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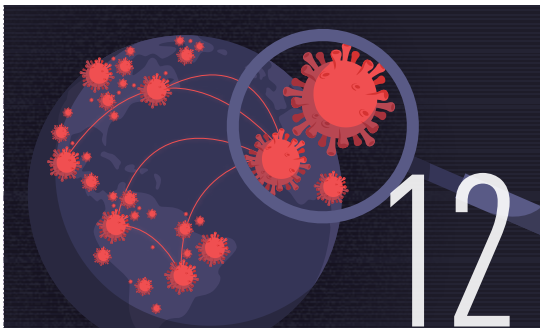

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DEAN'S MESSAGE

Dear Reader,

We live in interesting times. When I began jotting down thoughts for a draft of this message earlier this year, I had no inkling of the coming virus threat that would work its way around the world, sickening hundreds of thousands, locking down entire cities and communities, upending businesses and slowing global economies. The rapidity of the COVID-19 outbreak has caught many governments unprepared, prompting the WHO to declare a pandemic on 11th March. It is one that the world is still grappling with at the time of this newsletter going to print.

The suddenness and speed with which the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) crossed international borders brought home in dramatic fashion the extreme interconnectedness of our modern lives. It is a vivid demonstration of how the world as we know it is changing. It is being re-shaped by a confluence of forces, from the digital and technological revolutions that are dramatically transforming the way we live, work and play, to the realignment and fragmentation of international political and economic partnerships, and the reconsideration of personal, civic and societal norms and institutions.

In ways big and small, the teaching and practice of medicine is also being fashioned and transformed by these changes. The NUS Yong Loo Lin School of Medicine will mark its 115th year this July with a tribute to the generations of women alumnae who have helped to shape the practice of medicine in Singapore. Our School has weathered two world wars, educated and graduated 10,000 men and women and played a substantive role in the establishment and maintenance of Singapore's healthcare system. It is linear progression of the sort that we can no longer take for granted or assume to be the norm.

We must ride the winds of change and seize the opportunities that present themselves—in good times and bad—to continually review and refresh our curriculum, and ensure that the medical knowledge and skills we teach and impart to our students will continue to prepare them to confidently and skilfully handle the health challenges awaiting them. Our research efforts similarly will concentrate on seeking better ways to promote and prolong health and health span.

This pandemic has clearly demonstrated that not being ready is preparing to fail. We cannot preserve our heritage by holding on to established practices without constantly seeking improvements and relevance. In this 115th year of our existence, we will celebrate and enhance our history by looking forward and preparing for a constantly changing world. Our vision is to inspire health for all and I hope the stories in this newsletter will challenge, motivate and encourage you on your journey.

Yours sincerely,

Yap Seng

HOLDING UP HALF THE SKY

WOMEN IN SINGAPORE MEDICINE

by A/Prof Gan Yunn Hwen and A/Prof Sophia Archuleta

A/Prof Gan is an associate professor at the Department of Biochemistry and the Assistant Dean for Equal Opportunities and Career Development at the NUS Yong Loo Lin School of Medicine. She is a scientist working on infectious diseases.

A/Prof Archuleta is the head and senior consultant of the Division of Infectious Diseases at the National University Hospital. As a clinician educator, her clinical expertise and primary interest, is in the care of people living with HIV and its associated conditions.

Mao Tse-tung's famous saying reflected his appreciation of the critical role that women played, and continue to play, in China's national growth, progress and development. Decades later, Mao's conviction would be echoed by Michelle Obama at the Summit of the Mandela Washington Fellowship for Young African Leaders in July 2014: "No country can ever truly flourish if it stifles the potential of its women and deprives itself of the contributions of half of its citizens."

Women hold up half the sky in Singapore too – they raise children, care for the elderly at home, and many also hold down jobs at the same time. In healthcare, women now figure prominently across the range of roles, from administrators to nurses and from allied health professionals to doctors.

Despite the critical and diverse roles and responsibilities undertaken by women here, their economic status, corporate status and progress show a disturbing picture. Like their counterparts in many countries, Singaporean women still lag behind men in terms of income and career progression in many professions. According to a Straits Times report,[1] women's pay has not improved in the last ten years, with men earning 20% more.

The report cited a study by consumer research firm ValuePenguin, which reviewed data from the Ministry of Manpower (MOM). The information indicated that in 2006, the median gross monthly income of men was about $2,452, approximately 19% higher than the $2,053 for women.

In 2016, the median monthly income for Singaporean male workers rose to $3,991. This was 18% higher than the median for women, which was $3,382. Encouragingly, the report added that wage gaps narrowed in health and social services, as well as in manufacturing, public administration and education, information and communications, and financial and insurance services.

Two years later, things have not made much progress. According to another Straits Times article,[2] research conducted by jobs website Glassdoor found that women are still earning 13% less than their male counterparts. Among high-paying jobs, the MOM found that the largest pay gap was in specialist medical practitioners, with women specialists making only about 49.7% of their male colleagues' median wage.[3]

VARIOUS REASONS FOR UNDER-REPRESENTATION

The disparities are most visible at leadership levels in the professional and occupational areas, with women under-represented in leadership ranks relative to their overall numbers and qualifications, compared to other developed countries.[4]

There are various reasons to explain this continuing gulf between the genders – chief of which are societal norms and values. These biases in structures, systems, policies and processes throughout our society could be subconscious, meaning our behaviours, choices and practices are shaped by underlying assumptions and attitudes without us even realising.

These have been cited as reasons for women being assigned disproportionate responsibility for family caregiving and "softer" roles such as nurturing or welfare-supporting functions that are generally accorded less value in organisations. This, together with inadvertent effects of government policies, hold women back from making the same sort of progress marked by men. It is a development that could put women at greater risk of financial hardships in old age especially when women live longer than men; the same Straits Times article reported that women aged 60 years and older had Central Provident Fund (CPF) balances that were 69% of the average men's balance, while females aged between 55 and 60 years had CPF accounts that were 84% of their male counterparts'.[4]

Class of 1947

Tan Sri Dr Salma binti Ismail

The late Tan Sri Dr Salma was born on 19 December 1918 in Alor Setar, Kedah. She received her early education at the Kampung Bahru Girl's Kedah, passing her Junior Cambridge in 1934 and Senior Cambridge in 1935, the latter with distinction. She then continued her education at the King Edward VII College of Medicine in Singapore in 1936 under a scholarship by the State Government of Kedah. She was conferred a degree in Medicine in 1949, making history as the first Malay woman to qualify as a medical practitioner in Malaya. Dr Salma practised in Kedah and Selangor and died of old age in Malaysia.

Class of 1955

Tun Dr Siti Hasmah Mohamad Ali

Tun Dr Siti Hasmah has set an example of personal and professional achievement for women in her country, campaigning tirelessly for women's health, family planning, drug abuse control and adult literacy.

Often a pioneer in her profession, Tun Dr Siti Hasmah was one of the first Malay women to enrol for a medical course at the King Edward VII College of Medicine in Singapore after the war.

In 1955, she graduated as a medical doctor from the Faculty of Medicine, Universiti Malaya, Singapore, and joined the government health service. Ten years later, she became the first woman to be appointed medical officer in the Maternal and Child Health Department and, in 1974, became the first woman to be appointed the State Maternal and Child Health Officer.

Tun Dr Siti Hasmah is the author of several articles on family medicine and the socio-economic factors associated with pregnancy and childbearing in Malaysia and has held a number of posts. She has served on various associations, including being the patron of the Malaysian Association of Maternal Health and Neonates. She has also been active in efforts to educate young people about the dangers of drug abuse.

Her decades of public service, voluntary work and leadership in the fields of public health, literacy and drug abuse control saw her honoured on numerous occasions, including awards from Malaysia's Yang Di Pertuan Agong, as well as the sultans of Selangor and Kedah.

Class of 1974

Prof Low Poh Sim

Senior Consultant, Division of Paediatric Neurology, Khoo Teck Puat-National University Children's Medical Institute

National University Hospital Professor, Department of Paediatrics, NUS Medicine

Prof Low is a senior consultant paediatrician and is one of Singapore's leading specialists in paediatric neurology.

Her long and distinguished career of 40 years has seen her hold key appointments, including being Chairperson at the Khoo Teck Puat-National University Children's Medical Institute, National University Health System (NUHS); Head of Department of Paediatrics at NUS Medicine and the National University Hospital (NUH); as well as Associate Dean at NUH. She has also been Head of the Division of Paediatric Neurology and Developmental Paediatrics and is a member of several medical advisory panels.

As Head of the NUH Division of Paediatric Neurology, Prof Low led her team to develop greater capabilities in clinical services and oversaw the development of new and essential clinical services and programmes in the area of paediatric neurology, as well as the development of the Child Development Unit at Jurong Medical Centre.

Over the years, Prof Low has also nurtured and mentored countless young paediatricians, many of whom are now established paediatricians and leaders in the profession. She has been appointed by the NUS as the Chief Examiner for the Master of Medicine in Paediatrics, a post she has served faithfully in for the past 20 years. With the introduction of the residency programme for post-graduate training in Singapore, Prof Low continued to play a seminal role in maintaining national training and assessment standards as a member of the Residency Advisory Committee and the Chief Examiner for Paediatric Medicine.

Prof Low's sustained involvement in and commitment to the area of clinical care and student development runs alongside her research work, which has resulted in the publication of several scientific papers in high-impact peer-reviewed journals.

WOMEN IN SINGAPORE HEALTHCARE

What is beyond debate, however, is the participation and crucial roles that women around the world have played in healthcare, which first gained significance in the 1800s with the work of Florence Nightingale and the International Committee of the Red Cross.[5] The preponderance of women in nursing reflected the historical dominance of men in medicine – a situation that was also replicated in Singapore. The country saw very few women enrolling in medical school; the second graduating class of the Straits Settlements Medical School (the forerunner of the National University of Singapore [NUS] Medical School) in 1911 included just two women – E Nunes and JS Lee.[6]

Modest beginnings notwithstanding, the list of early women doctors in Singapore includes the late Tan Sri Dr Salma binti Ismail, Tun Dr Siti Hasmah Mohamad Ali, Prof Low Poh Sim, Prof Chay Oh Moh and Prof Leo Yee Sin. (Read more about their achievements in their respective panels.)

Despite their historical and early active involvement in medicine and healthcare through the centuries, women today are still not as well represented in leadership roles, such as heads of department and assistant or vice-chairs of medical boards, as their male counterparts. At the National University Health System, 2019 figures show that women hold 21.2% or 41 out of 193 senior leadership posts, and out of a clinician population of 1,700, women make up 39.1%, or 664. At the NUS Yong Loo Lin School of Medicine (NUS Medicine), 33.3% assistant professors, 28.6% associate professors and just 10.1% tenured full professors (as of 2019) are women.

At the National Healthcare Group, women occupy 32 of 117 senior leadership posts in 2019. Out of the clinician population of 1,512, women comprise 42%. Over at SingHealth, 48% of the 2,393 clinicians are women and they hold 76 out of 272 leadership positions.

MORE WOMEN IN MEDICAL PRACTICE TODAY

The 1979 quota capping female enrolment in medicine at NUS to just a third has been identified as a major contributing factor to this imbalance in gender representation.[7] In the intervening years, Singapore's steadily ageing population, higher immigration flows, as well as the attrition of doctors leaving for the private sector, led to an increase in demand for healthcare services, which translated into a need for more medical staff. The growth of Singapore's biomedical research and development sector that added to the growing demand for more doctors also helped to convince the Government to abolish the policy in 2003. The decision was well-received universally and "served to rectify the anomaly in which 'less qualified' male students were preferentially admitted to NUS Medicine over 'more qualified' female students, many of whom went overseas to study medicine and never returned to Singapore."[8]

Five years after the quota was removed with the strong support of the Remaking Singapore Committee's Group on Women's Issues, the Association for Women Doctors (Singapore) and Members of Parliament Dr Lily Neo and Mr Charles Chong,[9] women made up nearly 49% of enrolment in 2008 for the NUS Medicine undergraduate degree programme. In 2018, the intake of females comprised at least 55% of the freshman cohort entering NUS Medicine. In the same year, the percentage of females enrolled in Duke-NUS Medical School made up at least 53% of the incoming cohort, while they comprised between 30% and 40% of the students in the Lee Kong Chian School of Medicine's first four intakes.[10] The female students from NUS Medicine are at the forefront of student leadership, helming projects and initiatives such as large-scale public health screening campaigns, as well as community service programmes here and even in neighbouring countries.

WORKING TOWARDS A BETTER TOMORROW

We are hopeful that women will eventually fill more leadership posts in the coming years but this requires intentional efforts by institutions and individuals to recognise, acknowledge and address the issues. Since 2017, the National University Health System's (NUHS) Women in Science & Healthcare (WISH) has been working closely with the NUHS leadership to raise awareness, facilitate access and promotion for women, as well as address misperceptions and unconscious biases in the clinical and medical sciences. More recently, the creation of the Equal Opportunities for Career Development Office within NUS Medicine in 2019 seeks to plug the leaky pipeline of women in academic medicine and aims to offer both men and women equal opportunities and rewards in academia. We look forward to embracing a future where more women can fulfil their full potential as they continue to make their mark in medical thought and practice, and help shape the course of health-care in this country and beyond.

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Class of 1976

Prof Chay Oh Moh

Senior Consultant, Department of Respiratory Medicine, KK Women's and Children's Hospital

Prof Chay is a senior consultant in the Department of Respiratory Medicine Service of the KK Women's and Children's Hospital (KKH). She is also the Associate Designated Institutional Officer of SingHealth Residency, Campus Director of KKH, and Professor in Paediatrics, Duke-NUS Medical School and NUS Medicine.

For more than 20 years, Prof Chay has been an outstanding mentor and educator par excellence, making significant contributions to the professional initiation and development of innumerable medical students and residents in the areas of paediatrics and paediatric respiratory medicine, with her teaching, training and mentorship.

As the first Academic Chair of the SingHealth-Duke NUS Paediatric Academic Clinical Programme, she established a robust framework that has effectively cultivated strong mentor-mentee relations across all levels of doctors at KKH, as well as in SingHealth. She was awarded the National Outstanding Clinician Mentor Award, National Medical Excellence Awards 2014.

Class of 1983

Prof Leo Yee Sin

Director, Institute of Infectious Diseases & Epidemiology

Clinical Director, Communicable Disease Centre

Senior Consultant, Department of Infectious Diseases, Tan Tock Seng Hospital

Clinical Professor, NUS Medicine

Prof Leo proved her mettle during one of the worst health crises to hit Singapore in recent times: the 2003 SARS virus outbreak. She has also participated in the fight against Chikungunya and pandemic influenza virus outbreaks during the late 1990s and 2000s. While heading the Institute of Infectious Diseases and Epidemiology at Tan Tock Seng Hospital, Prof Leo was also involved in various research in dengue, influenza, HIV and emerging infections. Singapore's evolution from developing to developed country has led to changes in the disease landscape.

Disclaimer:
All figures cited in the article were contributed by the relevant parties.

BEFORE THE LIGHT FADES:

TERMINAL LUCIDITY AND OTHER END-OF-LIFE EXPERIENCES

by Dr Noreen Chan
Head & Senior Consultant, Division of Palliative Care,
National University Cancer Institute, Singapore

My friend's grandmother recently died at the venerable age of 94, after years of dementia that had relentlessly and gradually robbed her of her lucidity and personality, until she was barely able to communicate any more. Finally, she was admitted to hospital with a pneumonia that was so serious, the doctors warned her family to be prepared for the worst.

But she did not die as expected, not yet anyway. Not only did her condition stabilise over the next two weeks, she also started to speak again. She started asking for, and having coherent conversations with, friends and family, amazing everyone who had not heard her utter a sentence for years. She even told my friend who had a holiday trip coming up, that no matter what happened, she should not cancel. Eventually, the old lady asked to go home, and after a few days, she passed on peacefully.

What my friend experienced with her grandmother is "Terminal Lucidity", which describes a phenomenon in which a dying person who has been unresponsive and uncommunicative, suddenly becomes alert and clear-headed. Relatives may think this is some sort of miraculous recovery, only to find that the person soon lapses back into a stuporific state before dying. Also known as "end-of-life rally", "bounce back" or in 回光返照 ,in Chinese, this phase may last from minutes to days.

A FLARING OF A FADING LIGHT

Biologist Michael Nahm is credited with coining the term in 2009 to describe this temporary return of clarity and vitality, which could be observed in the days or even hours before death. He and his co-workers published a case series in the Archives of Gerontology and Geriatrics (2012): most of the patients that Nahm and his team observed had severe neurological conditions like advanced dementia or Parkinson's Disease, but terminal lucidity has been observed in many different patient types. There are various explanations offered, but the truth is, no one really knows why this happens.

The authors wrote that "increased awareness of unusual end-of-life experiences could help physicians, caregivers, and bereaved family members be prepared for encountering such experiences, and help those individuals cope with them." I wonder if these experiences are really that unusual: they could be more common than we think, but no one talks about them. I do agree though, that awareness of such occurrences could help us walk families through the experience of accompanying the dying person on that final journey.

A LAST GOODBYE

Not everyone goes through this terminal lucidity phase, but when it does occur, it may have profound meaning and impact on the family. For some like my friend, and as described in this article https://www.nytimes.com/2017/07/11/well/live/the-gentler-symptoms-of-dying.html, it can be a precious opportunity for meaningful time with a loved one, a brief return of a cherished relationship, a "last hurrah" before the fading of the light.

Others believe that the dying person wants to convey "last words", and feel obliged to fulfil any expressed last wishes. When those last words are not uttered or not coherent, or those last wishes are not able to be fulfilled, uncertainty, regret, and possibly a more difficult bereavement may be experienced. A few of my patients were still wracked with guilt that they could not do what their dying relative had asked, for example sending a parent back to hospital when he/she had wished to die at home. And now, facing their own end of life, these unresolved issues added to their inner turmoil.

> Death is not extinguishing the light; it is only putting out the lamp because the dawn has come.
>
> — Rabindranath Tagore

My maternal grandmother had her brief rally, when, on what would be her final night on earth, she suddenly requested for "kopi" (coffee) after not eating nor drinking for days. My mother made us brew up a fresh batch of sweet black coffee, just the way Mama liked it. She had a tiny sip, fell back into a doze, and died a few hours later.

The whole family had known Mama was dying, not only because she was a frail nonagenarian with cancer, but also because the week before, during a rare wakeful moment, she had announced to us that Connie had come to visit. Connie was a childhood friend of my mother who had died decades ago! And any traditional Peranakan knew that when a dying person started to see and talk about the departed as if they were present, the time left would be very short. Soon, that person would "cross over", or in our patois "jadi orang halus." Ah, the many euphemisms we have for death and dying, but that is another article for another day.

A UNIVERSAL PHENOMENON AND ALSO A UNIQUELY PERSONAL EXPERIENCE

I had grown up hearing stories from my grandmother about her younger days in Melaka, when she was keeping vigil for her dying mother-in-law in the hospital. My great-grandmother kept talking about long-dead relatives and friends, which frightened many people, including her own daughter who refused to accompany her, saying she was afraid of ghosts. So my Mama, her dutiful daughter-in-law, had to do it. I remember asking Mama if she was scared, and she replied in her very pragmatic way, that if the old lady was not frightened, then she had no need to be either. And anyway, the "melekat-melekat" (ancestors) were just coming to visit, why would they want to cause any problems for their own family members?

It made perfect sense the way Mama explained it, and emboldened me to ask if Ah Kong (her late husband) ever visited her. My grandfather was taken away by the Japanese after the fall of Singapore in 1942, and like hundreds of young men rounded up during the Sook Ching, he was never seen again. Mama replied in a matter of fact way, yes he did, from time to time. I was flabbergasted. "How do you know?". "I just know".

Over the years there have been hundreds of books about understanding and preparing for dying and death, from a wide range of perspectives. In the 1990's, Sogyal Rinpoche's "The Tibetan Book of Living and Dying" – which I found esoteric and rather heavy-going - was a massive bestseller. More recently, Dr BJ Miller and Shoshana Berger's "The Beginner's Guide To The End" offers a practical 21st century approach. The huge diversity underscores the reality that death may be a universal phenomenon, but the experience is unique to each person, family and community. And dying is not merely a biological phenomenon, but has been and always will be, a social, psycho-emotional and spiritual one. So even as we seek to understand terminal lucidity and other phenomena that occur around death, my sense is that the answers will not be found only in the realms of science, but also in the fields of philosophy, sociology and spirituality. Or there may be no clear answers at all. For those patients and family members who are "thinkers" and "do-ers", who wish for a roadmap to guide the way forward in their dying journey, this kind of uncertainty can be deeply unsettling.

There will be experiences which are undeniably real, but which remain a mystery. That is not a bad thing, because it keeps us humble, and keeps us curious. We will each ask our own questions, seek our own meaning, and find the answers which make the most sense to us.

The House of Belonging

I awoke
this morning
in the gold light
turning this way
and that

thinking for
a moment
it was one
day
like any other.

But
the veil had gone
from my
darkened heart
and
I thought

it must have been the quiet
candlelight
that filled my room,

it must have been
the first
easy rhythm
with which I breathed
myself to sleep,

it must have been
the prayer I said
speaking to the otherness
of the night.

And
I thought
this is the good day
you could
meet your love,

this is the black day
someone close
to you could die.

This is the day
you realize
how easily the thread
is broken
between this world
and the next

and I found myself
sitting up
in the quiet pathway
of light,
the tawny
close-grained cedar
burning round
me like fire
and all the angels of this housely
heaven ascending
through the first
roof of light
the sun has made.

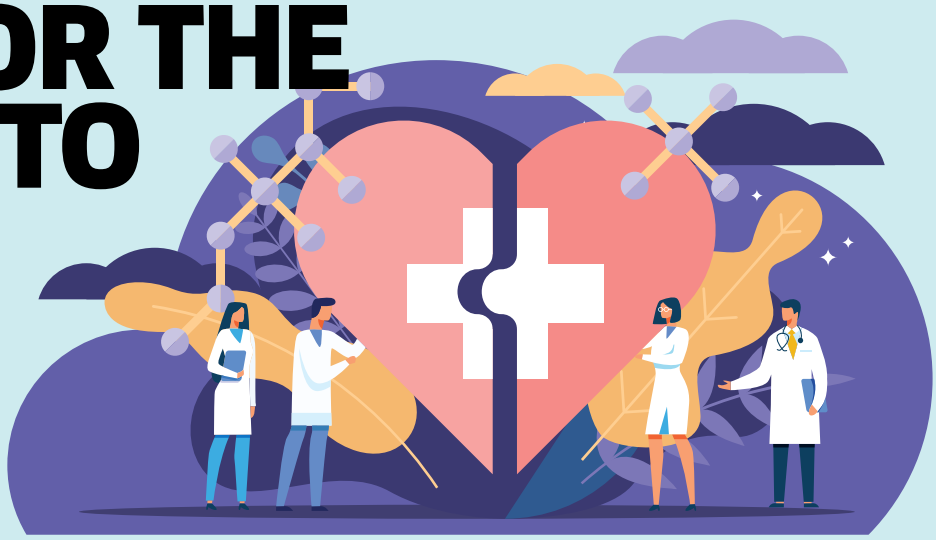
This is the bright home
in which I live,
this is where
I ask
my friends
to come,
this is where I want
to love all the things
it has taken me so long
to learn to love.

This is the temple
of my adult aloneness
and I belong
to that aloneness
as I belong to my life.

There is no house
like the house of belonging.

- David Whyte

HEALTHCARE IMPROVEMENT AND HEALTHCARE ETHICS: TIME FOR THE TWAIN TO MEET



by Vikki Entwistle
Professor of Biomedical Ethics,
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Alan Cribb
Professor of Bioethics and Education,
King's College London

Polly Mitchell
Research Fellow in Bioethics and Public Policy,
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Good healthcare is, by definition, of at least some positive value. But there are many things we could consider before judging any particular examples of healthcare to be good, and not all practical efforts to improve healthcare are entirely positive: they can, for example, cause harm, waste resources and treat some people unfairly.

In this article, we outline the need to develop work on the ethics of healthcare improvement, focusing especially on the more formalised quality improvement (QI) approaches. We start by considering the different emphases that QI and healthcare ethics bring to the idea of 'good' healthcare. We look particularly at the value that insights from healthcare ethics can add by emphasising that healthcare quality is not fully or simply a measurable property. And, we note a few key questions that an ethics of healthcare improvement could usefully address. We suggest that both the healthcare improvement and healthcare ethics fields might benefit from more cross-field working.

GOOD HEALTHCARE: WHAT QI EMPHASISES

Within the broad field of healthcare improvement, QI is well established as a professional or quasi-professional activity: health service staff, often with designated QI roles, sometimes working with academic and patient/community collaborators, employ a set of QI tools, techniques and methodological standards that have now been refined by decades of research and development. QI projects involve intervening in carefully designed ways to improve specific and measurable aspects of healthcare quality – typically but not exclusively related to healthcare safety, effectiveness and cost-effectiveness.

The technical-methodological commitments of QI mean that the kinds of healthcare 'good' it focuses on and pursues are 'measurable properties' of healthcare that project teams and sponsors deem to be indicators of (aspects of) quality. Progress towards better healthcare is judged by assessment of the changes in these measurable properties – for example reductions in the number of central line infections among patients in oncology services, increases in the proportion of people with diabetes who have blood pressure and blood glucose levels within target ranges, reductions in the prescription of brand name medicines for a condition for which cheaper generic equivalent medicines are available, or increases in the proportion of service users who indicate on questionnaires that their healthcare team involved them in decisions about their treatment.

QI approaches have several important merits. They reflect values of clarity, transparency and empirical testability. Projects that conform to QI ideals are likely to be taken seriously and gain practical policy support in contexts where a strong emphasis is placed on the kinds of quantitative evidence that they are able to generate. But as we noted in the introduction, QI projects are not necessarily entirely positive. And because some of the problems they can generate will not be evident within their own frames of reference, perspectives associated with the field of healthcare ethics can be useful to illuminate and help address them.

GOOD HEALTHCARE: A BROADER VIEW FROM HEALTHCARE ETHICS

Healthcare ethics is a wide-ranging field of inquiry. A relatively small but diverse group of healthcare professionals and academics engage in it professionally, and many more people from all walks of life engage in it at least occasionally as they consider and critically discuss what is good, right and justified (or not) in healthcare – what should or ought to be done, and why?

Ethical analyses and debates about QI specifically and healthcare improvement more generally can examine many ideas about what might be considered good in healthcare, and they do not normally approach the question of what is good through the lens of measurement. Within healthcare ethics, claims that one form of healthcare is better than another can reflect qualitative evaluative comparisons, and the rigour of these claims can be debated and tested in conversations that include consideration of uncertainty and disagreement about what particular health services are for, about what kinds of good have been achieved and how, and about which features and experiences of healthcare should be prioritised and why.

Relatively little work in healthcare ethics to date has focused explicitly on the ethics of QI or of healthcare improvement more broadly. There have been discussions about the ethical governance of QI (about whether and how QI projects should be regulated in a similar way to health-related research projects) but these have tended to rely on a QI kind of framing and to be rather limited in scope, envisaging a weighing up of the intended and likely improvements in the selected measurable properties of healthcare against any risks of physical or psychological harm that people might need to be protected from. But ethics encompasses much more than this, and is much more than what ethical review boards or ethics committees do when they decide whether or not a highly contested procedure, a research project, or even a QI project should go ahead, especially if their decisions are constrained by particular criteria.

The agenda for an ethics of QI could usefully include questions such as:

- Whose perspectives and which values are built into the design of particular QI interventions, and whose perspectives and which values might have been obscured?
- What assumptions about what matters are reflected (or not) in the ways widely endorsed quality concepts are operationalised into measurable properties of healthcare? How adequately do the measures used to assess an aspect of quality (e.g. safety or effectiveness) capture what different people consider important for that aspect of quality?
- What else that people can reasonably consider important for good healthcare is affected, either positively or negatively, by QI interventions and/or associated measurement activities?
- What challenges do QI activities pose for people working on them and for people whose healthcare work or experiences as patients, family members or communities are, or may be, affected by them?

Some of these questions are perhaps more likely to be raised and attended to in relation to aspects of healthcare quality that are more readily recognised as contested, such as patient- or person-centredness and equity. In the case of patient- or person-centredness there is a growing concern that QI approaches could end up undermining the promotion of intended benefits because neither the kind of interventions that are assessed nor the measures of patient experience used to evaluate them (if they are different) reflect anything like the scope and complexity of what can matter for patient- or person-centredness. However, it is important to remember that all aspects of quality are ethically complex and even established measures of effectiveness have involved value-laden decisions in their development. Ideas about effectiveness that remain possible even if they are rarely considered include notions that treat it as a function of what matters to individual patients. More individualised assessments of effectiveness could perhaps enhance the responsiveness or sensitivity of judgements of good healthcare, but they would also be less practicable for comparisons of services and for overall evaluations of interventions.

This tension leads us to suggest that another key but rather neglected question that an ethics of QI could usefully address is:

- How should we strike a balance in healthcare improvement work between approaches that treat quality as a measurable property and approaches that treat it as an evaluative judgement?

POTENTIAL BENEFITS OF CROSS-FIELD WORKING AND LEARNING

Although QI and healthcare ethics are both concerned with 'good' healthcare, the people who work on them typically do so in separate groups. The different emphases within their approaches to good healthcare are likely to pose some challenges to collaborative working, but there is scope for both fields to benefit from closer engagement. The field of healthcare ethics could arguably be expanded and enriched by closer engagement with the practical realities and ethical challenges of QI and healthcare improvement, and there is significant scope for healthcare improvement work to engage more explicitly with its normative assumptions and potential downsides.

This piece is based on work funded by the Wellcome Trust (209811) and published in the *Journal of Medical Ethics:* Cribb A, Entwistle V, Mitchell M. What does 'quality' add? Towards an ethics of healthcare improvement. J Med Ethics, 2020; 46: 118-122.

As a Lokun volunteer surveys the locals through our door-to-door Health Needs Assessment (HNA), she looks out for areas to opportunistically educate them on the spot. This volunteer has been supporting the project for 5 trips now, seen here speaking to a villager with a pamphlet.

PROJECT LOKUN: MEDICAL STUDENTS WITH A HEART FOR CAMBODIA

by Tricia Koh and Kalista Wan
Phase II Medical Students and Project Directors

Lokun doctors and students serving the villages at Lokun clinics.

Established in 2006, Project Lokun is a biannual medical humanitarian project to Pursat Province, Cambodia, jointly organised by students from the NUS Yong Loo Lin School of Medicine and University of Puthisastra (Phnom Penh). In December 2019, Project Lokun embarked on our 26th trip, affectionately known to us as L26. With each trip, the volunteers aim to embody their mission statement to Cultivate, Connect and Care, as they cultivate the importance of health and disease management through education, connect the villages back to their own local healthcare system and care for the villagers by providing primary healthcare services in the short term.

The Lokun committee and our volunteers comprising NUS Medicine students, doctors and physiotherapists, with smiles all round on the last day of Lokun clinics.

Village clinics are key to our efforts in providing the villagers in Pursat with free, accessible healthcare. This is further supplemented by our referrals system which links villagers back to their local healthcare system. In the recently concluded L26, Project Lokun worked with three Singaporean doctors, a Cambodian nurse and two Malaysian physiotherapists to conduct free clinics.

One new initiative implemented with the clinics was the inclusion of physiotherapists. After analysing the data collected from previous trips, the team observed that musculoskeletal (MSK) problems made up a large proportion of the cases seen at Lokun Clinics. Previously, only symptomatic treatment was provided through the prescription of certain drugs or creams by our doctors. In L26, our Clinics Committee decided to expand the services provided at Lokun Clinics and recruited physiotherapists who could provide a more personalised and interactive approach for these patients with MSK problems. Over the four days, Lokun Clinics served 309 villagers across four villages in Pursat Province: Prey Omal, Takeo, Toul Makak and Kampong Luong.

The other arm of Project Lokun's outreach is Education, targeted at primary schools and adult learning. In L26, we reached out to 840 primary school students across the four villages we served. Carefully developed and refined over the years based on feedback and data gathered, our health education syllabus were designed to meet the needs of primary school students. Some of the topics covered include body hygiene, water sanitation and puberty. Our lessons are made more engaging with the use of flipcharts, worksheets and various hands-on activities.

During this trip, Project Lokun arranged a meeting with an official from the Pursat Department of Education Youth and Sport. We were able to gain more insight into their teaching pedagogies and exchanged teaching resources. We also received valuable feedback on our education syllabus and materials. Moving ahead, we aim to fine-tune our curriculum with reference to their official education materials and feedback gathered, as well as explore further collaboration to improve our content and methods of education.

L26 was a trip where we saw great strides taken forward by our three new Departments: Health Needs Assessment (HNA), Supply, and Partnerships.

The HNA department designs and runs the door-to-door survey Project Lokun conducts every trip. Having concluded our general health HNA the past trips, we piloted our HNA survey on tuberculosis, focused on the health-seeking behaviour and knowledge of villagers relating to this major disease in Cambodia. In the process of drafting a survey, we came under the mentorship of experienced doctors and learnt so much about navigating the intricacies linked to producing a good survey that would allow us to collect meaningful data.

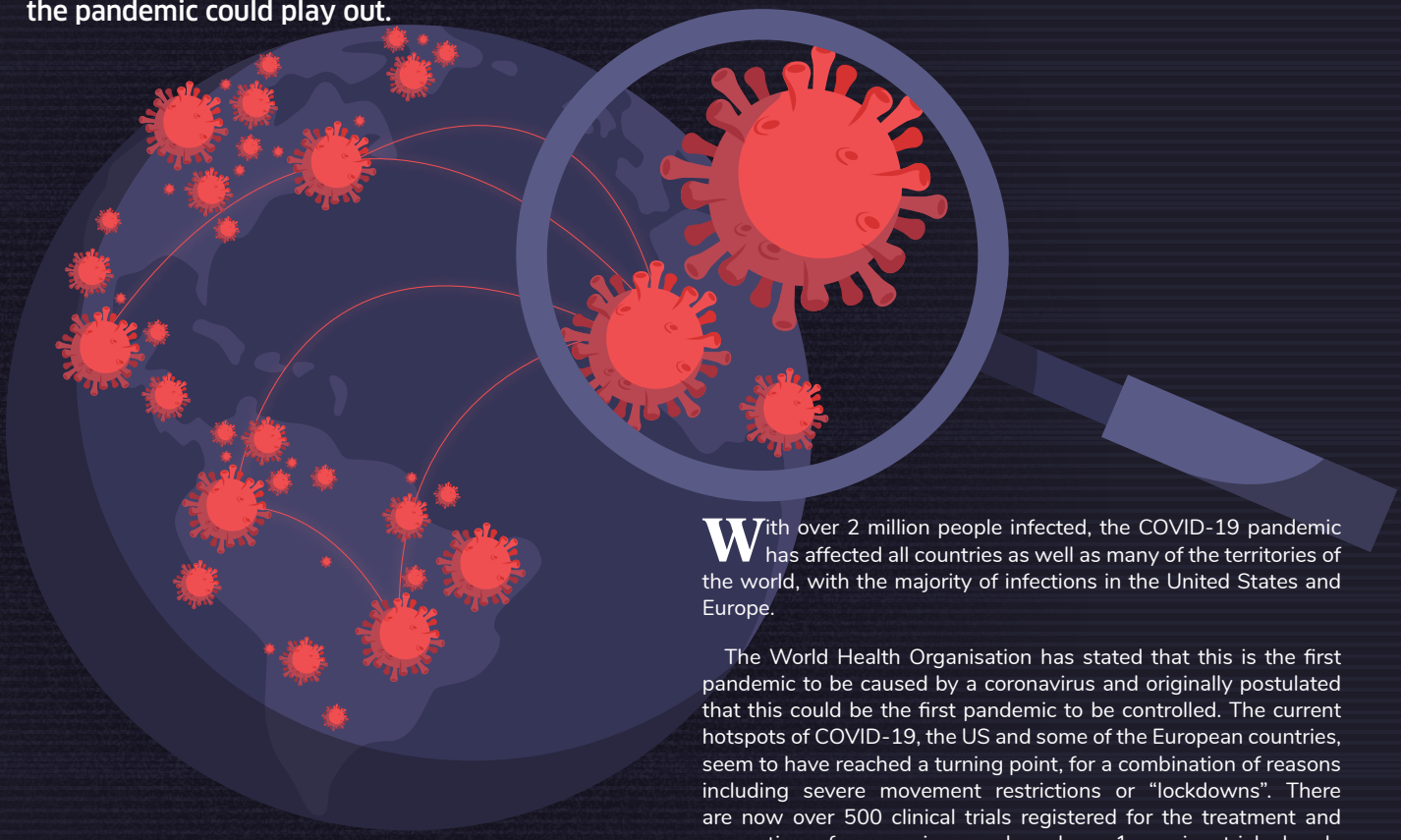
The Supply and Partnerships Departments are responsible for working with local partners such as hospitals, pharmacies and NGOs. Working with local players help us understand the current healthcare landscape so that our initiatives complement and are more applicable to the local context. By conducting Health Facilities Assessments (HFA) at the various health facilities around the region and meeting with the various local healthcare stakeholders, we had a better sense of the local environment and established meaningful collaborative relationships at the same time. We believe in partnering with the local stakeholders and are excited to see fruitful partnerships materialise in the trips ahead!

As Project Lokun continues to establish itself in Cambodia, we place paramount importance on developing and nurturing our relationship with our Cambodian university partner, the University of Puthisastra (UP). We are working more closely and in tandem with the Lokun Cambodian Wing (LCW) than before—not only as co-planners and executors of Lokun, but also as treasured friends who have faced difficulties and challenges together. As we advance trip-by-trip, it is our hope to have our Cambodian counterparts take on more and grow into their own, so that we can truly achieve our project goal of becoming sustainable.

Lokun Heads from both the Singapore and Cambodian Wing showing our appreciation for our doctors who came to serve.

WAYS IN WHICH COVID-19 PANDEMIC COULD UNFOLD

As the COVID-19 rages on globally, ***Asst Prof Jyoti Somani*** and ***Professor Paul Ananth Tambyah*** look at how the pandemic could play out.



With over 2 million people infected, the COVID-19 pandemic has affected all countries as well as many of the territories of the world, with the majority of infections in the United States and Europe.

The World Health Organisation has stated that this is the first pandemic to be caused by a coronavirus and originally postulated that this could be the first pandemic to be controlled. The current hotspots of COVID-19, the US and some of the European countries, seem to have reached a turning point, for a combination of reasons including severe movement restrictions or "lockdowns". There are now over 500 clinical trials registered for the treatment and prevention of coronavirus, and a phase 1 vaccine trial already underway, though no drugs or vaccines are currently licensed for this infection. With the high caseloads in recent weeks, there have been concerns about intensive care resources as well as personal protective equipment for healthcare workers and other first responders, particularly in Italy and the US. Innovative approaches to production and manufacturing, reduced demand from China as well as a "flattening of the curve" in various countries, have alleviated these concerns somewhat.

If the disease does indeed plateau in Europe and North America, it would be important at this point to look at India, Bangladesh and the countries of Africa. The extent of COVID-19 disease in these densely populated countries can be determined through large sentinel surveys using existing systems such as influenza-like illness surveillance or even better, through large scale serological studies. This will answer the question whether the tropics will sustain transmission through the northern summer or if the warmer weather will limit the spread to pockets where people are living in close quarters, such as in slums and refugee camps.

TWO TRAJECTORIES THE GLOBAL SPREAD COULD TAKE

Like SARS, the vast majority of patients with COVID-19 will experience a mild illness. A small proportion, about one in 10, will require intensive care, and some may not survive.

Like SARS, the vast majority of patients with COVID-19 will experience a mild illness. A small proportion, about one in 10, will require intensive care, and some may not survive. While China and the US Centers for Disease Control and Prevention have reported that nearly half do not survive being critically ill and on a respirator, this may be more reflective of an older, sicker population or later access to healthcare. Other countries, including Korea, Germany and Singapore have so far, had a higher percentage of patients who survive critical care mainly due to younger populations being infected.

Scientists are speculating what proportion of the population will get infected with SARS-COV-2. For influenza A H1N1 in 2009, we know that figure was around a quarter of the population after the first wave of infection. We also know that COVID-19 is more severe than influenza so the impact on healthcare systems, especially in low and middle-income countries can be significant if such large proportions of the population are infected. Unfortunately these middle and low income countries do not have widespread infrastructure for ICU beds and ventilators, but they do tend to have generally younger populations which are known to be less susceptible to more serious illness.

With SARS, testing only became available weeks after the outbreak began, meaning that many mild cases early on were missed, inflating the fatality rate. We are only just seeing the rollout of rapid PCR-based diagnostic tests worldwide and even the introduction of serological based tests. After a slow start, the United States has now tested more than 1% of its population, a higher proportion than Singapore or Korea, which previously led the way in testing. Once the rest of the world catches up, and once there is widespread serological testing, the overall case fatality rate will likely be around 1-2%.

The other big difference between SARS and COVID-19, especially in countries previously affected by SARS, is the high degree of healthcare worker protection, which may mean lower rates of infections in medical professionals working on the frontlines. As this virus is most infectious at the onset of symptoms, it is possible that many healthcare workers are actually infected outside of work. There has been a report from Changi General Hospital in Singapore showing that even during an intubation procedure on a critically ill patient, healthcare workers were not infected despite many wearing only surgical masks. Without detailed molecular epidemiologic analysis (i.e. RNA fingerprinting), it is not certain where the infected healthcare workers are getting exposed. Tragically, many older healthcare workers and a few younger ones have died from COVID-19.

It is important to keep in mind that the extent of the global outbreak in the following months will depend on many key factors that can be shaped.

There are two possible scenarios we foresee going forward, but it is important to keep in mind that the extent of the global outbreak in the following months will depend on many key factors that can be shaped: these include public health responses, developments in rapid testing, effectiveness of widely adopted lockdowns and physical distancing measures, demonstration of effective treatments and potentially the roll-out of a vaccine.

In the first scenario, the epidemic slows down in the northern hemisphere as it starts to warm up. Even now, the countries with high chains of transmission are those where the temperature remains in the 10 to 20 degrees Celsius range and below—the United States, Europe (Italy, France, Spain, UK), Iran and Turkey.

While many tropical countries have had some cases, there has not been widespread community transmission so far in most, perhaps because the higher humidity and warmer weather may be preventing rampant spread, as the virus cannot survive so long in the environment and on inanimate objects in warmer temperatures. There will still be clusters of spread within close contacts and super spreading events which have not been fully explained thus far.

While the virus might disappear altogether in the northern summer like SARS, there is also the risk that, similar to the influenza pandemics of 1918, 1957 and 1968, the COVID-19 outbreak may slow down during the northern hemisphere summer season, but return in a second wave in October or November when it gets cold again.

The second possible scenario is that the COVID-19 disease may turn out not to be sensitive to temperatures, in which case, the spread of infection will continue worldwide for months, at least until herd immunity develops in communities. The strategy of “flattening the curve” is aimed at preventing healthcare systems from being overwhelmed and has underpinned many severe lockdowns and implementation of social distancing in most countries. While this may indeed achieve the desired outcome, importantly, the overall number of COVID cases will likely not decrease. Rather, it is just that they are spread out over time. The ideal is that a vaccine is developed sooner rather than later, so that the overall number can really drop, or that effective treatments are identified so the community cases can drop below a level needed to sustain transmission.

These lockdowns are hard to sustain and there is always the fear that there will be a resurgence of infections if they are terminated prematurely. A concern about full shutdowns has been that herd immunity does not easily develop. One epidemiologist has suggested a strategy of serial lockdowns to allow for the development of herd immunity. Thus, even after the lock down lifts, the contract tracing, isolation of cases and close contacts, and aggressive testing must continue. Regardless, the “exit strategy” has to be based on solid scientific understanding of the extent of the disease in the population as well as the potential sites for super spreading events which can be targeted for enhanced surveillance.

THREE SCENARIOS FOR LARGE OUTBREAKS

The spread of SARS-COV-2 virus remains foremost droplet and contact (direct or through objects). Singing has been speculated to disseminate droplets, which carry the infection. With careful contact tracing and quarantining, along with close surveillance and testing, Singapore has been able to clearly show the typical pattern of spread. There is pre-symptomatic and symptomatic transmission, including some unusual situations where the contact was only through the same seat in a church, which highlights the gaps in our understanding of the transmission of this virus.

While the vast majority of patients with COVID-19 do not spread the infection at all and some spread the infection to only a couple of family members, there are some unique situations that have resulted in much more extensive spread – these have been dubbed "super spreading events".

One of the first super-spreading events was the Diamond Princess cruise ship that remained off the coast of Japan for 14 days. Eventually, a total of 712 persons were infected out of 3,711 persons on board, as well as some public health officers.

Cruise ships are already well known for outbreaks of other highly infectious pathogens including the norovirus (known locally as "stomach flu") and influenza for a variety of reasons. These include the close quarters in which passengers and crews find themselves, the risk of environmental contamination and generally older populations. Since the Diamond Princess cruise ship event in Japan, there have been a number of other instances, including the Grand Princess in California, the Ruby Princess in Australia and most recently the Grand Mortimer, a cruise ship that was headed to Antarctica. The latter had a 60 per cent rate of secondary infections. On this last cruise, the virus was likely brought on by passengers. Thus far, Antarctica remains free of SARS-COV-2!

In Singapore, Saudi Arabia, Bahrain, and the UAE, among other places, there are clusters of infection that are occurring in **dormitories of foreign workers**. This is not unexpected, as these are settings where 8 to 20 workers are housed in close contact. Unfortunately, once these dormitories are quarantined, the virus is likely to spread rapidly within the confined space similar to what happened on cruise ships. Widespread testing of all workers, and separating all workers while treating those who are positive may help to diminish ongoing transmission.

Prisons and detention centres are another area where there has been unintended and rapid spread of COVID-19 abroad, and it would be prudent to be monitoring these sites closely here in Singapore and elsewhere.

Second, **large gatherings** where people gather, sing or share food, can potentially lend themselves to huge outbreaks should there be someone shedding large quantities of virus.

The huge and rapid outbreak in South Korea among members of a religious group, which had more than 200,000 members, accounted for more than half of the over 7,000 cases of COVID-19 infections in the country.

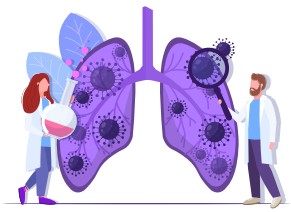
Third, a large outbreak could happen in **communities where there are big numbers of people susceptible to the virus**. The nightmare scenario for public health is the COVID-19 outbreak at nursing homes, such as the one in Seattle, Washington. The home became the early epicentre of the outbreak in the US with high rates of COVID-19 related deaths. Nursing homes have elderly patients with many comorbid conditions. Many live in close quarters with common staff and caretakers, who can bring the virus with them to work.

Thus, there is always a risk of healthcare-acquired infections which can spread rapidly, including influenza and other respiratory viruses, norovirus and other gastrointestinal illnesses. The COVID-19 outbreak has led to new screening, visiting and other precautionary measures in many nursing homes and assisted-living facilities world-wide. The fear remains that if such incidents occur in other long-term care facilities across the world, the toll on elderly or disabled people from COVID-19 will be significant.

FOCUS ON MEDICAL DEVELOPMENTS, RELOOKING LARGE GATHERINGS AND ENCOURAGING TESTING

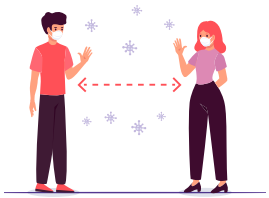
Three areas of focus lie ahead in the fight against COVID-19.

First, scientists are already working on treatments. There are studies now enrolling patients (with some well underway in Singapore) to see if any of the known and newer anti-viral drugs will be effective. There are also plans to conduct trials of preventive drugs among at-risk populations in Singapore too.



In addition, newer and more effective tests are being developed, including blood tests that can tell whether a person has already been infected, such as the one used by Duke-NUS to establish the link between the two church clusters in Singapore. Studies conducted at the National Centre for Infectious Diseases (NCID) and also in China show that serology does not usually become positive until at least two weeks after the onset of illness, so these tests cannot be used for the acute diagnosis of illness. However, they will be able to be used to identify an immune population who could be approached for obtaining plasma that may contain protective antibodies. Giving convalescent plasma with high levels of antibodies from recovered patients to sick patients with COVID-19 is currently one of the treatment approaches being planned by the NCID here in Singapore.

Second, the need to cancel large gatherings and the impact of social distancing can be better examined once more reliable testing on a population basis can be done.



Third, while countries focus on containing the virus, the key is still in identifying every case. In addition to broadening testing, providing free treatment or compensation for those on medical leave is critical to encourage people to get tested and treated, to ensure that they will not be penalised by their employers, or be deterred by the thought of potential financial difficulties.

This is especially challenging in low-income countries and low-income households with sole bread-winners.

Difficult decisions will have to be made while we wait for the scientific consensus as well as the development of new treatments and vaccines.

Public health authorities must decide when to move from containment, which requires doing costly and labour-intensive contact tracing for every case, to mitigation, where we focus on those who are most vulnerable to prevent complications while keeping track of the situation in the broader community.

With the concerted global effort of clinicians, scientists, public health professionals and the public, there is a good chance we will succeed in limiting the suffering and deaths from COVID-19.

Assistant Professor Jyoti Somani (*right*) and Professor Paul Ananth Tambyah (*left*) are from the Department of Medicine. Prof Tambyah is also President of the Asia Pacific Society of Clinical Microbiology and Infection.

NUS YONG LOO LIN SCHOOL OF MEDICINE,
NATIONAL UNIVERSITY HEALTH SYSTEM,
GLOBAL OUTBREAK ALERT AND RESPONSE NETWORK
PRESENT

COVID-19
UPDATES FROM SINGAPORE

This is a global crisis that requires a global response.

Fight, Unite, Ignite.

Dr Tedros Adhanom Ghebreyesus,
Director-General of the World Health Organization

The COVID-19 pandemic is savaging global populations and economies. More than ever, clinicians, scientists and planners need to come together to share and exchange best practices, ideas and experiences that will help to improve treatment and advance the search for and development of a vaccine. Join Professor Dale Fisher and Dr David M. Allen of the NUS Yong Loo Lin School of Medicine as they host a weekly webinar series featuring infectious disease and other experts from around the world.

HOSTS

PROFESSOR DALE FISHER
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Ask the Expert: KEY COVID-19 CONCERNS

As the COVID-19 epidemic continues to move world headlines and restrict global travel, trained virologist *Dr Khor Ing Wei*, Dean's Office, takes stock with *Professor Paul Tambyah*, Infectious Diseases Division at NUS Medicine, Senior Consultant in Infectious Disease at NUH and Head of the Infectious Disease Research Coordinating Office, on what we do and do not know about the novel coronavirus and a few common concerns and fears.

How is the virus transmitted from person to person? For example, can someone get infected just by standing next to a person who is infected with SARS-CoV-2, the virus that causes COVID-19, or would the infected person have to sneeze or cough or come into contact?

Right now, we do not know. It probably depends on what the person touches. For example, the worldwide spread of the SARS virus was triggered off by a single individual at the Metropole hotel in Hong Kong who is not recorded as having come into contact with any of the individuals who went on to become the index cases for outbreaks in Singapore, Taiwan, Canada and Hong Kong. There is no documentation of him sneezing or coughing near any of those people. The current theory is that it was simply from contact with the lift buttons.

Can the virus survive for days to a week on surfaces such as plastic, metal and wood? So, if someone infected with SARS-CoV-2 touches a treadmill and I come along and touch it sometime (even days) later and rub my eyes or mouth, can I get infected?

Again, based on the data from the Metropole hotel during SARS and emerging data from the Diamond Princess cruise ship, it is indeed possible that someone can be infected sometime after coming into contact with a contaminated surface. The good news for hot and humid settings is that for most coronaviruses, they do not survive long in conditions of high temperature or humidity. We do not know if that is also true for SARS-CoV-2, but it seems likely.

Are healthcare workers more likely to be a source of infection, both via contact and close proximity? Some people are avoiding healthcare workers on public transport and some taxi drivers are refusing to pick up healthcare workers.

This is another difficult question to answer. During SARS, healthcare workers who were working while ill were the source of infection for a number of patients. COVID-19 is different from SARS in that it seems to be spreading more efficiently in the community in Singapore rather than in healthcare facilities. As such, at the moment, the risk of transmission from healthcare workers appears to be lower than, for example, from office workers.

How is COVID-19 different from the normal cold and flu? Is it more deadly than the flu, or does it mainly kill the elderly and immunocompromised people?

It is far too early to determine how deadly this infection is. The overall mortality outside China seems to be much higher than the seasonal flu or even the deadly pandemic of 1918-19. It is true that the flu kills mainly the elderly and immunocompromised while COVID-19 has killed young and previously healthy doctors, among others.

In fatal COVID-19 cases, what actually kills patients?

There are very few autopsy reports of COVID-19. A report published in the Lancet showed extensive damage in the lungs, with evidence of acute respiratory distress syndrome. There were signs of both direct damage from the virus and an overwhelming immune response, with many cells in both the airways and in the surrounding tissues.

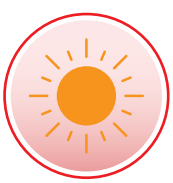
What are the most effective steps we can take to protect ourselves? In addition to hand washing, does the use of hand sanitiser help or is it not very useful?

Maintaining good hand hygiene is always a good idea. This is even more crucial in low-income countries, as described in this article: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5781206/.

Hand sanitiser is very helpful in situations where we cannot get to a tap such as outside a lift or in a train station. Use of hand sanitisers have been shown to markedly improve hand hygiene compliance in healthcare settings so I think that overall they are a good thing.

More importantly, we need to identify every case and ensure that sickly individuals are isolated and treated appropriately. That way, the chains of transmission can be broken.

Is this virus killed by warmer temperatures, meaning that, come summer in the northern hemisphere, the epidemic will die down?



That is what I think and hope. As mentioned, there are no data yet for this virus but this appears to be the case for its close cousin, the SARS coronavirus, as well as for seasonal influenza.

All information stated in the article is correct at time of printing. The information contained herein may change subject to changes in prevailing medical guidelines.

DISPATCH FROM THE FRONT

by Dr Chua Ying Xian and Dr Lawrence Lam Teck Meng
Family Physicians, NUHS

Alumnus Dr Chua Ying Xian, who graduated in 2010, and Dr Lawrence Lam are family physicians at the National University Polyclinics. They share a glimpse into their work day in what—at least for the immediate future—is the new normal.

Photo credit: National University Polyclinics

Dr Chua Ying Xian examining a patient with flu symptoms in the fever zone

Dr Chua checking on his patient after the swab is done

NOT YOUR SUPERHERO

> "This is the fight of our lives. We are going to win. Whatever it takes."

Steve Rogers, or better known as Captain America, said this to the Avengers before they had the exigent yet perilous task of retrieving the Infinity Stones in their bid to reverse the catastrophe. That battle cry was what kept the team going, and can we say the same for the current Covid-19 pandemic?

The outbreak's focus, which had shifted from China to Europe, had claimed more than 50,000 lives with more than a million infected at the time of writing, with countries shutting off their borders frantically from mid-March in a desperate effort to put a brake on the contagion. Physicians around the world had started to share harrowing experiences in various media, from being overwhelmed by the sheer volume of patients streaming in the already overloaded healthcare facilities, to being ostracised by members of the public. People are looking for reliable information and physician leaders want accurate and actionable messages to reach the public.

As a frontline family physician, it has never been more daunting to deliver care for my patients during this pandemic. Through sweat-soaked clothes and personal protective gear, my team of frontline healthcare providers worked tirelessly to differentiate the higher-risk patients from those who had a relatively minor non-COVID-19 infection. From pre-triage screening workflows to appropriate segregation of patients, patients are sent to designated zones for their consults.

Dr Chua Ying Xian (left) and Dr Lawrence Lam having a quick lunch (and break) after seeing patients in the morning

Each morning, the team of doctors will huddle for a short discussion, going through countless iterations of revised workflows, updated case definitions and suspect cases' swab results from the day before. About 30% of all clinic attendances are seen by the fever sector during a working week. This will include patients who present with any respiratory symptoms, had declared a significant travel history, and are under stay-home notices or phone surveillance by Ministry of Health officers. This translates to each of us seeing up to eight patients per hour on a busy day. Lunch breaks and continuing medical education sessions are held in separate zones for fever zone family physicians. Each day ends with a chafed face and an exhausted mind. Photos of health-care workers unmasked after each shift started circulating on social media, leaving a lasting and palpable image to all.

To top it all, each patient coming through the door poses its own challenges in a pandemic. A low-grade fever and cough might no longer be just an everyday "common cold". Having studied the symptomatology of patients suffering from the novel coronavirus and with five of them passing through our doors earlier on in the outbreak, accurate identification is indeed not a walk in the park. While a large majority of them presented with fever, not all present with florid respiratory symptoms. Two had initial presentation of lower urinary tract symptoms, and another had clinical and biochemical resemblance to dengue infection, which eventually was diagnosed as a false positive dengue infection.

The work doesn't end when the clinic pulls its shutters down. Each time the phone beeps signifying a new message, I squirmed, glancing at the title of the messages. Local news with updated workflow is being disseminated at breakneck speed. One has hardly time to fully digest information before the next update pops up. And before I know it, it's dawn again, and time to head back to the clinic.

IS IT WHAT IT IS?

I still remember the consultation with our first confirmed case vividly. This patient presented to us with six days of a fever and cough developing, having already been seen at the Emergency department. He tested negative for dengue and was discharged. As the clinic where I am practicing is surrounded by dengue hotspots, and as his fever was persistent, I repeated his blood count. It was strangely still suspicious of dengue. In view of the growing numbers of COVID-19 infection, naturally the patient and his wife were worried about it. As they had no significant travel or sick contact history, we decided to review the patient the next day for reassessment. When he returned, the follow-up blood test showed worsening platelet counts which was consistent with dengue fever. But something was amiss when he said "I am feeling a little more breathless today. Is this part of dengue?"

He had developed an uncommon symptom not quite consistent with dengue. As family physicians, we rely on both our knowledge of outbreak epidemiology along with good history taking and understanding of disease patterns to determine diagnostic probabilities. However, now we were faced with a clinical dilemma as well as onflicting symptoms and laboratory investigations. Dengue fever does not cause cough or shortness of breath usually. Low platelet count was not a common feature of COVID-19 infections either. We knew that we had done what we could in primary care and this patient needed further work-up and investigations.

"Dengue doesn't usually present this way. Let's send you to the hospital for further checks, alright?"

We decided to refer him to the hospital. When we found out the next day about the confirmed COVID-19 diagnosis, we had mixed feelings. Of course, we were worried about getting the infection, as well as all our staff and patients who came in close contact with the him. I texted my wife immediately and asked if she wanted to stay with her parents for a fortnight, just to be on the safe side. Numerous messages of concern from family and friends started pouring in. Irrational doubts crossed through my mind the next couple of days. Did I scratch my face after I saw the patient? Was my mask properly fitted? Why is my throat so itchy? Am I... infected?

The fear is real. The concerns are legitimate.

"PLEASE DON'T COME TOO NEAR ME"

It broke my heart when a patient said that and frantically gestured when I was about to examine him. "I think I am infected; I have been staying with a confirmed patient!" exclaimed the young man. "It is OK. I will still examine you. You are under my care. Don't worry, you can see I am wearing my protective gear." My words somewhat reassured him as he sat gingerly at the edge of the chair. "Thank you for being kind. Everyone at home is avoiding me like a parasite since I started coughing." He replied softly. I can sense the sadness in his voice, and on any other day, I would have given him a gentle reassuring pat on his shoulder. That day, I held back. I knew it is the correct thing to do, to minimise duration and physical contact time, yet a wave of guilt overwhelmed me.

Dr Lawrence Lam (right) and Dr Chua Ying Xian discussing patient cases

"HEY, I AM HAVING A COUGH AND FEVER"

It is the last thing you want to hear when various staff from different departments come over and report sick. In full gear, I examined a few of them, before they posed a very difficult question, "Dr, do you think I might be infected?" These colleagues have been serving and coming into direct contact with the confirmed cases in our clinic. Though most have been attending to the patients in their full protective gear, there's still this fear that they might be infected. I have the very difficult task of treating them, arranging for swabs to be performed and yet extending words of comfort while asking them to continue to observe the necessary precautionary measures. Through these consults, I told myself to remain composed and appear fearless, for the battle isn't just a physical one, but a psychological test as well. The staff needed assurance, and I as a team member, must provide them with that.

AND WE STICK TOGETHER

"What should I do? I just found out my patient was a confirmed case!" On more than one occasion, I received texts from my private General Practitioner (GP) colleagues. Awestruck, I quickly learnt that it was not fear of acquiring the infection, but the immediate concerns they had for the rest of the patients who were within the clinic vicinity of the confirmed case. Discussions on contact tracing, living apart from their family members became dominant topics, while minimizing attending social events become the new normal. Yes, the pandemic has forced many to practice social distancing. But it has also afforded opportunities to communicate best practices, share our struggles, and even talk about what's left of our social life.

AS THE EVENING COMES

I enter the de-gowning room as the clinic sees the last few patients step out. I disinfect my stethoscope, pulse oximeter and discard the soaked PPE. Peering out of the window, I can see the evening glow in the distance. The familiar faint rumbling of the train and people walking in the distant restored some sense of normalcy. Washing my face, checking the pressure marks on my face and nose, I returned to my desk to attend to outstanding emails and work on my lectures, which I am scheduled to give to both post and undergraduate medical students.

"PART OF THE JOURNEY IS THE END"

There's much hype about heroes without capes. I will take a slightly different stand. Superheroes do not fear, we doctors and nurses do. Superheroes do not faint, doctors and nurses do. Superheroes do not weep, doctors and nurses do.

I am not a superhero. I am your primary care doctor. And to my fellow colleagues who stand united and bravely at the frontline – as Tony Stark would put it – part of the journey is the end.

The role of primary care in fighting this pandemic was to triage and identify suspect cases, reassure the public and promote social responsibility to reduce up-trending community transmission. Everyone has a role to play in this fight. We know that this will be a drawn-out war, and we will push on, one patient at a time.

There will be light at the end of the tunnel. But till then, I will be in my gear, ready for the next challenge.

Working together as a team for the well-being of the patients and community

UNITY IN THE FACE OF COVID-19

Since the onset of COVID-19, the National University Health System (NUHS) has turned around all three campuses—Kent Ridge, JurongHealth and Alexandra—as well as the polyclinics, to care for patients with heightened vigilance and infection control measures. Catch a glimpse of what goes on at the frontline and behind the scenes, as healthcare heroes tirelessly lead the fight against COVID-19.

Photo credit: National University Health System (NUHS)

It's business as usual, but with more infection control measures in place. Staff greeting or screening patients at designated stations are required to don protective equipment before starting their shifts, with added security to guide people through spaces.

Medical staff remain focused in their work. Where possible, doctors conduct follow ups and clinical consultations through telemedicine to advise patients remotely.

Here, a nurse takes light snacks to a patient in an isolation room.

Hidden from sight but no less important, Laboratory Medicine teams perform tests for COVID-19 infection.

It's all hands on deck: support staff continue to keep operations running smoothly.

The NUS Yong Loo Lin School of Medicine is a founding institutional member of the National University Health System (NUHS), an academic health system formed in 2008, dedicated to achieving and maintaining excellence in clinical care, research and education. One of three public healthcare clusters in Singapore, NUHS taps on the wealth of resources residing within NUS by drawing upon academic, research and creative capabilities to develop solutions for existing and emerging health and healthcare needs. It works in close collaboration with community hospitals, general practitioners, family medicine clinics, nursing homes and other community partners to provide integrated care to the community.

Thoroughly Infectious: THE COVID-19 CHRONICLES

LAUGHTER IS THE BEST MEDICINE

COVID-19 has been dominating world headlines since the start of 2020. With a deluge of information (and misinformation) about the disease contributing to mounting global fear, public health education about the novel coronavirus is crucial. It prompted the NUS Yong Loo Lin School of Medicine to team up with the Global Outbreak Alert and Response Network at the World Health Organisation (WHO) to calm feverish minds and help sort out fact from fiction.

The treatment plan? A strong, sustained dose of comic strip humour.

SCAN QR CODE TO VIEW VIDEO

More strips online:

- medicine.nus.edu.sg
- @NUSMedicine
- @nusmedicine
- @NUSMedicine
- NUS Yong Loo Lin School of Medicine

A NEW 'INVISIBLE' ENEMY STRIKES

When the virus made its first appearance in December 2019, Singapore braced for impact. A well-connected transport and business hub which is home to more than 5.8 million people cannot but be open to the world. The country saw its first confirmed case of infection on 23 January this year. The long weeks and months since have seen the government introducing a series of precautionary measures aimed at keeping Singaporeans safe while attempting to flatten the epidemiological curve through the promotion of hand and personal hygiene, mitigation of mass crowding and controlling of border movements.

As the tally of confirmed cases grew day by day—a sign that the coronavirus was staking its insidious flag in countries across the globe—instant noodles, toiletries and disinfectants became objects of panic buying, becoming as coveted as hand sanitisers and face masks were in the early days of the outbreak.

Meanwhile, life as we know it has been disrupted and the world has to ride out waves caused by the pandemic.

THE CHALLENGE: EXPLAINING COVID-19

In the face of this unprecedented crisis, clear public health messages are critical to inform, educate and even calm people, not only so that they keep in good health, but so that everyone understands and complies with evolving precautionary health measures aimed at breaking the chain of transmission and preventing new cluster outbreaks in communities, said Professor Chong Yap Seng, Dean of NUS Medicine. "This is a global crisis and because it's a novel coronavirus, there is little precedent for us to build on. I think it is important that people get real facts and evidence from experts and not rely on hearsay."

Given the depth and breadth of experience presented by NUS Medicine's Infectious Diseases clinical faculty (for example, Professors Dale Fisher and Paul Tambyah quickly became go-to experts for journalists in search of expert analysis and comment on the evolving epidemic that became a pandemic), and the increasingly apparent need for simple, clear explanation of important facts and important precautionary health tips, the novel idea for a comic strip was born.

The idea gestated in Prof Chong, after he emerged from a meeting with Health Minister Gan Kim Yong in February, "He suggested that we use infectious disease expert Prof Dale Fisher as a public voice, so that people would get good information that was authoritative. And I thought the best way to portray Dale was in a series of comics, which would have universal appeal."

"We wanted to tap on the experts that we have access to, so they could give accurate, timely advice to the public; and get everybody to act responsibly and correctly. We wanted to reach everybody, most of all lay people, and of course we wanted to reach out to those in the field—the healthcare workers, the researchers—so that they know that we are behind them."

The first COVID-19 Chronicles comic strip was put out on the School's web and social media platforms on 14 February, a mere two days after initial discussions between the Dean and the School Communications team. Published three times a week, the Chronicles steadily gained traction and caught the attention of social media users and various news media organisations. The comic strips soon gained the interest of the Global Outbreak Alert and Response Network (GOARN) of the World Health Organization, which now shares the Chronicles strips with territories and countries that it deems are in need of a simple and appealing way of communicating with the public.

The comic strips use light humour to bust myths, share reminders of health and hygiene precautions and provide pertinent updates relating to the novel coronavirus. Every strip concludes with a health tip from its resident infectious diseases advisor, Prof Dale Fisher, who jokes that he has become a "cartoon character".

THE EXPERT VOICE: LIGHT-HEARTED TOUCH TO A HEAVY TOPIC

"Messages to the community are hugely important. In fact, solutions are with the community and we need to keep them engaged in the response," said Prof Fisher, who is with the School's Infectious Diseases division in the Department of Medicine and has been working in this field for almost 30 years. He has been the Chair, Steering Committee of the WHO's Global Outbreak and Alert and Response Network (GOARN) since 2013. Under the auspices of the Director General of WHO, Prof Fisher was part of the WHO technical experts mission to review China's response to COVID-19. He has also been the Chair of Singapore's National Infection Prevention and Control (IPC) committee since 2013.

Prof Dale Fisher points to one of the comic strips, "Second Family". It describes how healthcare staff keep COVID-19 patients in good spirits while they are in isolation wards.

While he initially thought it was "really crazy" to be a cartoon character, Prof Fisher sought feedback from a host of colleagues and friends who unanimously gave their thumbs ups for the pilot comic strip. The rest is history.

"As we had more and more iterations, I realised how talented the team is and how important the messaging is. There are so many ways to communicate—this is one way. I know WHO wants to pick it up and translate them."

Spokesperson for GOARN, Ms Sameera Suri, affirmed that GOARN and WHO are building on a longstanding partnership with NUS, where NUS has been actively involved in responding to outbreaks, supporting training of responders and more recently participating as a member of the GOARN Steering Committee represented by Prof Fisher.

"This outbreak is as dependent on community compliance and leadership as it is on treatment and access to healthcare services," Ms Suri said. "'The COVID-19 Chronicles' get essential messages out in an easy to understand, and visually effective manner, connecting peoples, contexts and realities to the response. The strips bring difficult public health realities alive with humour and compassion and connect each reader to the interdependent and connected response community. They will be of interest to everyone who can read and access the internet. Besides the public, the strips reach GOARN partners who can encourage and educate their staff and communities with useful advice."

THE TRAVELLING COMIC STRIPS

The series has been warmly received on social media, with more than 3 million reached on Facebook alone by the end of March. Besides CNN, news outlets in Australia, New Zealand, Europe, North America and closer to home in Malaysia and Indonesia have taken notice of the comic strips. It has also inspired creative social media content from individuals, particularly from the strip titled "Alternative Handshakes", which featured greetings using elbows and feet, as well as the palm-to-palm Thai *wai*.

THE CREATIVE HAND BEHIND THE CHRONICLES

Andrew with "Airborne Fears"

As interest in the comic strips grew online and on social media, followers were curious to know the identity of their illustrator.

Art school teacher and freelance illustrator Andrew Tan is the creative hand that brings the Chronicles to life, working on ideas and themes provided by the NUS Medicine Communications team.

"I was naturally interested in this because I like creating stories and because there is a good cause behind it—educating the public. So there is value in it.

"I like to use the comic medium to depict real life, stories about real people, and it's a lot more fun for people to read. It's visual: this appeals to kids and adults alike, with a simple and clear message. COVID-19 is a complex topic and we want to reach out to all walks of life, even across countries, with some humour injected."

Drawing inspiration from life and his family, Andrew often runs punchlines by his wife, who he reckons has a different but a 'better' sense of humour: "I usually watch her face and if she laughs, I know it will work".

As much as he can, Andrew tries not to tell the reader what to do directly, as "it will put people off". He muses, "I make my characters go through a tussle of sorts, and lead the reader to a decision about what they should do in that particular situation."

His favourite strips so far include "Airborne Fears", "Keep Hands Away" and "Mouthwash and Other Myths".

"I feel quite honoured to be part of this educational project."

A public health education initiative, the COVID-19 Chronicles is a comic strip series produced by NUS Yong Loo Lin School of Medicine, in partnership with the Global Outbreak Alert and Response Network (GOARN) of the World Health Organisation (WHO).

More strips online:

medicine.nus.edu.sg | @NUSMedicine | @nusmedicine | @NUSMedicine | NUS Yong Loo Lin School of Medicine

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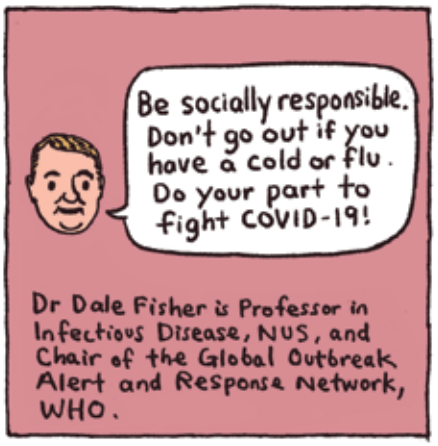
NUS National University of Singapore | Yong Loo Lin School of Medicine

THE COVID-19 CHRONICLES

"NO TWO MINDS ABOUT IT"

GOARN | 2020 YEARS



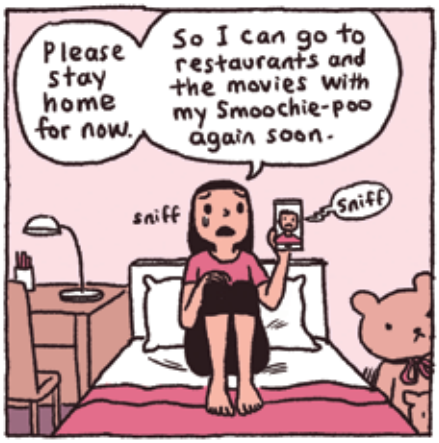
Dr Dale Fisher is Professor in Infectious Disease, NUS, and Chair of the Global Outbreak Alert and Response Network, WHO.

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

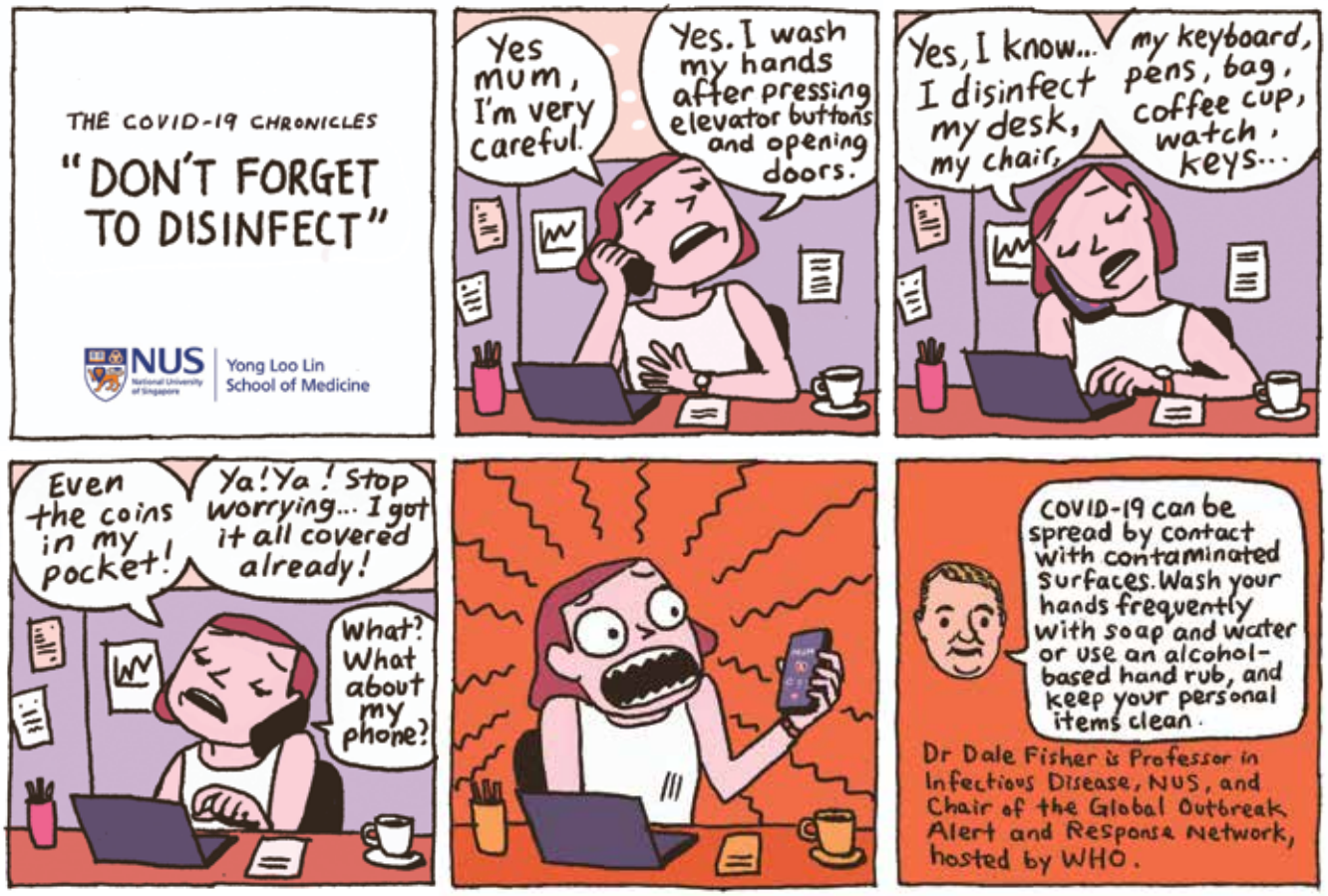
THE COVID-19 CHRONICLES

"DO YOUR PART"

GOARN | 2020 YEARS



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


THE COVID-19 CHRONICLES
"DON'T FORGET TO DISINFECT"
NUS National University of Singapore
Yong Loo Lin School of Medicine
Yes mum, I'm very careful.
Yes. I wash my hands after pressing elevator buttons and opening doors.
Yes, I know... I disinfect my desk, my chair,
my keyboard, pens, bag, coffee cup, watch, keys...
Even the coins in my pocket!
Ya! Ya! Stop worrying... I got it all covered already!
What? What about my phone?
COVID-19 can be spread by contact with contaminated surfaces. Wash your hands frequently with soap and water or use an alcohol-based hand rub, and keep your personal items clean.
Dr Dale Fisher is Professor in Infectious Disease, NUS, and Chair of the Global Outbreak Alert and Response Network, hosted by WHO.


NUS National University of Singapore
Yong Loo Lin School of Medicine
THE COVID-19 CHRONICLES
"KEEP HANDS AWAY"
GOARN 2020 YEARS
Mummy, my eyes are itchy.
WAIT! WAIT! Don't touch your eyes!
Your hands have touched so many things.
If the virus were on those things
it can get into your body when you rub your eyes!
Now my nose is itchy! I need to scratch!
Don't touch any part of your face yet!
Now wash your hands! More soap! Sing "Happy Birthday" twice!
Happy Birthday to you. Happy Birthday to you...
Sing slower! Rub between your fingers! Do it properly!
pant pant pant
OK. Your hands are clean! It's safe! Rub, scratch, touch all you want, now. Quick!
...But it's not itchy anymore.
Keep your hands away from your face. If you need to touch it, first wash your hands with soap and water or use an alcohol-based hand rub.
Dr Dale Fisher is Professor in Infectious Disease, NUS, and Chair of the Global Outbreak Alert and Response Network, WHO.

“

There are more than 42,000 nurses in our healthcare sector today, making up 42 per cent of the total healthcare workforce. Nurses are the backbone of the sector, and this means we need nurses to be critical thinkers with the ability to perform clinical reasoning, assessment and judgement.

— Ms Tan Soh Chin
Chief Nursing Officer

ARMING NURSES WITH SKILLS AND KNOWLEDGE, FLOWING PATIENTS FROM HOSPITAL TO COMMUNITY

Through her 45 years in the nursing profession, Chief Nursing Officer (CNO) Tan Soh Chin has never said "no" to new experiences. That included taking on the challenges of her current position as Singapore's CNO at the Ministry of Health (MOH).

When the previous CNO Pauline Tan moved to Yishun Community Hospital, Ms Tan succeeded her after pondering for a long time. "Taking the lead as CNO was part of my 'national service' to contribute to the nursing profession," she explains. Ms Tan was appointed in January 2015.

From the time she was a trainee nurse at age 18, Ms Tan worked for healthcare institutions in the public and private sectors. After 10 years at a public hospital, she moved to the private sector, spending a year at a medical specialist centre as a clinic nurse-cum-administrator to a senior surgeon. She ran his clinics and also assisted him in the operating theatre.

Missing nursing and the clinical environment in a hospital setting, Ms Tan returned to public service in 1985—this time to the National University Hospital (NUH), which was then under the final phase of construction and commissioning.

"Working in a hospital that started from scratch was a good experience. It was at NUH that I found ample opportunities to grow and become more 'clinically seasoned'," says Ms Tan, who spent 16 years at NUH.

Another turning point for her came when she joined KK Women's and Children's Hospital as its Assistant Director of Nursing. She stayed there for 14 years before she was seconded to the MOH.

With Singapore's evolving population demographic and healthcare needs, Ms Tan believes that nurses with the clinical knowledge and skills to analyse, identify and treat are no longer a good-to-have but a must-have. "There are more than 42,000 nurses in our healthcare sector today, making up 42 per cent of the total healthcare workforce. Nurses are the backbone of the sector, and this means we need nurses to be critical thinkers with the ability to perform clinical reasoning, assessment and judgement," she says.

She is confident that the proportion of well-educated and highly-skilled registered nurses in the workforce will grow at a brisk pace. This is attributable in part to the expanding intake for the Bachelor of Science (Nursing) programme at NUS Nursing. In 2018, 313 A-level students, polytechnic graduates and mid-career professionals were admitted into the programme. This is an increase of 33 per cent over the number of students admitted the year before, and represents a more-than-sixfold increase since the school took in its first batch of nursing students in 2006.

"We are very encouraged to see nursing become a career of choice for high-calibre students," she says. "This is a result of the school's effort and investment in developing its programme to groom and train future nurses."

The increased interest from millennials in a nursing career comes at the right time as the government plans to recruit 30,000 more healthcare workers—including highly trained nurses and doctors—in primary and community health settings by 2020 to care for Singapore's ageing population.

The next few years will see the government focusing on reviewing nursing education to promote lifelong learning, says Ms Tan.

VISION FOR THE PROFESSION

Nurses enjoy diverse career advancement and upgrading opportunities today, thanks to two key initiatives rolled out by the MOH to retain nurses in recent years.

One of these is the National Nursing Task Force's CARE package in 2014. The Task Force, set up in 2012 with the aim of developing and strengthening nursing in Singapore, addressed fundamentals such as career structure and nursing autonomy, and looked into whether nurses were practising to the full extent of their education and training.

One of the subcommittees of the Task Force, which was chaired by Ms Tan, formulated policies on career structure and nursing salaries, including reviews and increments. Policies were also enacted to ensure adequate training funds for nursing education, as well as make certain the nursing career structure is progressive and responsive, with more opportunities for professional growth and able to meet nurses' career aspirations.

At the same time, a marketing communications campaign, "Care To Go Beyond", was initiated by the MOH to enhance the image of nursing, attract more locals into the profession, acknowledge nurses' contributions and increase the public's understanding and respect of the profession.

In the face of demographic changes with the nation's growing ageing population, there is a need to shift care from hospital to community to bring care closer to home. With more resources allocated to the community care sector, a well-trained and clinically competent nursing workforce is thus required to spread across all sectors to manage patients at every step of their life stages from cradle to grave, says Ms Tan. She sees nurses as a crucial "link and interface on the ground" for the post-discharge complex cases from the hospitals who need home care or day care, a third of which is made up of end-of-life patients.

A well-trained community nursing workforce is also key to managing the frail elderly at the neighbourhood Senior Activity Centres, which now come under the MOH with the merger of the social and health sectors. Together with the community partners, these nurses attend to the seniors with chronic diseases who need care, manage them before they fall down or fall ill, and help them age well in the community.

"There is thus a need for nurse leaders to understand the perspectives of both acute and community nursing, so that they can then take on broader leadership roles and lead care across the acute and community care sectors," says Ms Tan.

In March 2019, the Singapore Nurse Leaders Programme (SNLP), jointly developed by the MOH and Healthcare Leadership College, commenced to develop future nurse leaders with a better understanding of the community care sector and a more holistic view of the healthcare landscape. The SNLP was one of the recommendations of the Future Nursing Career Review Committee, formed in 2017, to strengthen community nursing.

Of the 42,000 nurses under the Singapore Nursing Board register, about 13 per cent are not active. Ms Tan and her colleagues from the MOH hope to bring back this group of nurses through a programme called "Return to Nursing". This is challenging as those who left nursing for more than five years and who want to return to the profession must be trained to equip themselves in the latest skills and knowledge before they can practise nursing again for safety reasons, she explains.

"The Ministry is very supportive of nursing as a profession. It believes very much that if we manage to transform the nursing workforce–the largest group within healthcare–we will be able to impact positively on our care transformation."

With much work done on nursing retention, recognition and autonomy, Ms Tan says that the next few years will see the government focusing on the competency slice of the pie. Education is the biggest-ticket item that remains key to the MOH's thrusts as it is part of its longer-term goal to ensure that the quality of the workforce will not be affected downstream, she says.

The review of nursing education will go in tandem with the government's SkillsFuture drive, which promotes lifelong learning via modular, stackable and part-time training, says Ms Tan. The main thrust is to recognise both formal education from the tertiary institutions and the informal training of nurses run by the healthcare clusters and institutions, many of which have their own structured training road maps, she adds.

"In the future, we plan to develop an accreditation system as well as competency frameworks to recognise the skills and competencies attained by a nurse at the workplace," she reveals.

The MOH recently announced that it is setting up the National Nursing Academy (NNA) to oversee nursing Continuing Education and Training (CET) efforts. The NNA will allow nurses to access a comprehensive suite of nursing courses and learning opportunities to promote lifelong learning.

"The Ministry is very supportive of nursing as a profession. It believes very much that if we manage to transform the nursing workforce—the largest group within healthcare—we will be able to impact positively on our care transformation," she says. "It is indeed a very exciting time for nursing, if you ask me."

This article first appeared in "Game Changer: Advancing Nursing Education since 2005", which was published in October 2019 to commemorate the 10th anniversary of the graduation of NUS Nursing's pioneer class.

> “When you look at primary care, and even advanced primary care, there’s no reason why a well-trained nurse with her or his Master’s degree can’t manage a patient’s hypertension, hyperlipidemia or vaccinations and screening programmes.
>
> **— Professor John Eu-Li Wong**
> Senior Vice President
> (Health Innovation & Translation), NUS

ACCELERATING HIGHER EDUCATION IN NURSING

Professor John Wong, Isabel Chan Professor in Medical Sciences, Senior Vice President (Health Innovation & Translation) at the National University of Singapore (NUS), and former Chief Executive of the National University Health System, played an instrumental role in advancing higher education for nurses, when he championed the setting up of a degree programme at NUS in 2003.

Then, just months after his appointment as Dean of the Yong Loo Lin School of Medicine, he began to engage key government and nursing officials on establishing a nursing degree programme for school-leavers at NUS.

He first met with then Chief Nursing Officer (CNO) Ang Beng Choo, making a pledge to champion the programme. He then had formal meetings with key Ministry of Health officials at the time—Health Minister Khaw Boon Wan, Director of Medical Services Tan Chorh Chuan and Permanent Secretary Moses Lee—to seek the government's green light for a local Nursing school.

(Left to right) Professor John Eu-Li Wong with Professor Emily Ang, Head of the NUS Alice Lee Centre for Nursing Studies; Dr Amy Khor, Senior Minister of State (Health); and NUS nursing students at the first group-wide Nurses' Day celebration in 2018, organised by the National University Health System.

When the government gave its go-ahead, he approached the NUS President and Provost in 2003, Professor Shih Choon Fong and Provost Chong Chi Tat, respectively, to secure their support for a school of Nursing at NUS.

One of the challenges was obtaining funding for the programme, but a late-night meeting with Prof Shih at the residence of the late Dr Lee Seng Gee, then Chairman of the Lee Foundation, cleared this hurdle.

"We met Dr Lee at his residence close to midnight as he had a function to attend," Prof Wong recalls, "and the meeting went on till past 1 am."

"We told him the reason we were keen to advance nursing education in Singapore was because critically-thinking baccalaureate-prepared nurses were critical to Singapore's future. His wife, Dr Della Lee, fully understood our vision and objectives and soon after that meeting, the Lees made a donation to create a school in honour of Dr Lee's mother, Alice Lee," he recounts.

In 2005, the philanthropic group presented a $30 million gift to NUS to fund the setting up of a nursing school, as well as new scholarships and professorships. The donation paved the way for the team comprising staff from NUS and the CNO's office to turn its plans into reality. Their priorities were to hire leading faculty and locate classrooms, labs and office facilities for the programme.

Prof Wong explains that starting the nursing school as a department within the medical school was a deliberate decision, but it was named a "Centre" to avert perception that it is being "dominated by the medical profession".

An International Advisory Panel comprising nursing leaders from Australia, United Kingdom and United States was convened to provide expert advice on curriculum and faculty for the Centre.

Subsequently, the team went to Hong Kong to recruit the school's first founding head, Professor David Arthur, who was appointed in June 2006.

In August 2006, the Alice Lee Centre for Nursing Studies officially opened its doors with 49 students and five faculty members sited at the Faculty of Engineering, due to a shortage of space in the School of Medicine.

The school moved to its present location at MD11 in February 2011. Today, the programme has taken off with an enrolment of more than 300 students. It is also ranked Asia's leading nursing programme by the QS Rankings.

The belief that a strong nursing school would be a critical prong of Singapore's future healthcare ecosystem motivated his vision, explains Prof Wong.

Nurses, being the largest profession in healthcare, have the best chance to be scaled up to take on roles in healthcare leadership, administration, care delivery and policy-making, compared to the smaller number of doctors and other allied health professions such as pharmacists and physiotherapists.

"I can't understate how important the Centre is going to be in turning out real drivers and leaders of Singapore's future healthcare," he reiterates.

Attracting the best and brightest school-leavers to take up Nursing as a career will, however, remain an uphill challenge, as it requires young women and men to devote their lives to a "really tough" profession.

Prof Wong believes three things must happen before high-calibre school-leavers choose nursing over other healthcare disciplines such as medicine and pharmacy—and the good news is that all are being done.

"Firstly, society has to change its perception that all nurses do are bathing and cleaning patients. Secondly, the healthcare profession needs to engage nurses as partners and leaders. And lastly, career and compensation structures should be designed to enable this."

With the evolution in nurses' professional development, Prof Wong sees no reason why the 21st century model of a primary healthcare provider can't include a family nurse practitioner.

"When you look at primary care, and even advanced primary care, there's no reason why a well-trained nurse with her or his Master's degree can't manage a patient's hypertension, hyperlipidemia or vaccinations and screening programmes. It could very easily be done; in fact, it's been done in some parts of the world," he reasons.

Presently, less than 15 per cent of the nurses in Singapore are graduates. "I want to see this proportion increase substantially in my lifetime," Prof Wong quips.

This article first appeared in "Game Changer: Advancing Nursing Education since 2005", which was published in October 2019 to commemorate the 10th anniversary of the graduation of our pioneer class.

Workshop participants from various departments and schools formed multi-disciplinary teams at the workshop.

WE'RE GETTING BISI!

Assoc Prof. David Halpern
CEO, Behavioural Insights Team

Dr Gayatri Kembhavi
Director, Centre for Evidence and Implementation

Assoc Prof Robyn Mildon
Executive Director, Centre for Evidence and Implementation

Mr Luke Ravenscroft
Director, Behavioural Insights Team

Dr Cheryl Seah
Director, Centre for Evidence and Implementation

Ms Jenn Ye
Education Division, Dean's Office

Dr Joanne Yoong
Director, Center for Economic and Social Research, University of Southern California; Visiting Assoc Prof and CEO, Research for Impact, Singapore

Vice-Dean Lau Tang Ching giving an opening speech at the inaugural Behavioural and Implementation Science Staff Workshop.

Medicine, as taught and practised in medical schools, has long focused on addressing the biological causes and treatments for disease and bodily injury. Yet in many instances, even when medical science has the cure or solutions to a better quality of life through preventive care, translation into actual population health and well-being could fail. At NUS Medicine, we aim to change this through thoughtful application of both Behavioural insights (BI) and Implementation science (IS) at the newly established Centre for Behavioural and Implementation Sciences Interventions (BISI).

Yes, we are getting BISI!

Healthcare systems worldwide are concerned with keeping their populations physically, mentally and socially healthy in an effective and sustainable manner. Since 1950, the cost of new drug development has doubled every nine years. Medical expenditure has become dominated by expensive later life secondary care, rather than preventive treatment. Defensive medical practice and overtreatment have contributed to these rising costs. At the same time, as we transition to a world in which chronic conditions prevail over acute diseases, many years of healthy life are now lost as a result of preventable behavioural risk factors related to lifestyle, such as smoking, an unhealthy diet and a lack of exercise, as well as inappropriate care-seeking and delivery.

Singapore is no exception. While Singapore's life expectancy has steadily increased (currently over 80 years), gains in healthy life expectancy have stalled. Singapore's health system has historically been regarded as highly efficient but driven in part by the pressures of an aging population, healthcare expenditure has quadrupled within ten years from S$2 billion in 2006 to S$8.5 billion in 2015, with an expected increase by at least another S$3 billion in the next three to five years. The level of transformative change that is needed to address these new challenges requires revisiting how we conceptualise healthcare, and how we design and implement interventions that are effective and sustainable for the long term.

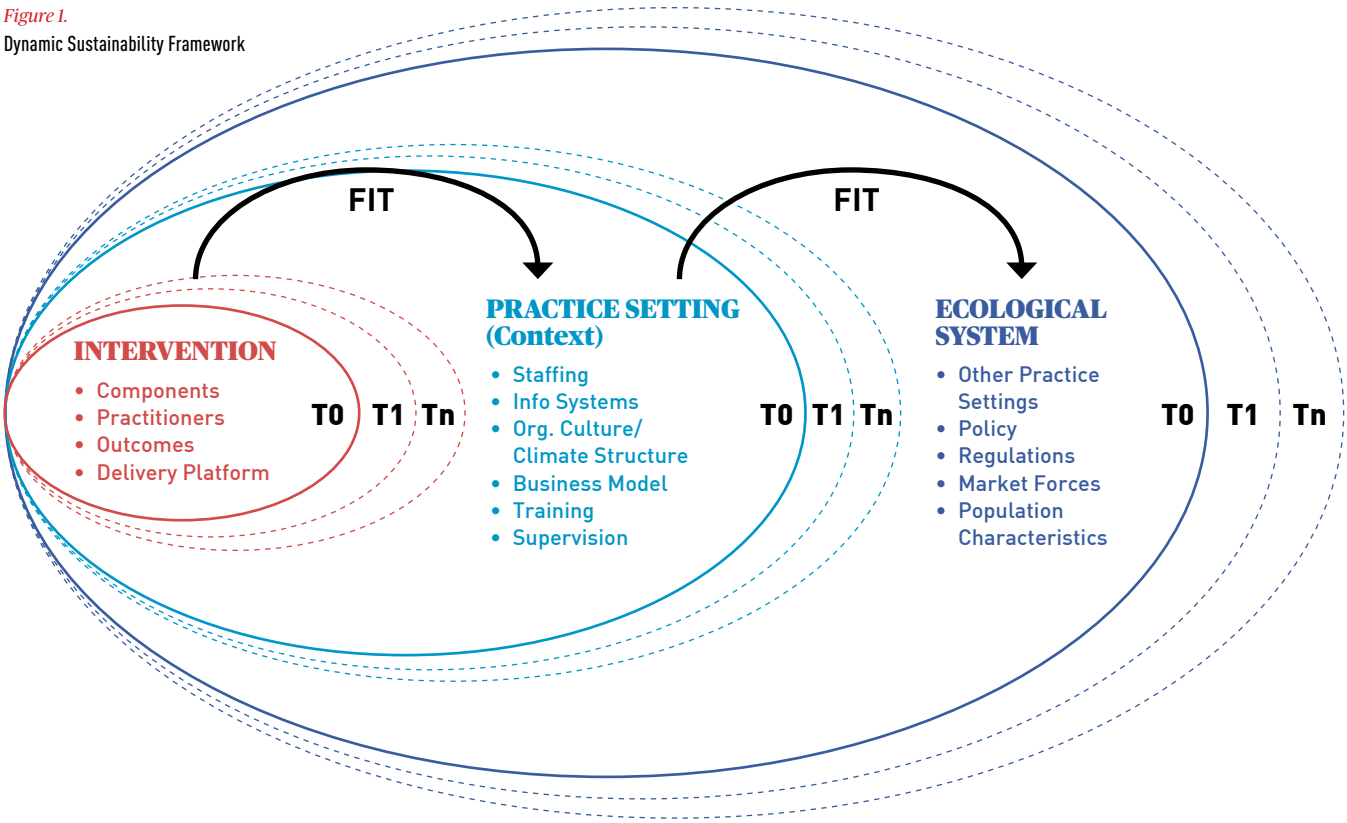
The field of behavioural insights refers to an inductive approach that combines knowledge from psychology, cognitive science, and social science with empirically-tested results to understand such factors, and to design interventions that promote more optimal decision-making at the individual and societal level. For example, the National Steps Challenge incorporates small ongoing financial incentives and builds in lotteries and competitions to nudge individuals into undertaking more daily physical activity, improving their own well-being. At the level of the community, better design can help to guide more socially optimal choices. Singapore's organ donation programme uses an opt-out default (meaning that all individuals are automatically enrolled unless they decline), a policy that has been shown to greatly increase participation rates while preserving individual choice. At the systems level, tools that focus attention on critical key indicators such as visualisations of cost and quality data help to keep value-driven outcomes at the top of mind for doctors and administrators that may otherwise be invisible in day-to-day operations.

Choice architecture alone, however, is not sufficient to ensure that such interventions lead to desirable outcomes in real-world settings. When evidence-based interventions developed within a controlled environment are implemented in real-world settings, several systemic factors impede their uptake. These include the lack of knowledge, skills and resources, competing demands on frontline providers, misalignment of research evidence with operational priorities and systemic constraints. For example, clinicians need to learn about the existence of an intervention and its potential benefits, how it fits patients' needs, make the decision to replace current practice, become well-trained in this intervention, adjust current routines or practices, use this new innovation effectively, and continue its use if it works as intended and if the need persists. Implementation science provides critical strategies (i.e. a set of planned and intentional activities) to promote the uptake of such interventions. At a systems level, these strategies apply to policymakers, practitioners and organisational leaders seeking to improve the integration of effective patient, professional and policy focused interventions (e.g. system change interventions, training, supervision, quality monitoring tools) into existing health systems and practices.

For example, an innovative health and development screening programme was initiated by the National University Hospital -Child Development Unit to improve health outcomes in preschool children from disadvantaged family backgrounds. A paediatric team provided screening and health checks within the community setting (with selected preschools) to improve reach and early intervention. However, the attendance rates of families at these screening sessions and subsequent treatments at tertiary institutions (e.g. the Early Intervention Programme for Infants and Children programme or dental care at Health Promotion Board) have been low. Applying implementation science frameworks, this community outreach programme will explore implementation barriers systematically, identify solutions and work with engagement teams to improve outcomes.

Translating evidence-based interventions into a real-world setting thus requires both behavioural and implementation science, working hand in hand to design interventions and ensure that they are disseminated effectively, implemented as intended and sustained as routine practice to improve the quality and delivery of healthcare services.

Figure 1.
Dynamic Sustainability Framework



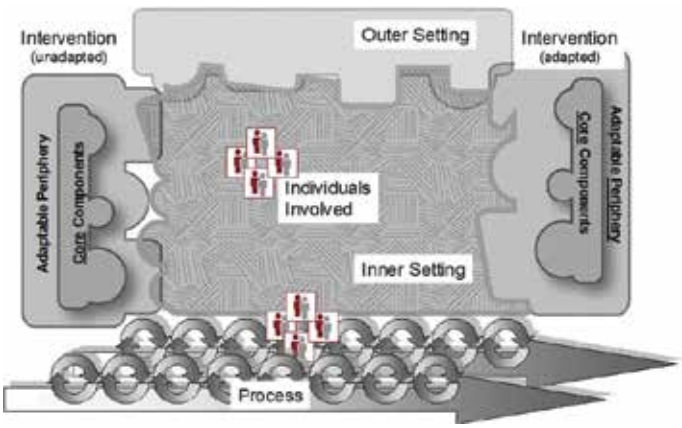


Figure 2.
CFIR-Consolidated framework for implementation research.

In line with this vision, a workshop was conducted in December 2019 aimed at equipping staff members with skills to drive transformative changes in the School. The two-day workshop was led by Prof David Halpern, a leading expert on behavioural insights, and Prof Robyn Mildon, an internationally recognised leader in the field of implementation science. Prof Halpern and Prof Mildon introduced the workshop participants to behavioural and implementation science concepts, including some well-recognised frameworks for both behavioural science (E.A.S.T.) and implementation science (Dynamic Sustainability, Figure 1, The Hexagon Tool, Active Implementation Framework (AIF) and CFIR-Consolidated framework for implementation research, Figure 2).

Prof Halpern and his team focused on identifying behaviours to target, understanding the barriers and enablers of the behaviours targeted, designing practical behavioural solutions and a feasible implementation plan. The E.A.S.T framework (Figure 3) was highlighted as a tool for design i.e. to encourage a behaviour, make it Easy, Attractive, Social and Timely. Prof Mildon highlighted the importance of contextualising interventions to fit well with individuals (practitioners and beneficiaries), the practice context as well as the bigger ecological system in order to achieve positive outcomes (Figure 1 & 2). That includes enhancing staff capacities, organisational support, adequate funding and sustainability planning.

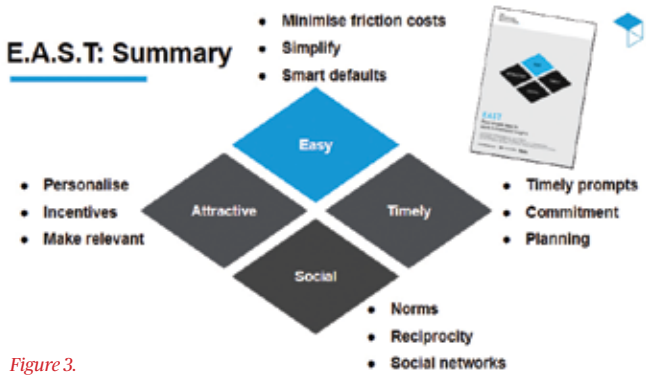


Figure 3.
EAST Framework

Workshop facilitators from the Centre for Evidence and Implementation (CEI) and Behavioural Insights Team (BIT) engaging with participants and generating ideas for implementable solutions.

Participants were introduced to the concepts and need for both behavioural and implementation science to work hand-in-hand in order to drive effective change. In teams, participants then focused on a real-world problem they face regularly in their area of work.

Participants were introduced to the concepts and need for both behavioural and implementation science to work hand-in-hand in order to drive effective change. In teams, participants then focused on a real-world problem they face regularly in their area of work. Participants were guided by workshop facilitators to apply the concepts of behavioural and implementation science for their chosen 'problem'. Through this interactive approach of simulated application, participants were able to synthesise learning and collaborate inter-professionally within multi-disciplinary teams. Teams considered other factors (e.g. context, patients' needs, presence of an enabling environment, practitioners' capacity, stakeholder engagement) when designing, implementing, and evaluating an intervention.

Participants gained a deep appreciation of the interaction between behavioural and implementation science when applied to issues of lifestyle management, home-based delivery of healthcare services, medication compliance and elderly care.

This introductory staff workshop forms the foundation for future courses under development for undergraduate medical students and systems level intervention projects in the hospitals. Planning is underway for a series of workshops for medical students from Phase I through Phase IV, including the opportunity for students to work with a team from the NUHS cluster to provide guidance and mentorship for behavioural and implementation science (BIS) projects.

The School envisions that as more professionals are equipped with a sound understanding of BIS, we are better positioned to drive transformative changes that will see improvements to healthcare and patient outcomes in a manner that is effective and sustainable for the long term.

BANKING ON BIG DATA FOR BIOMEDICAL INSIGHTS

PRECISION MEDICINE IN THE ERA OF BIG DATA AND BIOBANK

Fifteen years ago, researchers observed that French families with very high LDL cholesterol levels carried a mutation in the gene coding for the proprotein convertase subtilisin/kexin type 9 (PCSK9) enzyme, making PCSK9 more active. PCSK9 promotes the destruction of LDL cholesterol receptors on cells, which help to remove LDL cholesterol from the blood. On the other hand, another group of researchers identified individuals in the Dallas Heart Study who had very low LDL cholesterol and seemed to be protected from heart disease; they had a different mutation in the PCSK9 gene that made PCSK9 less active. Based on these findings, researchers developed antibodies that inhibited PCSK9.[1] Today, the PCSK9 inhibitors are a new class of effective cholesterol drugs which, when added to statins, lowers cholesterol levels and prevents heart disease, almost exactly as predicted by the genetic association studies.

The discovery of PCSK9 inhibitors illustrates how big healthcare data (both clinical and genomic data) can help to improve patient care by identifying novel drug targets. Much of this comes from the big healthcare data that is linked to biological samples in human biobanks.

A century ago, university researchers would occasionally store small collections of human biological samples for specific research projects.[2] These early biobanks included a few pieces of information, such as the date of collection and clinical or disease data (aka. phenotypic data). Today, biobanks have evolved both in scale and complexity, encompassing samples from many more people. In addition, advancing digital technologies have made it possible to store and link together large amounts of different types of data, including imaging, genomic and electronic health records (EHR) data. This has greatly expanded the quantity and diversity of data associated with the biological samples in biobanks.

On the larger end of the scale, many countries have established population biobanks comprising samples and associated clinical and biological (including genomic) data from hundreds of thousands of healthy and sick individuals. Examples are the Japan Biobank, the UK Biobank and the All of Us biobank, the last of which aims to collect and store samples and data from 1 million people.[3-5] Some university biobanks stand shoulder to shoulder with these population biobanks, with Vanderbilt University's BioVU boasting more than 250,000 DNA samples that are linked to the corresponding patient electronic health records (EHRs).[6]

Biobanking the ethical way

Much of a biobank's value resides in the people who agree to contribute their samples and data to it. However, in light of recent data breaches, some people may be reluctant to participate because of concerns about how their samples and data will be used and protected. Biobanks need to address these and other ethical concerns in order to recruit participants and maintain their relevance:

"Hot button" ethical issues for biobanks include consent, privacy, data security and transparency. The NUS Centre for Biomedical Ethics has published a series of articles that present guidelines for addressing these issues.[12,13]

Transparency is about being clear and upfront with participants about what to expect, eg, how their data will be used and shared, who could access the data, the potential benefits and risks of participating, what protections are in place to protect their privacy, and their right to withdraw.[13]

In 1964, the World Medical Association developed the **Declaration of Helsinki** (last updated in 2013), ethical standards to protect human research subjects, including people contributing to biobanks.[14]

In 2016, the same organisation expanded recommendations to include guidance about **privacy**, as well as data use and security. The new guidelines (Declaration of Taipei) are meant to complement the Declaration of Helsinki.[15]

In 2013, the Global Alliance for Genomics and Health (GA4GH) was set up to develop standards for the ethical sharing of genomic and health-related data.[11] Toolkits for topics such as consent, privacy, **data security and data governance** are available on the GA4GH Web site.

WHAT ARE BIOBANKS GOOD FOR?

Biobanks and their associated data have many potential applications in healthcare. By combining biological data with diverse phenotypic data, investigators can discover novel drug targets, as well as develop diagnostic and treatment strategies that are tailored to specific groups of patients.

In addition, some genes called pleiotropic genes are associated with multiple diseases, which are usually difficult to identify. Investigators can use the linked genetic and phenotypic data maintained by biobanks to identify the multiple diseases affected by the same gene.[7]

They could also use the data to study the potential impact of a particular treatment strategy on multiple linked diseases and identify additional benefits or potential side effects. This knowledge can lead to the selection of better candidate treatments for further development, potentially saving billions of dollars that would otherwise be spent developing treatments that eventually fail.[8]

However, setting up a useful biobank and big data resource is not a trivial undertaking. Investigators at the NUHS Centre for Precision Health (CPH), which set up the NUHS biobank PHEN-GEN (short for "Phenotype-Genotype"), knew they would have to overcome significant challenges to create an effective resource.

The PHEN-GEN team comprises investigators who are interested in the clinical application of genetics. They are clinician-scientists from the NUS Yong Loo Lin School of Medicine and its affiliated academic health system, the National University Health System (NUHS), including Professors Tai E Shyong, Goh Boon Cher, Lee Soo Chin, Mark Chan, and Adrian Low, and Drs Teng Gim Gee and Peter Cheung; the National University Hospital's Chief Technology Officer and big data expert Assistant Professor Ngiam Kee Yuan; and health economist Assistant Professor Wee Hwee Lin. Based on Vanderbilt's BioVU biobank, PHEN-GEN aims to initially collect and store 10,000 blood samples from outpatients at various NUH specialty clinics. This biobank will be an integral part of the Precision Medicine Strategic Research Programme, one of nine new strategic programmes at NUS Medicine that will bring basic scientists and clinicians together to meet common biomedical goals.

> They could also use the data to study the potential impact of a particular treatment strategy on multiple linked diseases and identify additional benefits or potential side effects. This knowledge can lead to the selection of better candidate treatments for further development, potentially saving billions of dollars that would otherwise be spent developing treatments that eventually fail.

FACING HURDLES

Two immediate challenges are the storage capacity needed for the large number of samples, and the vast computing power required for big data analysis. Both of these elements may be difficult for individual researchers to afford on their own. PHEN-GEN is meeting the first challenge by turning to the NUH Tissue Repository, which stores millions of samples according to industry best practices. To access the required computing power, the PHEN-GEN biobank will tap into DISCOVERY AI, an NUHS platform that connects multiple machine learning systems to research and clinical databases (including the NUH patient EHR system) for big data analysis and the development of machine learning tools. DISCOVERY AI will link the PHEN-GEN blood samples with phenotypic data from the corresponding patient EHRs and genetic data, if available.

A third challenge is that different types of data often have different formats. This includes doctors' notes, or the information about aspects such as diagnosis and treatment that is input by clinicians. In order to analyse the data properly and use the results to make accurate predictions about, for example, disease risk and treatment response, the data needs to be standardised and harmonised after it is collected. PHEN-GEN meets this challenge by applying the Observational Medical Outcomes Partnership (OMOP) Common Data Model to EHR data, which transforms the various types of data into a consistent format.

Besides these challenges, human biobanks must consider ethical issues that are unique to activities involving human subjects. Key ethical issues are consent, privacy, data security and transparency. The PHEN-GEN patient consent process fulfils the requirements put forth by the Singapore Personal Data Protection Act (PDPA)[9] and the Human Biomedical Research Act (HBRA),[10] and is further guided by recommendations in the GA4GH consent toolkit.[11] To help protect the privacy of participants, DISCOVERY AI has a data de-identification function that can remove person identifiers such as NRIC, name and date of birth from the patient health data; these identifiers are then stored on a separate server from the one used to store the health data.

DISCOVERY AI also includes a data governance function, in line with PDPA and the HBRA requirements. Access to PHEN-GEN samples and data is limited to those investigators whose proposals have been approved by both the relevant Institutional Review Board and the PHEN-GEN Data Governance Committee, a group of people that may include principal investigators and data experts. Approved investigators will be able to access the de-identified data in an environment that is optimised for both accessibility and the safeguarding of the privacy and confidentiality of the people contributing the data.

Said Prof Tai E Shyong, "As PHEN-GEN and other biobanks continue to add to the quantity and diversity of their samples and data, and as technologies to analyse large numbers of analytes in large populations advance even further, the breadth and impact of applications will only increase."

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BEYOND IMMUNITY:

RESEARCHERS UNCOVER HOW MICROGLIA AFFECT LEARNING AND MEMORY

by Dr Khor Ing Wei
Dean's Office

A decade ago, scientists showed that microglia, the immune cells of the nervous system, contribute to inflammation in neurodegenerative diseases such as Alzheimer's disease (AD) and Parkinson's disease (PD).[1,2] Now, researchers from the Departments of Anatomy and Physiology at NUS Medicine have discovered another role for microglia in neurodegenerative diseases, this time in the cognitive impairment aspect of these devastating conditions. The finding could help in understanding and treating dementia, which affects one in 10 people aged 60 and above in Singapore,[3] and which accounts for $2.8 billion in healthcare expenses and informal caregiver costs in 2015 alone.[4]

Publishing in the prestigious journal *Glia* in November 2019, Associate Professor S. Thameem Dheen, Head of the Department of Anatomy and Assistant Dean of the PhD programme at NUS Medicine, his PhD student Genevieve Saw, and colleagues showed that microglia influence long-term potentiation (LTP) in synapses (connections between neurons).[5] LTP, in which a synapse is strengthened by repeated activation, is thought to form the basis of learning and memory in the brain. The researchers also demonstrated that microglia-mediated LTP is under the control of a protein secreted by the microglia themselves, phosphatidylinositol-3 kinase (PI3K). PI3K is also a major player in many cellular processes, including cell growth, multiplication and survival.

Similar to immune cells in other parts of the body, when an injury occurs in the nervous system, microglia move quickly to the injury site and multiply. At the site, the microglia produce either pro-inflammatory or anti-inflammatory substances. Another interesting aspect of microglia is that they come into contact with synapses. For a while now, microglia were thought to play a role in LTP, but the mechanism by which they did so had not been worked out.

By studying cultured microglial cells as well as brain slices in a preclinical model, the researchers found that activated PI3K from microglia in turn activated another protein, protein kinase B (commonly known as AKT), triggering a series of events. These events culminated in increased levels of a protein called brain-derived neurotrophic factor (BDNF), which was previously shown to stimulate LTP. The investigators demonstrated that microglial PI3K was controlled by two processes: 1) changes to histones, the proteins on which DNA is wound like thread on a spool; and 2) sumoylation, or the addition of small ubiquitin-like modifier proteins (SUMO).

"Microglial cells were the neglected population in the brain once, but our findings showing the involvement of microglia in learning-associated neuronal plasticity sparked an interest in this cell type," said A/Prof Dheen. "Further understanding of the function of these cells is important in determining the mechanisms of memory and learning in the healthy brain and memory impairment in the ageing brain."

The identification of the mechanism by which microglia contribute to LTP, the mechanism underlying learning and memory, opens the door to potential new therapies for AD and PD. Given the many potential AD therapies that have turned into false hopes, such novel drug candidates are urgently needed in the treatment landscape.

Ms Saw echoed these thoughts about the impact of the work. "By identifying new targets at which we can potentially aim therapeutic interventions, we will have a higher chance of modulating neuronal function and plasticity, especially during senescence [ageing] or neurodegenerative diseases."

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Outside the entrance to the Emergency Department, NUH

AGONY AND ECSTASY

Long hours on the feet. Uncertain mealtimes and toilet breaks. Harried staff at breaking point and abusive patients who think nothing of assaulting those trying to care for them. It's all in a long day's work - pre-Covid-19 days, that is. So spare a thought for *A/Prof Peter Manning*, Emeritus Consultant, Department of Emergency Medicine and Vice-Chairman, Medical Board, National University Hospital. He explains why this is not a job for the faint of heart.

"I'll get you, you !@#$%^&*()!!!"

This sentence, yelled at me by one of our regular drunkards during one Saturday night shift, formed his parting comment before he left the Emergency Department in the company of two police officers. In his eyes, my egregious act was to not give him Milo and biscuits as per our departmental policy for not feeding drunk, abusive or otherwise disruptive patients.

One is always happy to rid the department of such drunk patients. However, they represent a medico-legal minefield and must be assessed for underlying life-and limb-threatening conditions before they are allowed or encouraged to leave.

They are often more abusive towards our nursing and desk staff and the doctor has to be ready to step in to intervene on behalf of our colleagues.

Emergency Medicine poses constant challenges — dealing with sick people and their families, making a host of clinical decisions in a crowded space with multiple distractions, and, with finite resources.

AProf Peter Manning in consultation with Dr Crystal Soh

OVERWORKED, UNDERAPPRECIATED, UNPREDICTABLE

A study in the United States of America by the American College of Emergency Physicians a few years ago observed a typically busy Emergency Department and noted that the average emergency physician was distracted by a colleague or an event every 18 seconds. We certainly are an over-stretched and, sorry to say under-rated discipline.

Emergency Medicine (EM) is unpredictable; one simply does not know what will come through the door in the next few seconds: 5% controlled panic and 95 % relative 'boredom' is an expression often used to describe our working lives - a constant battle between the excitement of the discipline and the 'boredom'.

Being able to manage and thrive under this challenge intellectually is one of the key features of an emergency physician (EP). This unpredictability, the fast pace, the opportunity to work as part of a close-knit multidisciplinary team aligns with the satisfaction that our interventions can make a huge difference to patients during their worst (and occasionally final) moments of their lives. To counter that, some EPs bemoan the fact that we can only REALLY help perhaps 20% of our patients. The rest could have attended a GP's office or polyclinic for the same result and at much less cost.

SUCCESS BREEDS MORE SUCCESS

Emergency departments (EDs) should be for emergency conditions. However, the public go to EDs for everything, probably because it is convenient (just like one-stop shopping), and, they know they cannot be turned away without being screened first. In short, EM has become a victim of its own success.

> Unfortunately, this success is sometimes taken advantage of by doctors - if there is a problem that they cannot solve, send the patient to the ED and let them sort it out. In a way we have become a place of last resort for any number of issues and problems.

I alluded earlier to the type of verbal abuse shown towards us. Other challenges less obvious to our colleagues in other disciplines include self-care during shifts (do I have time for a meal/restroom break?), and, standing or walking for long periods. Perhaps most disturbing is the constant threat of physical violence from patients and/or their families.

I have been punched or kicked twice by patients in the last five years. Police reports were made in both cases, resulting in one expatriate assailant being warned severely of his immigration status at Immigration and Checkpoints Authority, while the other was sentenced to 10 months in jail (apparently he had 'priors' in terms of such activities.)

So, how does this type of working environment affect the typical Emergency Physician?

This results in often negative retrospective reviews by our colleagues in other disciplines who simply do not understand that under our working conditions, it is extremely difficult to make a perfect diagnosis or disposition. I quote Abraham Lincoln...."Don't criticise them; they are just what we would be under similar circumstances"...unfortunately, too many of our colleagues expect perfection of us.

THE EMERGENCY PHYSICIAN'S PLIGHT

Increasingly, EM literature describes burn-out experienced by increasing numbers of EPs. It is my experience that burn-out is more likely to occur in the younger EPs rather than those of us who are longer in the tooth. This reflects, I think, a difference in generational expectations towards work-life balance. The alacrity with which staff 'take MC' often leaves us with a skeleton crew to cover a busy shift.

With all the distractions and stressors, it has been concluded that EPs are especially prone to cognitive errors. Metacognition has entered our lexicon in the recent past and describes a process whereby a person ponders their own thinking. Pat Gorskey, MD, a professor of EM has described metacognition as the best strategy to prevent diagnostic errors and cognitive biases.

> Our job is a humbling one. You come on shift one day and one of your colleagues cautiously asks... "Do you remember the patient you sent home yesterday?" Nothing good ever comes of a conversation that starts with those words. This is when your body proves to you that you have an autonomic nervous system - you feel lightheaded and break out into a cold sweat.

This sums up the plight of an EP very well – most of our patients go home; but do any of them take home with them a mistake on our part?

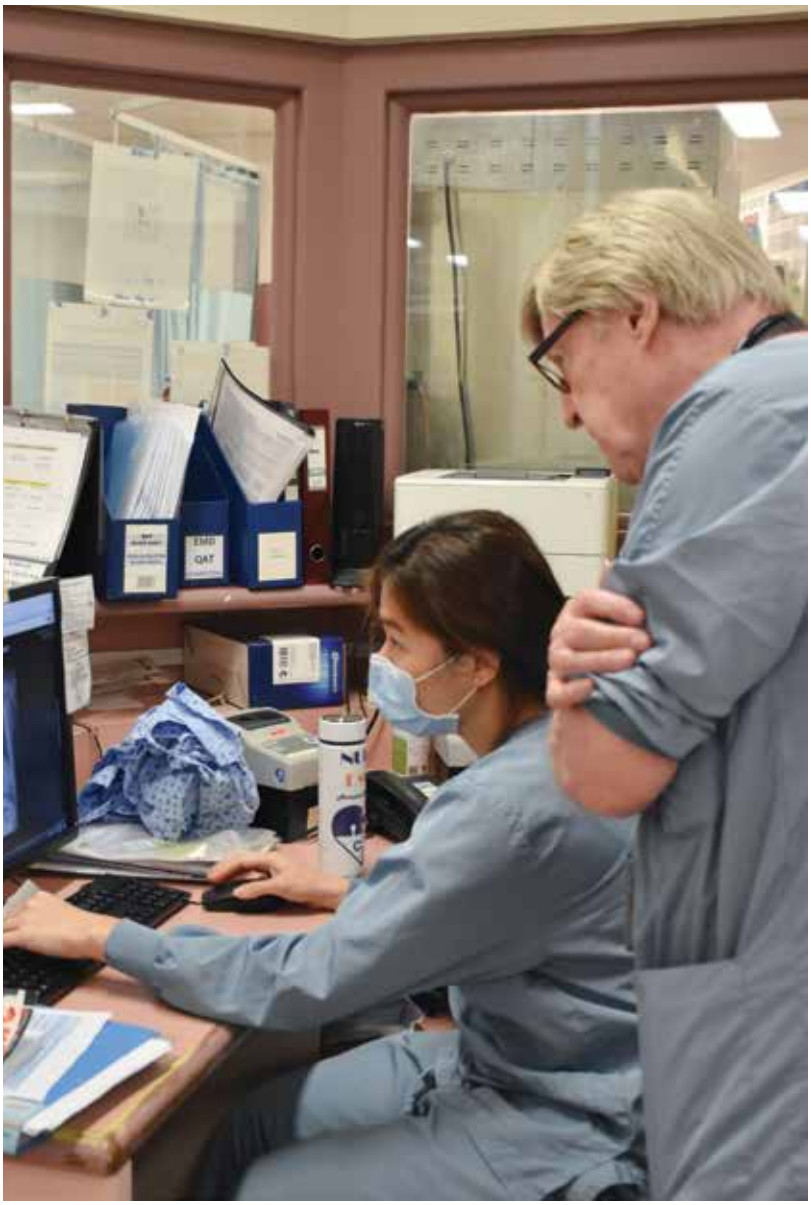
In recent years, the issue of reflection has entered EM education. This involves taking the time to play out in one's mind the many difficult clinical scenarios that can present. This could be a case that most EPs will never see or perform in their lives, for example, a surgical airway. However uncommon the scenario may be, the EP must know how to perform it. This is an example of prospective use of reflection.

Reflection can also be retrospective following a difficult case where the EP considers how they might have done better and use this reflection to plan for the next time they are in a similar situation.

Reflection can also be departmental, taking the form of Morbidity & Mortality conferences. These are held monthly and are well-attended by both senior and junior doctors. Again, challenging cases are presented to identify areas where we might improve our practice, both individual and departmental, for the future.

Contrary to what some readers might expect, many EPs have long careers, often exceeding 30 years. Yet we keep turning up on a weekly basis for more punishment.

I am not sure what that says about us. Are we ultra-dedicated or are we just big on pain?



Reviewing a patient's scan

ASIA PACIFIC MEDICAL EDUCATION CONFERENCE 2020: WHERE BEST IDEAS AND PRACTICES COME TOGETHER

by Lim Yih Lin
Senior Executive, Centre for Medical Education

Following the success of the past 16 runs of the Asia Pacific Medical Education Conference (APMEC), the 17th APMEC returned on 8 to 12 January 2020, gathering close to 1,300 medical and healthcare professionals from over 39 countries. Organised by the Centre for Medical Education (CenMED), Yong Loo Lin School of Medicine, National University of Singapore, the conference serves as an excellent platform for healthcare educators to share their experiences while learning about the latest ideas and best practices from international experts in medical and healthcare professional education.

Professor Ronald Harden (standing), Essential Skills in Medical Education (ESME) course director, guiding participants' thoughts through discussion.

The ones who made it possible: the current and incoming organising committee of APMEC, with the CenMED team and volunteers.

(From left to right) **Professor Yeoh Khay Guan**, Chief Executive, National University Health System, Singapore; **Professor Yvonne Steinert**, Director, Institute of Health Sciences Education, Faculty of Medicine, McGill University, Canada; **Associate Professor Tan Chay Hoon**, Department of Pharmacology, Yong Loo Lin School of Medicine, National University of Singapore, Singapore and **Dr Dujeepa D Samarasekera**, Director, Centre for Medical Education, Yong Loo Lin School of Medicine, National University of Singapore, Singapore at the MILES Award presentation ceremony.

With this year's theme, "Nurturing Values for Effective Practice – Trends, Issues, Priorities, Strategies (TIPS)", the conference focused on how best to face challenges in healthcare and ways to improve how we educate and nurture the next generation of medical and healthcare professionals.

Pre-conference workshops were offered over 8 and 9 January. These included courses on Essential Skills in Medical Education (ESME), which, as anticipated, were very warmly received. This special programme was designed for teachers who are engaging with medical education for the first time, as well as experienced teachers who have been given new responsibilities relating to teaching or assessment.

The symposium on "Seeking and Receiving Mentorship: How to Foster Successful Mentorship?" saw an enthusiastic turnout of 150 people. Five topics were presented by final year students from NUS Medicine, as well as practising doctors.

Due to overwhelming demand, post-conference workshops were also organised on 12 January. Delegates who attended the pre- and post-conference workshops walked away with more knowledge from the well-designed faculty development programmes, led by distinguished medical and healthcare professional education experts.

The main conference which was held on 10 and 11 January at the Resorts World Convention Centre featured a strong line-up of more than 160 international, regional and local speakers who touched on a wide range of healthcare education topics. Professor Yeoh Khay Guan, Chief Executive, National University Health System, graced the opening ceremony as Guest-of-Honour. Professor Yvonne Steinert, Director, Institute of Health Sciences Education, Faculty of Medicine, McGill University, Canada, and Dr John Norcini President Emeritus of the Foundation for Advancement of International Medical Education and Research (FAIMER®), USA gave the opening and closing keynotes on 'From Teaching Professionalism to Supporting Professional Identity: Nurturing Values for Effective Practice' and 'Professionalism, Professional Identity Formation and Assessment' respectively at the conference.

Professor Yvonne Steinert and Associate Professor Tan Chay Hoon, Department of Pharmacology, Yong Loo Lin School of Medicine, National University of Singapore, Singapore received the Mentoring Innovation and Leadership in Educational Scholarship (MILES) Award during the opening ceremony. This award was initiated in APMEC 2006 to recognise international and local scholars of distinction who have a hand in developing medical and health professions education in Singapore and beyond.

A total of 256 abstracts were presented during APMEC 2020. This year, the conference included a new 'Young Scholar' category, which was introduced for presenters who are below 35 years of age.

Congratulations to the presenters and the winners below!

Young Scholar Award

Winner

Andrew Kroger
Australia

The Creation of a Self-Sustaining and Expanding Medical Student Question Bank

Runner-up

Nicholas Ng Beng Hui
Singapore

A Multidisciplinary Workshop on Neonatal End of Life Care - A Challenging But Rewarding Experience

Free Communication Presentation

Winner

Pauline Luk
Hong Kong

Exploring the Online Learning Interactions Among Medical Students During a Self-Initiated Enrichment Year

Winner

Christopher O'Callaghan
United Kingdom

A Novel Approach to the Delivery of Video-Based Education, Continuing Education and Assessment of Health Workers in the Remotest Locations

Runner-up

Sarah Koh Mun Yee
Singapore

Visual Fixation and Diagnostic Performance of Undergraduate Dental Students Reading and Interpreting Intra-Oral X-Rays With and Without Formative Feedback

In all, delegates enjoyed a fruitful time learning, sharing, exchanging ideas and networking with other healthcare educators, all with the goal to transform the way they teach or enhance patient care.

Next year, APMEC will take place outside of Singapore for the first time. The 18th conference will take place in Kuala Lumpur, jointly organised by CenMED and University of Malaya (UM) and co-organised with the International Medical University, Malaysia (IMU). CenMED would like to take this opportunity to express their warmest gratitude to all international and local presenters, speakers and delegates who have made the 17th APMEC 2020 a roaring success.

DEMENTIA AND PALLIATIVE CARE TAKE CENTRE STAGE

by Yap Shi Jed
Phase II NUS Medical Student

Yap Shi Jed directed two plays put up at the NUS University Cultural Centre as part of a hall-of-residence production on 17 and 18 January 2020. Written by local playwright Haresh Sharma, "Don't Know, Don't Care" and "Don't Forget to Remember Me", reflect social attitudes toward the elderly and loved ones with dementia. The plays drew an audience of more than 600.

Mdm Wong dreams in "Don't Forget to Remember Me".

When I had first decided to be part of the King Edward VII (KEVII) Hall's community, I told myself that I would try something new, something I would never be able to get to do outside of school. I wanted to give acting a shot and got a spot as on the cast in last year's KEVII HallPlay 19/20 production.

Grandpa collapses in "Don't Know, Don't Care".

I was approached to take over as the Director in my second year. To be honest, I was very hesitant to do so as I was nowhere near the artistry of the previous director, but he, together with the rest of the committee, gave me their support and the confidence to lead it.

I did not start out knowing that I wanted to highlight themes relating to dementia, or palliative care. Rather, I simply did some research into what the local arts scene had to offer. While I was flipping through scripts found in the library, I chanced upon these two works in an anthology by Singapore playwright Mr Haresh Sharma. Perhaps it was my background as a medical student, or a prior attachment in the dementia ward at St. Andrew's Community Hospital, that allowed me to relate to aspects of the script.

When I first started directing, I felt like I was thrown into the deep end of the pool. I had to rely on whatever I had gone through in rehearsals with the previous director to guide the cast members. All the cast members I had this year were freshmen, whom at first glance but seem less experienced than seniors who had been in Hallplay for a couple of years. But this turned out to the best thing for me when it came to directing: I loved working with the freshmen, and enjoyed watching them grow! They are a ridiculously rowdy bunch of people with great chemistry together trying to hanker them down to serious work gave me the occasional headache. But boisterous as they were, everyone put in time and effort, despite busy schedules. Being able to watch us grow as actors and friends also kept me going.

Grandpa and Mother reconcile in "Don't Know, Don't Care".

In our plays, we portrayed the vulnerabilities of the caregiver and also examined the varying attitudes of family members' towards taking care of the elderly who are terminally ill. Since we were portraying elderly people with dementia as well as terminal illnesses, I wanted it to be as accurate as possible and hence wanted the cast to interact with those who were affected. One of the highlights this year was our partnership with the Alzheimer's Disease Association (ADA). Not only did the staff at ADA hold a talk for us, they also went the extra mile to organise a volunteering session for the cast, to befriend patients with dementia and their caregivers.

Cast of 'Don't Know, Don't Care' and 'Don't Forget to Remember Me'

Many of us have this preconception that all caregivers are capable and completely functional. But the reality may be far from that. Sometimes, caregivers start out just as lost as the people they care for and it takes a lot from them to come to terms with their situations. Speaking to the caregivers really helped put things in perspective for me and taught me a lot about putting myself in the shoes of others.

Just as the characters in "Don't Know, Don't Care" and "Don't Forget to Remember Me" made their generation gaps smaller, I hope our audience are able do the same for themselves.

Inspiring Health For All

Yong Loo Lin
School of Medicine