Press, pp. 628-643.

# Medical Students Demonstrate Efficacy of COVID-19 Vaccines in Multiple Immunocompromised Patient Groups

*Led by faculty mentors, they performed a meta-analysis that was published in a prestigious medical journal.*

The transmission and mutation of the SARS-CoV-2 virus has continued to fuel the ongoing COVID-19 pandemic globally. By February 2022, more than 400 million have had confirmed COVID-19 and more than five million have died worldwide. Trials and ongoing studies have sought to evaluate the efficacy and safety of vaccines developed to protect the global population from the worst of COVID-19's side effects and symptoms. High vaccine efficacy against symptomatic laboratory confirmed infections were reported, with protection rates

of over 90% after two doses of most vaccines available.

The protection afforded by vaccines is particularly crucial in vulnerable populations of patients such as those with compromised immune system, who face a higher risk of severe COVID-19 infection and mortality. A group of medical students from NUS Yong Loo Lin School of Medicine have now completed a systematic review and meta-analysis of the efficacy of various COVID-19 vaccines in multiple immunocompromised patient groups.



Through the review of 82 observational studies, the students compared the efficacy of COVID-19 vaccines between immunocompromised and immunocompetent people. They demonstrated that immunocompromised patients produced significantly less antibodies after COVID-19 vaccination as compared to their immunocompetent counterparts. Seroconversion, the process of making significant levels of antibodies after infection or vaccination which allows the body to protect itself, was especially poor in organ transplant recipients, with only a third achieving seroconversion after two doses.

A third (booster) dose was able to elicit a significant antibody response in most patients with cancers and autoimmune diseases, but was of variable effectiveness in organ transplant recipients. Among the immunocompromised groups studied, antibody levels were also lower than in immunocompetent controls.

Most studies included in this meta-analysis employed mRNA vaccines (Moderna, mRNA-1273 and Pfizer-BioNTech, BNT162b2) and no conclusive differences in response were found compared to inactivated or viral vector vaccines. As the base of evidence grows, the effect of regimens such as the enhanced primary series employed in Singapore and booster doses of COVID-19 vaccines may be studied. As more evidence on various types of vaccines emerge, it would be possible to study if vaccination with a specific type of vaccine confers greater protection.



**The medical students involved in this project performed a commendable feat, completing this detailed research study over-and-beyond their regular responsibilities and studies as students. We are grateful to NUS Medicine who also supported their growth and aspirations with the necessary resources throughout this journey.”**

*Asst Prof Raghav Sundar, team mentor*



More than  
**400  
MILLION**  
have confirmed  
COVID-19 and  
more than

**5  
MILLION**  
have died from  
COVID-19  
worldwide by  
February 2022

The students' paper was published by *The BMJ*, one of the foremost peer-reviewed medical journals available. This recognition from veteran researchers in their field was a significant achievement for the students.

The team of medical students behind the publication, third-year student Wong Shi Yin, fourth-year student Ainsley Ryan Lee and fifth-year students Teo Chong Boon and Benjamin Tan expressed their gratitude for the support from their team of mentors led by Assistant Professor Raghav Sundar and Dr Soon Yu Yang.

"We would like to thank Asst Prof Sundar and Dr Soon for their dedication guiding us through this journey. They have been empowering mentors, allowing us to grow as researchers and making this possible."

"The medical students involved in this project performed a commendable feat, completing this detailed research study over-and-beyond their regular responsibilities and studies as students," said Asst Prof Raghav Sundar. "We are grateful to NUS Medicine who also supported their growth and aspirations with the necessary resources throughout this journey."



# Immunotherapy Plus Chemotherapy Not Viable for Some Stomach Cancer Patients

*NUS Yong Loo Lin School of Medicine students and researchers develop novel algorithm to assess immunotherapy benefit in stomach cancer patients.*

**A**n algorithm developed by a team of medical students and researchers at NUS Medicine has identified a group of stomach cancer patients who may not benefit from undergoing joint immunotherapy-chemotherapy treatment.

They reported their finding in the study that was published in the *Journal of Clinical Oncology*, Volume 40, Issue 4. The researchers—fifth-year medical students Joseph Zhao, Teo Chong Boon, Benjamin Tan and third-year medical student Dominic Yap, 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, an algorithm to retrieve unreported subgroup survival data of patients who derived no benefit from adding immunotherapy to their cancer treatment options.

**The novel algorithm identifies a group of stomach cancer patients who can potentially be spared unnecessary treatment, side effects as well as high treatment costs.**



This means that patients, for whom the new treatment does not work, can potentially be spared unnecessary treatment, side effects as well as high treatment costs. 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.

The impetus for this algorithm came about when a recently-conducted Phase III randomised controlled trial—CheckMate-649—demonstrated that adding immunotherapy to conventional chemotherapy provides patients with advanced gastroesophageal cancer a significant chance of survival. A protein biomarker, known as PD-L1, has been hypothesised to be an indicator that can identify patients who may respond well to immunotherapy, along with conventional chemotherapy. This protein biomarker is commonly found on the tumour cells and the immune cells around the tumour. Patients with higher indicators of PD-L1 have been observed to derive more benefits from immunotherapy.

The authors of the CheckMate-649 clinical trial reported that patients with the biomarker scores of more than 1 or 5 showed a high survival rate when treated with a combination of immunotherapy and chemotherapy. This manner of reporting meant that clinicians were unable to tell if patients with the biomarker score between 1 to 4 would truly benefit from immunotherapy-chemotherapy treatment.



Based on the trial results from CheckMate-649, the Food and Drug Administration in the United States has given approval to use the immunotherapy drug nivolumab for all gastric cancer patients, while European approval has only been extended to a specific subgroup of patients, with PD-L1 score of 5 or more.

KMSubtraction effectively streamlines the process of having to reach out to senior authors of major studies to request for new analysis 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 their chemotherapy regimen. Instead, these patients could possibly be enrolled into clinical trials with newer agents, and spared the side effects and high costs of immunotherapy drugs.

The two first authors of the NUS paper, Mr Joseph Zhao and

Mr Dominic Yap, said they were grateful for the opportunity to work on this practice-changing study and the mentorship the team has received. Said Mr Yap, “The topic of immunotherapy and its implementation is complex and complicated by different interests.” Added Mr Zhao, “As medical students, we learn to treat patients with various diseases, with the focus on helping them at the individual patient level. Conversely, research utilising such biostatistical coding techniques allow us to contribute to patient care on a larger scale.”

The team's supervisor, Asst Prof Raghav Sundar commended the efforts and enterprising spirit of the medical students in coming up with this new algorithm, “The students have demonstrated phenomenal drive, ingenuity, innovation 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.”



From left:  
Dominic Yap,  
Joseph Zhao,  
Asst Prof Raghav  
Sundar, Benjamin  
Tan and Teo  
Chong Boon.  
(Photo courtesy of  
Asst Prof Raghav  
Sundar)



# Harvesting Baker's Yeast for Therapeutics Targeting Age-related Diseases

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*Researchers from Singapore and the UK successfully engineer common baker's yeast to produce D-lysergic acid (DLA), an ingredient used in medicine for dementia and Parkinson's Disease.*

**T**he silver tsunami is an emerging problem many countries will be confronting in the following decades, together with the associated societal and health challenges. According to the World Health Organization,

one in six people in the world will be aged 60 years or older by 2030. By 2050, the world's population of people aged 60 years and older will double to 2.1 billion. The number of persons aged 80 years or older is expected to triple between 2020 and 2050 to reach 426 million.



In line with the growing number of seniors, the number of people living with age-related diseases such as dementia, including Alzheimer's Disease and Parkinson's Disease, is also expected to increase exponentially. These age-related diseases are an emerging impediment to healthy and functional ageing.

The class of medicines used in the treatment of neuro-cognitive diseases and other neurological ailments such as migraines and headaches are currently obtained from extracts of the ergot fungus. The ergot fungi are parasites to cereal crops such as rye, and their cultivation entails growing them on top of fields of such crops that could otherwise be used for food production. However, continued cultivation of the ergot fungus for medicine is not sustainable as industrial agriculture is one of the largest contributors to carbon emissions worldwide.

Currently, between 10 to 15 tons of D-lysergic acid (DLA), an ingredient used in medicines for neuro-cognitive diseases and neurological ailments, are produced each year to meet global demand. In order to reduce the use of arable land to produce such medicines, a group of researchers from the NUS Medicine and Imperial College London have trialled an alternate way of producing DLA.

Using yeast commonly used to make bread, and applying

## Just like how baker's yeast has been used to produce the alcohol and flavours in beer, fermentation using the modified yeast can now produce D-lysergic acid or DLA, an ingredient used in the medicine for neuro-cognitive diseases and neurological ailments.

synthetic biology techniques, the team introduced the enzymes from the ergot fungus into baker's yeast, which also happens to be another fungus. Through the fermentation process, the modified yeast was then grown using sugar to produce DLA. Natural fermentation has been used throughout human history for food production, most notably in the production of bread and beer. Just like how baker's yeast has been used to produce the alcohol and flavours in beer, fermentation using the modified yeast can now produce DLA.

"It is possible to produce up to five tons of DLA annually using the current yeast strain; and with further optimisation, commercial production levels could be attainable," explained Associate Professor Yew Wen Shan from the Department of Biochemistry at NUS Medicine and the co-lead Principal

Investigator of the study. "This research builds upon the growing body of work that uses microbes such as yeast for the sustainable production of medicine and functional food ingredients."

Professor Paul Freemont, from the Department of Infectious Disease at Imperial College London, said, "Yeast has been a key part of human civilisation for thousands of years, helping us to make bread and brew beer. But our relationship with this familiar microbe is evolving. Through this exciting collaboration, we have been able to harness fungal cells to act as miniature factories to produce raw compounds for medicines. This is an example of how something seemingly small and inconsequential has the potential to change human lives, providing the drugs which will enable us to age better and reduce the environmental impact of industrial drug production."



Between  
**10 to 15**  
**TONS**  
of DLA are  
produced globally  
each year



# **It Takes a Tribe**

## **The Doctor Volunteers Who Helped Write the Story of Hospice and Palliative Care in Singapore**

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

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*On Valentine's Day this year, Singaporeans woke up to the news of the passing of Dr Cynthia Goh, the doyenne and pioneer of palliative care in Singapore and around the region.*

**H**er achievements are too numerous to describe, but more than 500 people from across Asia Pacific and from as far as the United Kingdom, who joined the livestream of her funeral wake, amply demonstrated the wide-ranging impact she has had.

One of the consequences of this sad event has been an increase in awareness of the history of the hospice movement in Singapore. Non-palliative Medicine colleagues of mine mentioned that they had not realised that hospice and palliative care started so long ago (almost 40 years!) as a grassroots movement, or of the many hurdles the early pioneers had to overcome.

While we undoubtedly stand on the shoulders of giants like Cynthia Goh, Rosalie Shaw and Anne Merriman—indeed, palliative care is one of those fields where women have been the major driving force—it is also essential to acknowledge the role of the volunteers who gave of their time and energy towards the cause. This motley crew, this tribe of largely unsung heroes, came from all walks of life, and did whatever needed to be done. A significant number of them are doctors, and it is to them that this article is dedicated.

I will not be focusing on doctors who delivered the palliative care, and so can only give a passing mention to pioneers like Drs Philip Tan, Lee Chang Long and Quek Peng Kiang of the Corporation Clinic who provided medical support to patients of



St Joseph's Home for many years. Instead, I will mention a few medicos who contributed to hospice and palliative care in other, but no less important, ways.

**Prof Kon Oi Lian** is widely known as a clinician scientist and Research Lead at the National Cancer Centre Singapore (NCCS). Few realise that she was an active volunteer in the hospice movement in its early days, serving as the Chairperson of the Joint Education Committee of the Co-ordinating Committee for Hospice work in Singapore. This committee comprised representatives from Assisi Hospice, Dover Park Hospice, St Joseph's Home and the Singapore Cancer Society. Remember this was before there were hospital-based palliative care services, and even from the beginning, the pioneering services understood that training and education would be crucial in developing palliative care locally.

In 1994, Prof Kon wrote to Prof Edward Tock, the Dean of the NUS School of Medicine, to request to meet and discuss incorporating Palliative Medicine into the undergraduate curriculum. This important initiative would not see fruition until almost a decade later, and it would be another group of doctors who helped Palliative Medicine find a place in the medical school curriculum. More details can be found in an article in SMA news, but I will give special mention to a couple of doctors.

**Dr Jerry Lim** is a retired GP and co-founder of Dover Park Hospice (DPH) along with Dr Seet Ai Mee; to this day they are fondly remembered by DPH staff as Papa Lim and Mama Seet. Dr Lim had personal experience of his late wife receiving hospice care overseas, and he was inspired to set up a secular hospice in Singapore (at the time, the only hospices were affiliated to the Roman Catholic faith).



Following the NIMBY (= Not In My BackYard) kerfuffle that led to Dover Park Hospice not being anywhere near Dover Park, it was through the help of Dr Seet Ai Mee (who is not a medical doctor but a biochemist by training) and her political connections, that alternative land was found near Tan Tock Seng Hospital. This was actually carved out of the carpark of the National Skin Centre (NSC), and to this day, DPH runs off the NSC power grid.

Dr Lim was also a vocal advocate of training and education, and he prevailed upon his friend and colleague **Prof Goh Lee Gan**, and others within the Family Medicine fraternity, to lobby for Palliative Medicine to get its foot in the door, so to speak. This happened in 2002 with a one-day posting for medical students to the Family Medicine teaching block, and this eventually expanded to a four-day posting. In 2020, the Palliative Medicine programme was taken out of Family Medicine and moved to the Internal Medicine Block, but we will always remember that it was Family Medicine that opened the door.

And now we come to two oncologists, both former colleagues of mine from NCCS:

**Dr Vijay K Sethi** is a radiation oncologist who was an active volunteer with the Singapore Cancer Society, not only helping to see patients, but also serving on various committees. He was involved in a landmark event called the International Conference for Hospice Care in Asia in 1996, which was attended by Dame Cicely Saunders and former President Wee Kim Wee (patron of the



**I remember the first time I attended a palliative care conference as a young trainee; suddenly I did not have to explain or justify myself, I recognised kindred spirits, people ‘got’ me. It felt so familiar and comfortable, like I had come home. That’s when I knew I had found my tribe.”**

Singapore Hospice Council). This conference subsequently evolved into the Asia Pacific Hospice Conference or APHC.

**Dr Koo Wen Hsin**, medical oncologist and current Chairman of the Division of Medicine at Sengkang Health, was my predecessor at DPH. Before I assumed my role as Medical Director in 2004, I asked him for advice and he had this to say: “Your job is to stand between the Council and the staff”. At first I was puzzled, then I came to realise that I had to be an effective bridge

between the governing council or board, and the staff working on the ground, so that each side understood the concerns of the other, and everyone could go about their work unencumbered.

Last but definitely not least, **Dr Chen Ai Ju**, who has had a distinguished career in public service, not least as Director Medical Services from 1996-2000. When I applied to go for advanced training in Palliative Medicine in Sydney (since there was no such programme in Singapore), I was an unknown quantity and was worried the usual references

and testimonials might not be enough. As it turned out, Dr Chen’s husband was my Orthopaedic surgeon (and he played golf with my father), one thing led to another, and I was given a very important letter of support that persuaded the people in Sydney to give me a chance. And the rest, as they say, is history.

What I did not know at that time, was that Dr Chen had been a volunteer with the Methodist Welfare Services for some years already. She later served as Chairperson of the Singapore Hospice Council, and Chair of the DPH MPAC (Medical Professional Audit Committee) during my time as DPH Medical Director. I benefited from her wise counsel and experience, for example during a time that we had staff resignations to deal with, she told me an uncomfortable but unavoidable truth: “People come, people go, no one is irreplaceable”.

I apologise that space does not permit me to mention more names nor tell more stories, but the fact is I would not be able to name everyone who contributed quietly, without fanfare, but with all their enthusiasm. The hospice movement in Singapore is similar to how the old National Theatre was built; back then, people were asked to donate whatever they could, pay for a brick, a tile—then slowly, brick by brick, tile by tile, we built something to be proud of.

Why a tribe and not a village? In modern times, tribes are no longer constrained by geography or ethnicity; rather, they are defined by a shared identity, a shared cause, and a shared understanding. Sometimes, when individuals are alienated

within their biological families or workplaces, or feel that they are not able to settle comfortably in where they find themselves, they may find a sense of belonging in a tribe e.g. former prisoners, former members of close-knit military and other uniformed services, LHBTQ people.

The Palliative tribe is diverse, scattered across the world, some more active than others, but all

focused on the alleviation of suffering. Some people join the tribe only temporarily, others decide to stay on. I remember the first time I attended a palliative care conference as a young trainee; suddenly I did not have to explain or justify myself, I recognised kindred spirits, people “got” me. It felt so familiar and comfortable, like I had come home. That’s when I knew I had found my tribe.

### *The Contract*

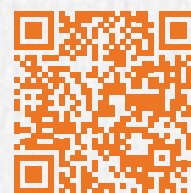
*by William Ayot*

*A word from the led*

And in the end we follow them –  
 not because we are paid,  
 not because we might see some advantage,  
 not because of the things they have accomplished,  
 not even because of the dreams they dream  
 but simply because of who they are:  
 the man, the woman, the leader, the boss,  
 standing up there when the wave hits the rock,  
 passing out faith and confidence like life jackets,  
 knowing the currents, holding the doubts,  
 imagining the delights and terrors of every landfall;  
 captain, pirate, and parent by turns,  
 the bearer of our countless hopes and expectations.  
 We give them our trust. We give them our effort.  
 What we ask in return is that they stay true.



Scan to read more about Dr Cynthia Goh here:



Scan to read about how Palliative Medicine found a place in the medical school curriculum here:

# Remembering Prof Cynthia Goh

BY DR ANN TOH, ADJUNCT LECTURER, DIVISION OF FAMILY MEDICINE; HEALTH & HUMANITY PATHWAY CHAIR AND CORE FACULTY FOR STUDENTS, OFFICE FOR STUDENTS, NUS MEDICINE

*We were seated in a Chinese restaurant in the quiet of a weekday—chairs positioned the way she liked it—conducive to our chat. "This dish is one of my favourites, it is considered street food in Hong Kong and very cheap, and I had it frequently growing up."*

**I** still hear her voice as though it was yesterday and the stories she had told which I have kept as food for my heart.

"Shall we write a book, Prof Goh, just for fun? To capture your stories? I want to remember them" she chuckled and said, "Yes, yes, before my memory fails me and before dementia takes over."

I still remembered the simple lessons spoken and unspoken. We had a Saturday round in SGH which ended with 'tea' at the *kopitiam* at 5pm, when I asked her, "Prof, the patient load is so heavy. We are running ward to ward, block to block; the patient list is so long, how do I show compassion and help my patients know that I see their suffering and I care?" She looked me in the eye and said, "Ann, to give another person 100% of yourself for just 10 minutes is a precious gift, not many people have felt a 100% attention from another just for them. Can you do that Ann? Put everything aside when you see the patient and give 100% of yourself for

that time when you are seeing them."

We often spoke about the soul of palliative care and I enquired about the magic of human touch that some practitioners like her embodied, that could soothe even those with the most severe total pain. I wanted to know the secret sauce as I wanted some of that magic of compassion to rub off from me too. There was no 10-step formula, but the "being with" and chats we had, the stories she told me over food and drinks at her favourite high tea places were like precious jewels I keep stored in the inner chambers of my heart and take out and ruminant over again and again and again, when I ponder what it means to be a wounded healer.

She taught me that doctoring in hospice care is love in action and it is an absolute "no-no" to leave a patient who is still suffering. She taught me that I must never turn away nor walk away from my patients' pain and that love in action requires strength, commitment, determination and sacrifice.



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She taught me that no act of kindness is too small, and a \$2.50 box of sushi for a dying patient who misses its taste carries value far beyond 2.5 million bucks. She taught me that there is always something you can do to somehow make things better if you really care and think hard enough. She shared that home hospice had a special place in her heart because there the patient is the host (and the "boss").

In our chats, she spoke in perfect, crisp British English, her beautiful voice and tone so elegant; and I spoke like an “aunty” with my rapid-fire Singlish. But as mentor to mentee, she accepted me for all my antics, my eccentricities, and even the unusual paths I choose to walk, and saw me for me.

In our chats, we spoke of the struggles of the local home hospice sector and the nurses who had bravely jumped in even when no one knew what palliative care was, and who have sacrificed so much to grow this field. We spoke of the social workers and pastoral care staff who tenderly met the psycho-emotional and spiritual needs of our patients—so often after office hours. I asked her, how will charity services sustain itself and be sustainable and while I fretted over the well-being of frontline hospice staff and teams, about financial resources to sustain the work and about operationalising dreams of increasing the regional reach to serve the suffering. Her response was always, “Ann, this is not our work, this is God's work and we don't have to worry, we just show up and say yes.”

So for the first time in my life, I allowed myself to grieve openly, cry and emote through the five stages of grief Elizabeth Kubler-Ross popularly outlined, because she taught me that to grow in compassion, we need to soften in the face of difficulty, pain and suffering, and not allow life to harden our hearts.

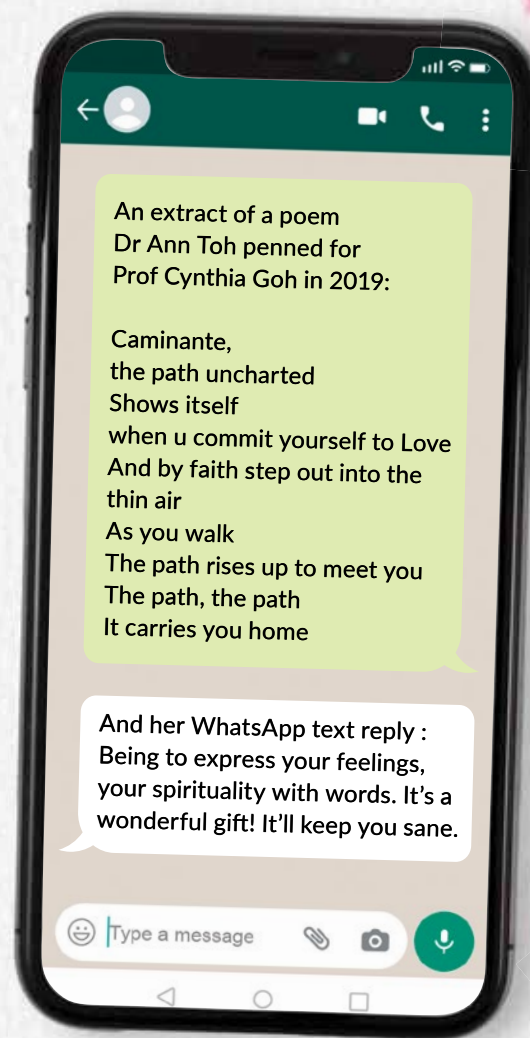
When I wept bitterly attending her funeral online, and I said out loud, “Prof Goh, it is

too soon, I haven't finished learning, and I am not ready”, I heard her saying to me in my heart, “Be brave Ann, give yourself to love and stay true, the path will open up and hospice work has a life of its own and will flourish. Stay true.”

I miss Prof Goh so very much, and I wished we had continued that book project that we had discussed to capture her stories which embodied the soul of palliative care, and her courageous love which opened

the path we now walk. I pray that I remember each moment, each word and each story she told me, and as I mourn, I renew my commitment to doctoring with the approach of being love in action.

*Dr Ann Toh works as a physician in the home care setting, delivering family-centred care to children with life-threatening and life-limiting illnesses in the community, under StarPALS at HCA Hospice Care. She also serves as a volunteer physician and advocates for vulnerable groups in the community and is passionate about nurturing students to become the next generation of doctors.*



**Genetic**

**Ancestry Matters**

**in Childhood**


**Leukemia**

**Treatment**

**Success**







*Race is an important context for understanding varying outcomes in childhood leukemia treatment.*

Researchers from the Yong Loo Lin School of Medicine and St Jude Children's Research Hospital in the United States have shown that it is important to consider race and genetic ancestry in treating acute lymphoblastic leukemia in children.

The team studied the impact of genetic ancestry on childhood acute lymphoblastic leukemia (ALL), the most common type of childhood cancer. They found that ancestry itself is associated with differences in biology of ALL, and is also an independent factor contributing to differences in treatment outcomes.

The doctors evaluated an international cohort of more than 2,400 children, including more than 400 paediatric patients from Singapore and Malaysia, to determine how genetic ancestry affects leukemia biology and outcomes under modern therapy. They found that several molecular subtypes were associated with East Asian ancestry (e.g. Chinese children). They also established that South Asian (e.g. Indian) and East Asian children have one of the best survival outcomes in the world. The findings were published in the March edition of *JAMA Oncology*.

While children with East Asian ancestry had survival rates similar to those of Caucasian children, previous research has shown that their genetic makeup showed genetic variations that render some medicines highly toxic for them, said Dr Shawn Lee, the lead author of the study and a Consultant in the Division of Paediatric-Hematology Oncology at the National University Hospital (NUH) who is currently on a research fellowship at St Jude Children's Research Hospital in Tennessee, US. "We need to review the application of therapies that were actually developed for Caucasian children and which do not work in exactly the same way in children of other races."

Added Dr Jun J. Yang, a pharmacogenomics expert and corresponding author of the study, "The world is becoming increasingly diverse, and so are children with cancer. As we look to the next generation of therapies for ALL, it's going to be essential we consider the diversity of this cancer on a global scale."

### **A need to understand why some children do better than others in ALL treatment**

Racial disparities exist in both the incidence and treatment outcomes for childhood with ALL. Globally, researchers have noted that Caucasian and Asian children do better than Blacks or Hispanics/Latinos. Locally and regionally, Paediatric oncologists like Associate Professor Allen Yeoh, Senior Consultant in the Division of Paediatric Hematology-Oncology in NUH and co-investigator of the study, has observed for many years that Indian children seem to fare especially well, most of

**"The world is becoming increasingly diverse, and so are children with cancer. As we look to the next generation of therapies for ALL, it's going to be essential we consider the diversity of this cancer on a global scale."**

*Dr Jun J. Yang, Pharmacogenomics Expert, Corresponding Author*



whom are cured. However, the exact reason for these racial differences are still not clear.

There is limited data on the genetic basis for such disparities. One main problem is that most of the studies and trials in childhood ALL currently are performed in Western countries (US and Europe), with children of European descent (White/Caucasian children) forming the bulk of genomic studies, and only a small proportion of Asian children. Moreover, although Asian populations include South Asians (Indians, Pakistanis, etc.), East Asians (Chinese, Japanese, Korean, etc.) and Southeast Asians (Malays, Indonesians, etc.), are genetically distinct and separate

populations, current research studies typically do not distinguish and differentiate between these ethnic groups. There is therefore a lack of information on the genomics of Asian children in childhood leukemia. "We are increasingly shifting into a world of precision medicine and individualised therapy. This information helps researchers to better individualise ALL treatment according to ancestry and biology, through refined risk stratification or design of biology-driven treatment protocols. We aim to conduct more studies and further understand the underlying biology so that we can close these gaps in survival," said Dr Lee.



### **Specific associations of biology with East Asian ancestry in childhood ALL**

The study that Dr Lee and Dr Yang led looked at children from various populations in North America (US), Southeast Asia (Singapore and Malaysia), and Latin America (Guatemala). These represented children of very diverse descent—European, African, Native American, East Asian and South Asian. In this cohort, there were more than 400 Asian children from Singapore and Malaysia. The researchers used a genomic technique called whole-transcriptome sequencing (RNA-sequencing) to comprehensively characterise ALL molecular subtypes and the genetic ancestry of each child. Determining ALL molecular

subtyping is very important because different subtypes have different treatment implications and prognoses.

For the first time, genomics of childhood ALL are reported at a very granular level in Asian patients (Chinese, Indians and Malays). They show that children of East Asian ancestry (i.e. Chinese ) have strong associations with subtypes such as DUX4 with good prognosis, and negative associations with subtypes with poorer prognosis such as BCR-ABL1-like.

In particular, East Asians (i.e. Chinese) and especially South Asians (i.e. Indians) have excellent ALL survival, as good or even better than Caucasian children (who have always been regarded as having the best outcomes in ALL). Specifically, Indian children have the best survival rates and one of the lowest relapse rates. Although this has been observed for a while now, this is the first time that the excellent survival outcome of this group of children has been reported in the context of modern-day therapy and on a global comparison with other races/ancestries.

### **Need for consideration of Asian diversity in ALL research and treatment**

“More importantly, this work, through showing the global racial diversity of childhood ALL, demonstrates the need to shift the overall paradigm of representation and diversity in cancer research. Currently, almost all therapies developed in ALL are based on Caucasian children, and the findings are then extrapolated to Asian children. For children in Singapore and other Asian countries, ALL (or cancer)

**“Although this has been observed for a while now, this is the first time that the excellent survival outcome of this group of children has been reported in the context of modern-day therapy and on a global comparison with other races/ancestries.”**

*Associate Professor Allen Yeoh, Senior Consultant in the Division of Paediatric Hematology-Oncology, NUH, and co-investigator of the study*

therapy must take into account racial diversity. As we look to the next generation of therapies for ALL, it is essential that we consider the diversity of this cancer from an Asian perspective,” said Dr Lee.

### **Success of Malaysia-Singapore protocol and treatment of Asian children**

The majority of Asian children evaluated in this study were treated on Malaysia-Singapore (Ma-Spore) ALL protocols. Developed by NUS Medicine faculty staff and paediatric oncologists at the NUH Associate Professor Allen Yeoh and Associate Professor Quah TC, and other Ma-Spore collaborators from KK Women’s and Children’s Hospital, Universiti Malaysia Medical Centre (Malaysia) and Subang-Jaya Medical Centre (Malaysia), this leukemia protocol is designed and tailored to the needs and profile of the region. This work highlights the success of this protocol, in being able to achieve survival outcomes for Asian children that are very comparable (or even better) than the West.



# Sprinting Towards the Forefront of Cancer Care in the Community

BY DR BENNY WANG, ADJUNCT RESEARCH FELLOW, AND ADJUNCT ASSOCIATE PROFESSOR LIM FONG SENG, SENIOR CONSULTANT, DIVISION OF FAMILY MEDICINE, NUS MEDICINE

*“Cancer is the new chronic disease”. Singapore’s cancer incidence rates are rising, with a corresponding need for improved cancer care from diagnosis to survivorship and palliative care. Over the past few decades the cancer incidence rates are rising, with age-standardised incidence rate (ASIR) (per 100 000 population) of overall cancer cases increasing from 188.7 between 1968-1972 to 228.8 in 2018.<sup>1</sup>*

**B**reast (15.5%), colorectal (15.1%), lung (12.3%) and prostate (7.8%) cancers form the most common newly diagnosed cancer cases locally in 2020. Mortality rates for these four common cancer types are 7.6% (breast cancer), 3.1% (prostate cancer), 9.6% (colon cancer) and 21.6% (lung

cancer). Indeed, these numbers are expected to be rising with an estimated 22.7% of the local population being at risk of developing cancer in their lifetime.<sup>2</sup>

The increased burden on specialist cancer care is thus unsustainable and there is an urgent need for the



The cancer incidence rates (per 100 000 population) increased to **228.8** in 2018<sup>1</sup>

development of better cancer care models in primary care. In the light of this, the Singapore Primary Care Cancer Network (SPriNT) was established in 2020 by the Department of Family Medicine, National University Health System (NUHS), to advance cancer care across primary care and specialist institutions.

SPriNT members comprise the National University Polyclinics (NUP), National Healthcare Group Polyclinics (NHGP), SingHealth Polyclinics (SHP), Primary Care Collaborative Cancer Clinical Trials Group, Australia (PC4), NUHS Primary Care Network (PCN), National University Cancer Institute, Singapore, National Cancer Centre, Singapore and Singapore Cancer Society, and is led by the Department of Family Medicine, NUHS.

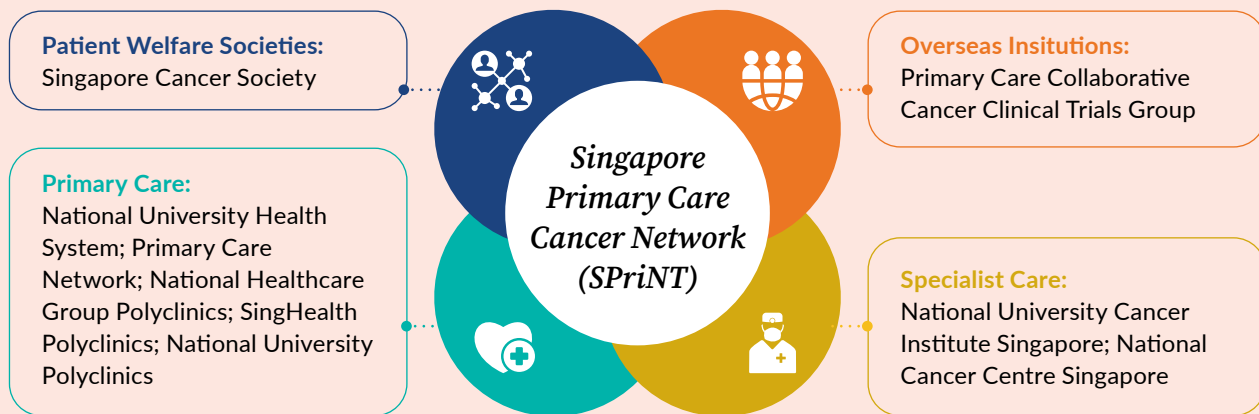
Some of the initiatives undertaken by SPriNT so far

include the standardisation of cancer clinical practice guidelines across the primary care institutions and tertiary cancer centres for shared care purposes and the organisation of continuing medical education programmes for healthcare professionals in the community.

SPriNT is also establishing collaborations with partners across the Asia Pacific region to promote research projects to advance cancer care. It launched the Asia Pacific Primary Care Cancer Research

Group on 17 July 2021 to promote regional cancer research collaborations.

In conclusion, SPriNT is a primary care initiative started to meet the needs of cancer care in education, service delivery and research in the community. It is with much hope and expectation that SPriNT's efforts can inspire many primary care colleagues to come onboard our bandwagon to meet the challenge of the rising cancer burden in Singapore in the future.



**The aims of SPriNT are:**



To provide education updates to those involved in cancer care in the community



To catalyse and facilitate innovative models of cancer care in the community including various models of cancer survivorship care and cost-effective cancer screening in the community



To undertake cancer research projects in the community

<sup>1</sup> National Registry Of Diseases Office (2018), 'Singapore Cancer Registry Annual Report'.

<sup>2</sup> International Agency for Research on Cancer, WHO, Singapore-Fact-Sheets. <https://gco.iarc.fr/today/fact-sheets-populations> (18th May 2021, date last accessed).

# Taking Stigma Reduction Online

*According to the 2016 Singapore Mental Health Study, one in seven adults will experience a mental health condition at least once in their life. However, over 75% of them will avoid seeking professional help.*



**S**tigma is a long-standing issue in the mental health arena. Over and beyond the illness itself, stigma exacerbates the challenges that people experiencing mental health conditions face, says Dr Shawn Goh, Assistant Professor at the National University of Singapore's Alice Lee Centre for Nursing Studies.

Stigma, he explains, comes in several forms: structural factors include socio-economic status, government policies, and the availability and accessibility of mental health services. Attitudes from the public and within individuals also discourage the use of existing mental health services.

However, seeking help early has a lot of advantages, including reducing the risk of severe complications. With appropriate management, people with mental health conditions

can contribute economically and productively in the society and enjoy a good quality of life.

“Addressing the public stigmatisation of people experiencing mental health conditions is paramount in bridging the mental health treatment gap,” says Dr Goh. He notes that for a long time much work—such as from the Silver Ribbon’s mental health projects to the National Council of Social Service’s “Beyond the Label” campaign—has been done over the years to address the stigma surrounding mental illness. More recently, organisations—including corporates and community groups too—are increasingly embracing mental health awareness and advocacy.

These traditional interventions, such as psychoeducation workshops, social activism, contact-based approaches and awareness

programmes, have proven effective at raising mental health literacy, improving attitudes, and reducing social distancing towards people with mental health conditions, says Dr Goh.

In his day-to-day work and interactions, he has seen the effect of these campaigns. “Anecdotally, more people, especially the younger generation, are more open to seeking help and hold a less negative perception of mental illness,” he observes.

“While the perception is changing slowly but surely, more can be done. The gap between the time taken to seek help has reduced, but it remains,” he says, stressing that self-stigma still needs to be addressed in tandem with improving mental healthcare provision for greater access to care and with improving the public perception of mental illness.

### Online versus offline: A review of efficacy

The evolution of stigma is coupled with another evolution: that of moving campaigns and interventions into the digital arena. Therein lies the question: how do online stigma-reduction campaigns compare with traditional approaches?

To this end, Dr Goh conducted a systematic review to compare the two. His paper, “Effects of online stigma-reduction programmes for people experiencing mental health conditions: A systematic review and meta-analysis”, was published in June 2021 in the *International Journal of Mental Health Nursing*.

In the meta-analysis, Dr Goh and his research team looked at studies that covered three areas: the public stigmatisation towards people with mental health issues across age groups and conditions; online interventions; and face-to-face interventions. Out of over 2,000 studies, nine met the relevant criteria and were analysed.

“We found that online interventions compare favourably with face-to-face, wait-list control, and no-intervention groups,” shares Dr Goh. Even within the studies excluded from the meta-analysis, the researchers saw that there was a significant reduction of public stigmatisation with online interventions. “This gives us a good indication that online interventions can be used effectively by organisations to target public stigma against people with mental health conditions,” he adds.

The finding is especially timely as COVID-19 has not only raised the acceptance of digital tools—but also made them an integral part of life in the new normal.



### Just as we see a doctor for a cough or cold, so too should we seek help for our mental health.”

*Dr Shawn Goh, Asst Prof at the  
NUS Alice Lee Centre for Nursing Studies*

Dr Goh explains that this receptivity may be due to the nature of online communications, which can take many forms, such as social media campaigns, moderated peer support groups and resource portals—and be tiered towards different levels of need and support modes.

“Apart from improving access (lowering structural stigma), the digital medium, especially social media, confers a sense of community while also offering a greater sense of control and privacy,” he adds.

People with mental health conditions can also moderate and pace their level of participation and “come to a level of comfort” before actually coming forward to seek help. This, says Dr Goh, gives them the space to “normalise their perception of themselves” and lower their self-stigma.

#### Optimising digital anti-stigma platforms

Based on the findings of this review and Dr Goh’s other areas of research—which looks at how open people across age groups are to online counselling—there are many more interesting avenues to pursue in stigma-reduction and mental health advocacy.

One of these is in developing better algorithms to drive mental

health promotion and content towards people who are seeking help. “This will help us to harness the technology optimally and ensure it is targeted, appropriate and relevant,” he says.

Another is in care integration and the creation of seamless hybrid models. “This relates to connecting digital anti-stigma efforts and information-giving with some form of expert intervention, such as telepsychiatry, telenursing as well as other onsite assessments and clinical treatments,” he explains.

Ultimately, Dr Goh notes that a greater understanding of the effectiveness of online stigma-reduction interventions and receptiveness to online treatments will allow mental health professionals to develop appropriate tools and platforms that lower barriers to help-seeking and increase accessibility.

The goal is to optimise the accessibility of mental health tools to drive mental healthcare upstream. “This is a more preventive and proactive approach that opens the door to mental health screening—just like we do for physical health and chronic illness,” he explains. “Just as we see a doctor for a cough or cold, so too should we seek help for our mental health.”



Professor Wong Hie Aik Ellen  
1977-1991

## Remembering Professor Wong Hie Aik Ellen

Head, Department of Biochemistry, 1977-1991

*Prof Wong, who passed away on 13 November 2021 at the age of 90, was the second Singaporean to helm the Department of Biochemistry.*

**H**er career with the University began in August 1959 when she joined the department as an assistant lecturer in Biochemistry. It was a time when most of the early biochemistry research focused on the nutritional properties of local food. Prof Wong was a recipient of a number of awards, including ones from the Fulbright Commission and the Lee Foundation. In February 1968, she went to the Vanderbilt University

in Tennessee, United States on a National Institutes of Health (NIH) grant to work on hormonal regulation of carbohydrate metabolism. By 1980, Prof Wong was promoted to Professor and the department had pivoted to diverse basic and applied research in topics ranging from diseases such as diabetes, hepatomas and blood gastrin levels in patients with duodenal ulcers to the mechanism of insulin action and flavonoid metabolism.





# Remembering Professor Yeoh Teow Seng

Head, Department of Pharmacology,  
1981-1987

*Prof Yeoh, who passed away on 12 March 2022 at the age of 90, was Head of the Department of Pharmacology from 1981-1987.*

The late Prof Yeoh Teow Seng was known for his passion in Pharmacology and is remembered as an excellent educator. He was noted for his gentlemanly conduct, his humility and peaceful demeanour, as well as his concern for the students under his charge. He was very much loved and respected as a teacher and mentor. Students loved his very clear and concise lectures. He had a phenomenal memory and could remember the face of every student in the class.

He was universally remembered for being able to randomly call out any student by name in every class he taught. As a researcher, Prof Yeoh was known for being extremely meticulous. He authored and contributed to papers in pharmacology and toxicology. He made advances in gastrointestinal pharmacology and important early contributions to understanding the toxicity of mercury in certain Chinese Traditional Medicine formulations and the safety of dental amalgams containing mercury.



*Photo taken in 1960: Professor Yeoh is second from the right in the front row.*



*Photo taken in 1989: Professor Yeoh is third from the left in the front row.*





## 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 shade wide and far and provides space for reflection and discussion. We invite you to come and take a seat under its shade.

### Healthy Longevity Webinar Series:

# Live Healthily, Learn Happily

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*It is a global trend that human life expectancy has increased significantly, meaning that we are expected to live longer than our grandparents. However, living long is not quite the same as living well.*

**R**ecent data show that although our ‘lifespan’ has expanded substantially (i.e. 26 years over the past seven decades), our ‘healthspan’—the length of time living in good health—did not catch up at the same rate. In other words, we may live longer but we also suffer from illnesses longer. The rising number of unhealthy elderlies is costly, both socially and economically, unless we do something to change this trend.

At the Healthy Longevity Translational Research Programme here at the NUS Yong Loo Lin School of Medicine, we believe that “To live longer is a plus, but to live healthily longer is a must.” Using multidisciplinary approaches, from basic to clinical studies, our researchers are working hard to find ways to extend human healthspan. Success means that individuals will have more time in life to do what they love, allowing them to contribute meaningfully to the society in their older years.

This mission requires multiple stakeholders to act together. To provide a platform for scientists, physicians, investors, and policymakers to discuss the latest advancements each has made and to keep the public well informed, we organise the weekly Healthy Longevity Webinar Series. In each one-hour episode, we invite an internationally renowned expert, based anywhere in the world, to give a lecture which is then followed by in-depth discussion facilitated by Professor Brian Kennedy



or Professor Andrea Maier. Both Prof Kennedy and Prof Maier are co-directing the Centre for Healthy Longevity at National University Health System (NUHS). Prof Kennedy is also Director of the Healthy Longevity Translational Research Programme at NUS.

We invite anyone and everyone who cares about healthy longevity issues to attend this webinar series, which takes place every first, second, and third Thursday of each month at 7 pm. Whether you are an expert in the field or the general public, you are encouraged to sign up to stay updated on the latest developments in healthy ageing research and exchange

perspectives with guest speakers and other attendees. After all, what could be more fulfilling than a healthy life that is characterised by happy learning?

↑  
Prof Brian Kennedy and Prof Andrea Maier, Co-Directors of the Centre for Healthy Longevity.

Scan to sign up for Healthy Longevity Webinar Series here:



Scan to watch the past episodes here:



<sup>1</sup> Garmany A, Yamada S, and Terzic A. Longevity leap: mind the healthspan gap. *npj Regenerative Medicine* (2021) 6:57; <https://doi.org/10.1038/s41536-021-00169-5>.

# COVID-19: Biomedical Insights into an Evolving Epidemic (BIEE3) – Translating Knowledge, Saving Lives



*Lifesaving. This word perfectly sums up the third edition of the educational series on COVID-19 presented by NUS Medicine faculty and leading biomedical and healthcare experts from around the globe.*

This third instalment built on the well-received first and second series. The first episode aired in July 2020 as the pandemic unfolded. The second edition in the series coincided with the pandemic's one-year mark in January 2021 and featured eminent scientists who provided insights on the virus biology and interventions to combat the pandemic.

Organised by the Department of Microbiology and Immunology and the School's executive education unit, MEDEX, this third series ran from 12 January to 21 February 2022 as 10 live webinars, simulcasted in English, Chinese and Bahasa. It saw over 7,500 participants from across the world gaining updated insights on the biology and biomedical research into COVID-19. Participants also learnt about the epidemiology of the outbreak, vaccine development and efficacy, and innovations in diagnosis and treatment. An international panel of experts shared their

latest evidence-based insights on detecting, treating, and preventing COVID-19 even as the disease continues to evolve.

Crowning the third series was the final webinar that saw a panel discussion among leading COVID-19 experts on the theme 'The New Normal: A Moving Target?', and which highlighted the sobering fact that we continue to live in the shadow of COVID-19. Hailing from different fields, including public health, biomedical, clinical, diagnostic, vaccine and therapeutics, the panelists shared perspectives on the current global situation and used Singapore's experience as a framework for a thought-provoking discussion.

Associate Professor Kevin Tan, Head, Department of Microbiology and Immunology, NUS Medicine sums up the impact of the third series in shaping the global transition into the new normal, "The unfolding and containment of COVID-19 has shown that the challenges involved are multifaceted and

complex. These series of webinars have provided an educational platform for our healthcare and biomedical community to glean new knowledge that can lead to science-based healthcare decisions. BIEE1, 2, and 3 were possible because of synergistic collaborations between NUS Medicine teams with complementary skill sets, leading to impactful outcomes."



A/Prof Kevin Tan introducing the international panel of experts for BIEE3.



**A lifesaving webinar. I shared the insightful information about vaccines that I learnt from the webinar with my friends. They got vaccinated after a long time of hesitancy."**

*Mr Legaspi Ravas, Jr., Philippine Science High School, Eastern Visayas Campus*

<sup>1</sup> <https://www.zaobao.com.sg/news/singapore/story20220222-1245109>.

<sup>2</sup> <https://www.straitstimes.com/singapore/health/it-is-not-the-time-to-have-a-covid-19-party-even-if-omicron-infections-are-milder>.

<sup>3</sup> <https://www.straitstimes.com/singapore/health/askst-can-vaccination-reduce-symptoms-of-long-covid>.

# Take 5: Q&A with National University Hospital’s Dr Matthew Chen

**Q: What are your views on pursuing lifelong learning in healthcare?**

**A:** Lifelong learning is essential in healthcare because it helps to keep our knowledge current even as healthcare becomes increasingly complex. There are always new things like skills to acquire and novel technologies to learn about, which we can then use to benefit the patients we serve.

Healthcare is an ever-changing field of practice with advances

in medicine, treatments, and models of care, and it is vital that we embrace lifelong learning to stay relevant to provide safe and effective patient care. Continuous lifelong learning can also help to open up new doors in your career.

**Q: What are the challenges faced by healthcare professionals in continuing education?**

**A:** It can be challenging at times when there are other competing factors for our time

e.g. day-to-day clinical work, other roles and responsibilities. I find what helps at the end of the day is a deliberate prioritisation of our time to ensure that we continuously learn regardless of how busy we get. After having learnt something new, we also have to remind ourselves to put it into practice and apply what we have learnt. I find that self-reflection is also a good skill in this respect, as I would ask myself, “now that I have learnt that, how can I do things differently this time?”

Dr Matthew Chen  
Consultant,  
Geriatric Medicine,  
National University  
Hospital.



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**Q: What was a recent CET course that you took with NUS Medicine?**

**A:** One of the most memorable courses was the one on “Leading and Managing in Medical Education”, which was part of the “Foundations in Health Professions Education (FHPE)” series. It featured a mix of online modules and a face-to-face workshop. The online modules were very informative and well thought out, as they provided a good knowledge base preparatory to the ensuing workshop.

I really enjoyed the workshop as there was a good balance of interaction with my course mates and the facilitators, and we discussed cases which were taken from real life scenarios which was extremely valuable to my work as an educator.

**Q: How has this CET course supported your career development?**

**A:** The knowledge that I have gained from the courses is very practical and applicable to my area of work in undergraduate and postgraduate education. I have since developed a deeper understanding in areas such as curriculum development and assessment, which has in turn improved the quality of my work. The courses have also allowed me to develop my professional network, which is a valuable resource to tap on when the need arises.



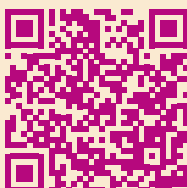
**Q: What motivates and drives you to pursue continuing education in healthcare?**

**A:** Knowing that our patients will benefit the most at the end of the day drives me to pursue continuing education. This can be through developing myself to improve direct patient care and safety, or upskilling others to improve the way they care for their patients. Having the right attitude and motivation, or as Simon Sinek puts it, focusing on the “why” rather than the “what” and “how”, can guide us towards the outcomes we want to achieve. It will help to keep us centred, and improve our work performance and resilience.



**Having the right attitude and motivation, or as Simon Sinek puts it, focusing on the ‘why’ rather than the ‘what’ and ‘how’, can guide us towards the outcomes we want to achieve. It will help to keep us centred, and improve our work performance and resilience.”**

Scan to view an excerpt of the interview with Dr Matthew Chan here:



Scan to view the full video on Lifelong Learning with NUS Medicine here:



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