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ACCELERATING **RESEARCH & INNOVATION**

A Newsletter For The Research And Innovation Community In Singapore • Issue 47 • June - July 2023

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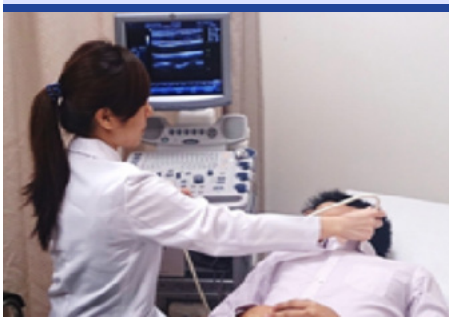
Strategic Research Programmes Led by Tan Tock Seng Hospital



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LATEST NEWS

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RESEARCH AND INNOVATION

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CAREER DEVELOPMENT

- Training Calendar
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NHG-LKCMedicine Joint Research Symposiums

Mind-Brain Disorders (25 November 2022)

The symposium featured a series of talks by exemplary clinicians and scientists who shared insights on topics ranging from sleep in stroke, Parkinson's and TBI, the clinical challenges in managing Dementia symptoms, mild cognitive impairment in Southeast Asian context, and the use of conversational agents for mental health and wellbeing.

MedTech (10 April 2023)

The MedTech symposium featured four clinician innovators and scientists who shared their expertise on different topics ranging from genomic, microfluidic and Organ-on-chips technologies, healthcare innovation in a disruptive world and the use of innovative Medtech solutions to improve Healthcare.

Missed the symposiums? You can view the Zoom recordings here.

Results for the FY2022 NHG Research and Innovation Talent Development Programmes Call for Applications

The FY2022 Call I was open from 26 April – 7 June 2022 and Call II was open from 18 October – 29 November 2022.

Congratulations to the following FY2022 awardees! To find out more about the programmes, please click here.

NHG-LKCMedicine CS Preparatory Programme (CSPP)

CSPP aims to provide clinicians with **an exposure to research in the early phase of their careers** through **research training** and **project experience.**

Name of PI/ Designation/ Department	Institution	Project Title
Dr How Guo Yuan Resident Diagnostic Radiography	TTSH	Evaluation of Predictive Factors for the Suitability for Yttrium-90 Microsphere Radioembolization, using Voxel-Based Dosimetry in Pre-Treatment Tc-99m Macro Aggregated Albumin
Ms Li Aiyu Senior Medical Social Worker Care and Counselling Department	TTSH	Understanding Caregiver Stress and Coping Perceived by Family Caregivers of Ventilator-Assisted Patients
Dr Anna Rosiana Resident Rehabilitation Medicine	TTSH	A Pilot Study to Assess the Feasiblity and Effectiveness of a Home-Based Exercise Programme to Improve Lower Extremity Strength and Ambulation Status in Chronic Stroke Survivors

NHG-LKCMedicine CS Preparatory Programme Plus (CSPP+)

CSPP+ aims to **prepare clinicians to embark on formal research training leading to PhD in the early phase of their research careers.** The programme would also help them to build up their research experience and generate preliminary data in preparation for competitive research.

Name of PI/ Designation/ Department	Institution	Project Title
Dr Sim Sai Zhen Family Physician Hougang Polyclinic	NHGP	Perceptions of Physical Activity in Frail Older Adults with Multimorbidity in the Singapore Primary Care Setting
Dr Jeremy Hoe Consultant Diabetes Center (AdMC)	KTPH	Influence of LDL Receptor Mutation Subtype on Clinical Characteristics and Response to Lipid Lowering Therapy in Familial Hypercholesterolemia
Dr Ying Jiangbo John Associate Consultant East Region / Adult Neurodevelopmental Service	IMH	Association between Gut Microbiota and Clinical Manifestations of Autism Spectrum Distorder
Ms Annuradhaa Ravi Senior Physiotherapist Rehab Services	KTPH	Investigating the Prevalance and Perceptions of Post Stroke Fatigue among Patients who have Suffered Acute Stroke: Mixed Methods Design

NHG-LKCMedicine CS Fellowship (CSF)

CSF aims to nurture and develop Clinician-Scientists with **a formal research training programme leading to PhD.**

Name of PI/ Designation/ Department	Institution	Project Title
Dr Justin Chew Linghui Consultant Geriatric Medicine	TTSH	Age-Related Dysregulation in the Inflammatory, Metabolic and Musculoskeletal Systems: A Study of the Vitality Domain of Intrinsic Capacity and its Impact on Frailty and Functional Decline

NHG-LKCMedicine CS Career Scheme (CSCS)

CSCS aims to develop research capabilities of clinicians to transform patient care through competitive research and enable them to **compete successfully for the National Medical Research Council (NMRC) Transition Award (TA) / Clinician Scientist Award (CSA)** within the next 2-3 years and further build his/her research career.

Name of PI/ Designation/ Department	Institution	Project Title
Dr Xu Chuanhui Associate Consultant Rheumatology, Allergy and Immunology	TTSH	The Associations of Post-Translational Modifications of Lipids with Disease Characteristics and Vascular Dysfunction in Rheumatoid Arthritis

NHG Centre for Medical Technologies & Innovations (CMTi) Clinician Innovator Preparatory Programme (CiPP)

CiPP aims to introduce clinicians to the **foundational skills and knowledge required for health technology (HealthTech) innovation** through innovation training and project experience, as well as to foster a healthy innovation culture in NHG.

Name of PI/ Designation/ Department	Institution	Project Title
Dr Benjamin Ding Tze Keong Associate Consultant Orthopaedic Surgery	WH	Side Cutting Acetabular Reamers to Improve Safety in Total Hip Replacement Surgery
Dr Tan Chee Hian Consultant Dermatology	NSC	Non-Woven Tissue Regenerative Dressings for Chronic Wound Management
Dr Joshua Decruz Associate Consultant Orthopaedic Surgery	KTPH	Planar Ultrasound Multi-Array (PUMA) Transducer
Dr Jeremy Hu Youwei Associate Consultant Ophthalmology	TTSH	Customised Speech Recognition for Automated Visual Testing
Dr Tan Shu Yun Senior Consultant Clinical Research Unit	NHGP	Osteoporosis Retina Prediction: ORION

Outcomes of the July 2022 NMRC Call for Applications

Congratulations to the NHG clinicians who have received the National Medical Research Council (NMRC) Talent Development Awards and Research Grants during the July 2022 Call for Applications.

Awardee	Institution	Project Title	Grant/Award
Assoc Prof Rupesh Agrawal Senior Consultant Ophthalmology	TTSH	Programme for Ocular Inflammation & Infection Translational Research (PROTON)	Clinician Scientist Award - Investigator (CSA-INV)
Assoc Prof Angela Chow Senior Consultant Clinical Epidemiology	TTSH	Different Strokes for Different Folks - Leveraging on Community Social Networks for Public Health Education on Antibiotic Use and Antimicrobial Resistance	Clinician Scientist Award - Investigator (CSA-INV)
Assoc Prof Barnaby Young Senior Consultant Infectious Disease	NCID / TTSH	The Singapore Platform for Controlled Human Infections with SARS-CoV-2 ('Sing-CoV')	Clinician Scientist Award - Investigator (CSA-INV)
Dr Justin Chew Linghui Consultant Geriatric Medicine	TTSH	Inflammation, Metabolism and Body Composition as Physiological Markers of Homeostatic Capacity in a 'Vitality Index' of Ageing: A Study of the Vitality Domain of Intrinsic Capacity and its Impact on Frailty, Activity Levels and Life-Space Mobility	Research Training Fellowship (RTF)
Ms Teh Wen Lin Senior Research Officer Research Division	IMH	Prefrontal Cortical Activity, Impulsivity, and Executive Function in Bipolar Disorder: a Functional Near-Infrared Spectroscopy (FNIRS) Study	Research Training Fellowship (RTF)
Prof David Lye Senior Consultant Infectious Disease	NCID / TTSH	Quantifying the Risk of Gut Microbiome Disruption and Disease Due to Antibiotic Therapy by Leveraging on the Singapore-Led Multicentre INVEST Trial	Clinician Scientist Individual Research Grant (CS-IRG)
Dr Yip Wan Fen Senior Research Analyst Research Division	HSOR	Elucidating Effectiveness, Perception and Barriers of Primary Eye Care Model in Singapore	Population Health Research Grant New Investigator Grant (PHRG-NIG)

To find out more about the NMRC Talent Development Awards and Research Grants, please click here.

Launch of Biomedtech Incubator co11ab Novena

The NHG Centre for Medical Technologies and Innovations (CMTi) is excited to announce the launch of **co11ab Novena** on 9 September 2022, an incubator to **help biomedical technology start-ups springboard the transition from research and development to commercialisation of their innovations.** co11ab Novena is a tripartite alliance between Nanyang Technological University (NTU), Agency for Science, Technology and Research (A*STAR), and the NHG. Additionally, it will be a coordinated center for healthcare and translational research that will promote the use of innovative technology in clinical settings and for the benefit of patients. The S$15 million facility is situated at LKCMedicine and has recently operated in May 2023. It will provide BioMedtech start-ups with access to industry knowledge, mentorship, and financial support to propel the translation of their ideas and concepts into products.

Contact **CMTi** at innovate@nhg.com.sg if you are a clinician who is interested in innovations and would like to collaborate with NTU and ASTAR scientists. Our team will assist you in the development of your innovative ideas into finished products and will offer resources to help you along your innovation journey.

Novel Subgroups of Type 2 Diabetes

Patients with type 2 diabetes (T2D) have many faces. **In the era of precision diabetes care (right treatment, to the right patient, at the right time), it is necessary to identify the "right diabetes-patient" to inform our choice of treatment strategies.**

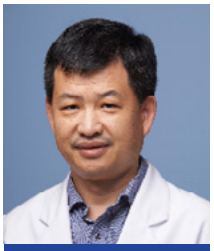
Using clinically available parameters (diabetes onset-age, body mass index, HbA1c levels, measures of insulin reserve and resistance to insulin hormonal action) in 687 patients with recently diagnosed diabetes, we observed that Asians with T2D can be clustered into three subgroups. Firstly, obese people with middle-age-onset diabetes and stable blood glucose control (45%, also termed as mild obesity-related diabetes; **MOD**). Secondly, non-obese people with older-onset diabetes with ageing related health-issues possibly accelerated by diabetes (36%, mild age-related diabetes; **MARD**). Thirdly, obese (thus insulin resistant) individuals with younger-onset T2D and uncontrolled blood glucose (19%, severe insulin-resistant diabetes; **SIRD**).

Importantly, these novel subgroups had distinct genetic and lipidomic (multiple lipids) signatures. Additionally, when followed-up over 7 years, the groups showed differential cardio-renal trajectories, worse among the **SIRD** group. This suggests the need to recognize the different T2D subgroups in the clinics, which will help to guide intervention-strategies targeting the subgroups. For instance, early adoption of advance disease-modifying anti-diabetic agents (e.g. SGLT2-inhibitor) for **SIRD** group to "bend the cardio-renal curve". For **MOD**, intensive weight management to induce diabetes remission may be the preferred strategy. This may prevent long-term diabetic complications. On the other hand, multi-domain interventions may better serve the needs of **MARD**, to retard ageing-related senescence such as physical frailty and cognitive decline.

Taken together, our study suggests that the stratification of complex condition such as T2D in the clinics may inform precision diabetes care. This may be an important strategy in our nation's war against diabetes.

Contributed by:

Assoc Prof Lim Su Chi
Clinical Director, Clinical Research Unit, KTPH



Dr Liu Jian Jun,
Principal Research Officer, Clinical Research Unit, KTPH

Dr Resham Lal Gurung,
Principal Research Officer, Clinical Research Unit, KTPH

Raising Healthy Children: Mental Health in Children and Adolescents

"It is easier to build strong children than to repair broken men" – Frederick Douglass

As intuitive as it sounds, it is challenging to build 'strong children'. Development itself is a process fraught with 'adventures' and 'obstacles'. Even under the best situation and with the 'best' of parents, the behaviours and emotions of children can change quickly and unpredictably. Try feeding a toddler who asks for marshmallows for dinner. In some circumstances, children may have difficulty paying attention, interacting with others or simply following instructions. While some children go through 'phases', certain behaviours may suggest a more serious problem lurking behind the scenes.

Mental health disorders often begin in childhood, e.g. neurodevelopmental conditions such as Autism Spectrum Disorders or Attention Deficit Hyperactivity Disorders. Others are related to development and learning. **Many more conditions such as anxiety or mood disorders, can develop in childhood or adolescence, and continue into adulthood.** These conditions also often co-occur. Without intervention, children cannot reach their full potential, let alone deal with the debilitating impact of mental health conditions in their lives that goes beyond academics, social or vocational functioning. **While 1 in 5 individuals experience the onset of a mental health condition in adolescence, there is a lack of data on the prevalence of mental health issues in children in Singapore.**

The team at the Department of Developmental Psychiatry, led by Dr Lim Choon Guan and Dr Sung Min is launching a mental health study on children and adolescents, supported by funding from the Temasek Foundation. **The study adopts a population-based approach, and aims to establish the prevalence of the major mental health conditions in children and youths aged 6 to 17 years old, as well as identify risks and protective factors that can impact the presentation and severity of the mental health conditions.**

Contributed by:
Dr Goh Tze Jui
Principal Clinical Psychologist, Department of Developmental Psychiatry, IMH

Singapore Medical Journal Best Research Paper Award 2019

Assoc Prof Mythily Subramaniam's article titled "**Successful ageing in Singapore: prevalence and correlates from a national survey of older adults**" has been selected as one of the **top three original research papers published in the Singapore Medical Journal (SMJ)** in 2019.

Her paper was selected for its potential impact on clinical practice, rigorous study design/research methodology, comprehensive data analysis, balanced discussion and quality of data interpretation.

"It was a pleasant surprise to be awarded the SMJ Best Research paper award. As Singapore faces the challenges of an ageing population, it is important to remember that older adults age successfully and contribute meaningfully to families and the society. I would like to take this opportunity to thank the older adults who participated in the Wellbeing of the Singapore Elderly study and contributed their valuable time to make this challenging study a success".

For more information about the awards, please click here.

NHG-LKCMedicine Clinician Scientist Talent Development Video

Clinician Scientists juggle between two demanding roles as both a clinician and a scientist. This video highlights the important role they play in our healthcare landscape and in advancing research, the joint efforts between NHG and LKCMedicine in grooming our Clinician Scientists, and the personal experiences of our Clinician Scientists.

Please click here to view our video on Clinician Scientists.

Credits: Clinician Scientist Development Office (CSDO), NHG Group Research & LKCMedicine, NTU Singapore

Strategic Research Programmes Led by TTSH

In line with the national Research, Innovation and Enterprise (RIE) 2025 Plan, NHG Group Research has developed strategic research thrusts based on the strengths of our national centres as well as existing capabilities of our institutions and LKCMedicine. These strategic research thrusts include **infectious diseases, skin diseases, mental health, mobility, frailty and falls, metabolic health, stratified medicine, health technology and multi-morbidity and population health.**

Over the years, TTSH has built research capabilities and achieved notable outcomes in these key focus areas. In view of this, TTSH has recently been awarded $9.5M in research funding to **spearhead programmes in (1) Mobility, Frailty and Falls (MFF), (2) Transforming Vascular Health (TVH) and (3) Preventive Health.** The **MFF programme** aims to shift the frailty curve to the left, preventing downstream adverse outcomes of frailty such as poor Patient Reported Outcome Measures (PROMs), falls and functional decline, and institutionalisation, thus reducing healthcare costs. The **TVH programme** aims to implement and effectively communicate vascular risk in a personalised manner, and to functionally phenotype individuals at different disease stages in the presence of diverse comorbidities to stratify them and identify suitable therapeutic strategies. The third component of TTSH's strategic research funding goes towards **intramural grants to seed research in preventive health** that are in line with TTSH's mission, and to address NHG's priorities, including cancer prevention, renal and respiratory diseases, and degenerative joint and spine disease.

In concert, the proposed programmes will achieve **clinical outcomes** through the establishment of new workflows, **strengthen internal capabilities and infrastructure within NHG, and better position TTSH and NHG as a whole in the national research funding landscape.**

Patient undergoing vascular imaging (Image credit: Assoc Prof Rinkoo Dalan)

Contributed by:
NHG Translational Research Office (TRO)

With inputs from:
Assoc Prof Tan Cher Heng, Assistant Chairman Medical Board (Clinical Research & Innovation), TTSH
Assoc Prof Karen Chua, Senior Consultant, Department of Rehabilitation Medicine, TTSH
Assoc Prof Rinkoo Dalan, Senior Consultant, Department of Endocrinology, TTSH

Reversing Diabetes through Targeted and Sustained Behavioural Change

Diabetes is a major public health concern, affecting nearly half a billion people around the world. Here in Singapore, one out of every three persons is at risk of developing the condition within their lifetime. Diabetes not only reduces the quality of life of those afflicted, but also imposes a heavy burden on society and the healthcare system. **It is imperative that we deal with it early, and where possible, prevent its onset or achieve remission in those with early disease.**

The NHG-Tanoto Foundation Diabetes Reversal Programme, officially launched on 5 August 2022, seeks to work with persons with diabetes to discover effective ways of achieving diabetes remission through **targeted and sustained behavioural change.** It will adopt a stepwise approach in studying how persons with diabetes in Singapore view their condition, the knowledge, attitudes and motivations that shape their health behaviours, and how healthcare providers can partner communities and patients in the adoption of healthy lifestyles and positive health behaviours.

Proactively controlling disease progression through behavioural change in persons with diabetes within primary care and the community could potentially be key to relieve the burden on the healthcare system, and gain a foothold in the war against diabetes. **This strategy is well-aligned with NHG's population health programmes and MOH's Healthier SG initiative, highlighting the importance of health, behavioural, and socio-economic factors in implementing effective community interventions.**

As part of the programme, NHGP dietitians have co-created meal plans & recipes for 800 kcal, 1000 kcal, 1200 kcal and 1500 kcal diets together with patients. These meal plans will be used in a **clinical trial to study the effectiveness of weight management in achieving diabetes remission.** In addition, a qualitative study on "Lived experiences of persons with Diabetes & Obesity" is ongoing. Together with data from an upcoming survey on "Barriers & Facilitators to Weight Management in Persons with Diabetes", **this research programme aims to provide insights into the knowledge, attitudes and motivations that drive behavioural change that can shape impactful interventions as well as individual and organisational strategies that will reduce the burden of diabetes in Singapore.**

Official Launch of the NHG-Tanoto Foundation Diabetes Reversal Programme (Image credit: NHG Corporate Communications)

From left to right:
Dr Janil Puthucheary, Senior Minister of State, Ministry of Communications and Information and Ministry of Health
Mr Bey Soo Khiang, Executive Advisor, Tanoto Foundation
Prof Benjamin Seet, Deputy GCEO (Education and Research), NHG
Assoc Prof Chong Phui-Nah, CEO, NHG Polyclinics & Primary Care
Assoc Prof Tang Wern Ee, Director, Clinical Research Unit, NHGP

Contributed by:
NHG Translational Research Office (TRO)

With inputs from:
The Reversing Diabetes Research Programme Team led by
Assoc Prof Tang Wern Ee, Director, Clinical Research Unit and Information Management & Analytics, NHGP
Ms Lee Ying Hui, Senior Manager, Clinical Research Unit, NHGP
Ms Hazel Lim Pinxiu, Assistant Manager, Clinical Research Unit, NHGP

Rapid Screening of Urinary Tract Infection using Microfluidics

Problems/Challenges

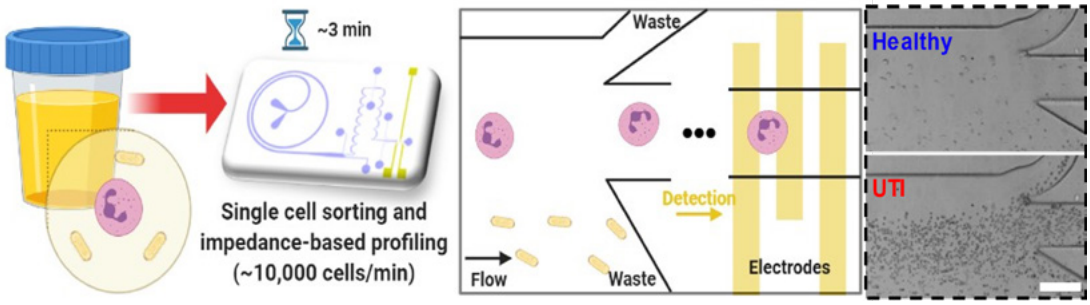
Conventional diagnosis of urinary tract infection (UTI) requires urine culture for bacteraemia which is **laborious and time consuming (~1 to 2 days).** Neutrophils, a key component of our innate immunity, are critical in resolving infections, and elevated counts in urine samples are often associated with UTI. In this project, the team aims to develop a **low-cost microfluidic chip for electrical-based neutrophil quantification in urine directly for rapid UTI screening.** This interdisciplinary project ((ID POCT/17003) is a collaboration between engineers at NTU and clinicians from TTSH and NCID.

Findings/Solutions

The developed label-free microfluidic urine cytometer first separates neutrophils by size and eliminate smaller bacteria/cell debris prior electrical quantification of cell size, membrane and nucleus properties at single cell resolution. The team clinically validated the platform using urine samples from healthy (n = 20) and UTI patients (n = 20) and observed a significant increase in large cells (> 10 µm, putative neutrophils and epithelial cells) as compared to healthy controls. Based on cell count and biophysical properties, they **achieved ~82% accuracy in identifying UTI cases within 5 minutes without any chemicals or antibodies.**

Current Status/Future Plans

A potential clinical utility is to perform culture-free urine screening in outpatient and emergency departments to eliminate non-UTI cases, while urine samples from suspected cases can be further cultured to confirm bacteria presence and species. **This will help reduce unnecessary healthcare cost and workloads.** Future work includes clinical testing with larger cohorts to characterise the biophysical effects of neutrophils when exposed to antibiotics, separating and characterising bacteria on the platform, identifying resistant versus susceptible bacterial strains with antibiotic exposure, as well as extending this technology to other sample types, e.g. point-of-care liquid biopsy (blood) testing.



Contributed by:
Dr Shawn Vasoo
Senior Consultant
NCID

Workflow of integrated impedance cytometry for rapid screening of urinary tract infection. Dotted box shows representative images of particle sorting from healthy and UTI samples.

The 'Little Brain' and Its Not-so-little Role in Psychiatric Disorders

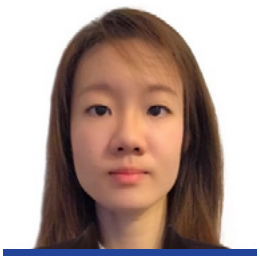
Earlier studies have revealed another candidate in the pathophysiology of schizophrenia (SCZ): the cerebellum (Latin for 'little brain'), which is increasingly implicated in non-motor functions. Of note, the CaV2.1 voltage-gated calcium channel is highly expressed in the soma and dendrites of cerebellar Purkinje cells (PCs) and is the most abundant presynaptic calcium channel. Hence, the combined team from NHG-NUS-NTU seeks to elucidate the clinical, cognitive correlates of cerebellar dysfunction in SCZ and whether alternative splicing of CaV2.1 in the brain underlie its molecular pathology.

At IMH, Assoc Prof Sim Kang and Ms Chew Qian Hui compared clinical differences between patients and controls, as well as patients with fewer and more cerebellar signs (CS). **They found that the presence of CS in patients was associated with greater symptom severity, and poorer motor speed. It was also associated with less frequent use of self-distraction as a coping strategy, which may be related to cognitive inflexibility related to cerebellar dysfunction. Patients without CS employed less self-blame coping at a higher level of resilience.**

At the NUS lab, the exon 37a of CaV2.1 was conditionally knocked out in cerebellar PCs of the mice before they were put through a series of behavioural tasks. Prof Soong Tuck Wah and Dr Sean Yeow **found that the mice evidenced a significant decrease in working memory capacity and/or impaired spatial memory as well as deficits in social behaviour, but no significant depressive-like behaviour.** At the NTU lab led by Prof George Augustine, they found that **there were alternations in synaptic strength and plasticity at the PC-DCN synapses in the knockout mice, which suggest that alternative splicing of CaV2.1 channels in Purkinje cells can affect cerebellar information processing, leading to cognitive and behavioural dysfunction.** This highlights the value of inter-disciplinary collaboration to better understand the neurobiology of clinical features seen in SCZ with the potential to identify biological markers of illness syndrome and prognosis.

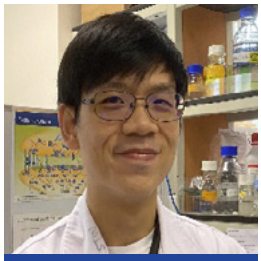
Contributed by:

***Assoc Prof Sim Kang**,*
Senior Consultant, IMH



***Ms Chew Qian Hui**,*
Research Assistant, IMH

***Prof Soong Tuck Wah**,*
NUS



***Dr Sean Yeow**,*
Research Fellow, NUS

***Prof George Augustine**,*
LKCMedicine, NTU

Minister for Health Launches SG100K and Enrols in Study

LKCMedicine is conducting Singapore's largest longitudinal study, SG100K, which aims to identify the social, environmental, lifestyle, and genetic factors associated with diseases prevalent in Singapore, such as diabetes, hypertension, and cancer. It will include 100,000 Singaporeans and span over several decades. The study could lead to the development of better tools for predicting and preventing chronic diseases among Singaporeans and other Asian populations. The study was officially launched by Singapore's Minister for Health, Mr Ong Ye Kung, who also joined the study as a participant.

Click here to find out more.

Minister of Health Mr Ong Ye Kung launched the SG100K study by NTU Singapore's Lee Kong Chian School of Medicine.

Second Pan-Asia Symposium on Genetics of Brain Disorders

LKCMedicine recently played host to the highly anticipated 2nd Pan-Asia Symposium on Genetics of Brain Disorders, which took place from 3 - 5 November 2022. The event brought together some of the world's leading experts in neuropsychiatric disorders, provided a platform for the sharing of cutting-edge research and fostered collaboration towards the development of more effective therapeutics. One of the highlights of the symposium was a keynote lecture by Harvard University Distinguished Service Professor of Stem Cell and Regenerative Biology Steven E Hyman from the Stanley Center for Psychiatric Research at the Broad Institute of MIT and Harvard, USA, who impressed the audience with a talk titled "Psychosis: Progress in understanding complex brain disease".

World's leading experts sharing cutting-edge research on Genetic Brain Disorders

Click here to find out more.

NHG CRCs Received the Distinguished Contributor Award for Clinical Research Coordinators (DCA-CRC) 2022

Clinical Researcher Coordinators (CRCs) are the pillars of Singapore's clinical research community. CRCs have proven to be of great value and importance to research investigators in **building a more holistic and synergetic system towards accomplishing greater clinical research.** They are the engine behind clinical trials contributing towards the generation of scientific knowledge and innovation, leading to the development of new treatment, drugs and therapies for patients.

The DCA-CRC was initiated in 2019 by Singapore Clinical Research Institute (SCRI) to recognise the dedication and contributions of CRCs. Each year, 1 Distinction Award, 3 Merit Awards and up to 5 Finalist Awards will be given out. For more information about the awards, please click here.

In January 2023, our very own NHG colleagues, Ms Priscilla Neo Yu Jun (TTSH) and Ms Wan Wen Yi (YH) received the **DCA-CRC under the Finalist Category.** Here are what the awardees have to say about receiving the awards, and their motivation and aspirations for research:

Ms Priscilla Neo
CRC
Clinical Research and Innovation Office
TTSH

"I feel deeply humbled and appreciated to receive the 2022 Distinguished Contributor Award. Knowing that my work is being recognised gives me the drive to do even better. Clinical research is a challenging field no doubt, but being able to be in the frontline and seeing the positive outcomes the research treatments have on our patients, heartens me. Keep going, and know that what you're doing will benefit others one way or another!"

Ms Wan Wen Yi
Research Nurse
Clinical Research Unit
YH

"I was truly humbled to have received this award. However, I feel that the honour is also shared by all my colleagues and mentors who helped to shape my career as a clinical research coordinator. The journey of a CRC is made remarkable by how many patients we have helped along the way, and the camaraderie that was formed with fellows CRCs by sharing knowledge and experiences."

Congratulations to Assoc Prof Lim Su Chi on Receiving the LKCMedicine Dean's Awards 2022!

In recognition of his research contributions to LKCMedicine, Assoc Prof Lim Su Chi (Clinical Director, Clinical Research Unit, YH and Clinician Scientist Development Office, NHG Group Research) was conferred the **Dean's Awards for Research** in December 2022.

The awards celebrate individuals and teams who have made outstanding contributions to the LKCMedicine's standing and achievements in areas of research, education, service, administration and innovation (team). The event is in its third edition since it was launched for the school's 10th commemorative year.

For more information about the Dean's Award, please click here.

In a recent interview, Assoc Prof Lim also talks about the major healthcare "tsunamis" that we are facing, what is being done to tackle diabetes in Singapore, and how medical students can get started in research. Click here to read more.

Assoc Prof Lim Su Chi (middle) with his research team

Nudging in the Right Direction

In recent years, behaviourally driven policies such as nudges have been increasingly implemented to steer desired outcomes in public health. The present study examines the different nudges, and the socio-demographic characteristics and lifestyle behaviours that are associated with public acceptance of lifestyle nudges.

The study used data from the nationwide Knowledge, Attitudes and Practices study (KAP) on diabetes in Singapore. **Three types of nudges arranged in increasing order of intrusiveness were examined:** (1) information government campaigns, (2) information governmentally mandated and (3) default rules and choice architecture. Acceptance was assessed based upon **how much respondents 'agreed' with related statements describing heathy lifestyle nudges.** Multivariable linear regressions were performed with socio-demographics and lifestyle behaviours using scores calculated for each nudge.

The percentage of respondents who agreed to all statements related to each nudge were: **75.9% (information government campaigns), 73.0% (information governmentally mandated),** and **33.4% (default rules and choice architecture).** Respondents of Malay/Others ethnicity (vs. Chinese) were more likely to accept information government campaigns. Respondents who were 18 – 34 years old (vs 65 years and above), female, of Malay/Indian ethnicity (vs Chinese), were sufficiently physically active, and with a healthier diet based on the DASH (Dietary Approach to Stop Hypertension) score were more likely to accept nudges related to information governmentally mandated. Respondents of Malay/Indian ethnicity (vs Chinese), and who had a healthier diet were more likely to accept default rules and choice architecture.

Overall, individuals prefer **less intrusive approaches** for promoting healthy lifestyle. **Ethnicity and lifestyle behaviours are associated with the acceptance of nudges** and should be taken into consideration during the formulation and implementation of behaviourally informed health policies.

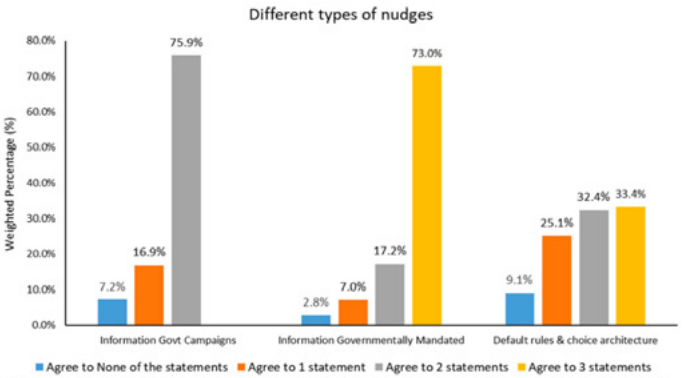


Fig. 1 Breakdown in percentage of individuals who agree to statements within the nudge classifications of information government campaigns, information governmentally mandated, and default rules and choice architecture

Tan, Y. W. B., Tan, E. R., Sin, K. Y., AshaRani, P. V., Abdin, E., Roystonn, K., ... & Subramaniam, M. (2022). Acceptance of healthy lifestyle nudges in the general population of Singapore. BMC Public Health, 22(1), 1297.

Contributed by:
***Tan Yeow Wee Brian**,*
Research Assistant,
Research Division, IMH

LKCMedicine Launches Biosafety Level 3 Laboratory

The launch of LKCMedicine's new Biosafety Level 3 laboratory (BSL-3) on 2 December, marked a significant milestone in the progress of research into pandemic viruses and deadly bacterial infections. Guest-of-Honour, Assoc Prof Kenneth Mak, Director of Medical Services at the Ministry of Health, graced the occasion. The laboratory located in the Experimental Medicine Building, will enable safe handling of dangerous bacteria and viruses, taking research efforts to the next level.

Click here to find out more.

LKCMedicine's new Biosafety Level 3 laboratory (BSL-3) officially launched by Guest-of-Honour, Assoc Prof Kenneth Mak, Director of Medical Services at the Ministry of Health

My Journey with WIND

I started the bronchiectasis clinic in 2016. Most of the bronchiectasis patients that I see in the clinic have excessive sputum which leads to cough and breathlessness due to the underlying damaged airways. Bronchiectasis is affecting the quality of life of my patients. Their respiratory symptoms and recurrent pulmonary exacerbations affect their social life, work performance and daily life. My patients told me that they could not sleep well at night due to waking up by coughing as excessive sputum irritates their lung and throat. The long-term symptoms are stressful and torturous.

The best treatment for bronchiectasis is to get rid of the excessive sputum from the lung. However, the chest physiotherapy will need to be performed by the patients once or twice daily. The physiotherapy technique has to be good and consistent for effective airway clearance. **Many of the patients find it hard to keep up with the daily chest physiotherapy as it is time consuming and tiring**. For some patients, a carer is needed to do the chest physiotherapy for them.

All the aforementioned posts a tremendous challenge and burden to bronchiectasis patients and their families. I want to do something that can improve their quality of life and alleviate their sufferings. Something that the patients would use and benefit from it. Thus, the WIND project was started in 2018. **WIND is a Wearable Intra-Nasal Device that provides automated intrapulmonary percussion and mobilises sputum towards the mouth for expectoration i.e., an automated portable chest physiotherapy device** (Figure 1). WIND has successfully progressed from benchtop concept verification, prototype development and first in-human (FIH) clinical trial. My journey with WIND is exciting. The driving force of this project is my patients.

Figure 1. Illustration of the WIND System

Contributed by:
***Dr Albert Lim**,*
Senior Consultant,
Respiratory & Critical Care Medicine, TTSH

DEFINITE-ly a STEP Forward in Our LEAPP for Better Diabetic Foot Care in NHG

DEFINITE (Diabetic Foot in Primary and Tertiary) Care is a pan-cluster, inter-institutional programme which aims to achieve coordinated multi-disciplinary care across primary and tertiary institutions for patients with diabetic foot ulcers (DFU), to decrease the clinical and economic burden of DFU within NHG. This is enabled through (1) scaling up existing primary care **DM Foot Screening and Surveillance, Treatment, Escalation Programme for Ulcer Prevention (DM Foot STEP)** programme and tertiary care MDT-style **Lower Extremity Amputation Prevention Program (LEAPP)** clinics, (2) closed-loop coordination of care between primary and tertiary institutions, (3) adoption of a patient-centric and patient-owned digital wound imaging app and (4) health economics analysis to evaluate cost effectiveness and long-term financial sustainability of the programme. The programme started in June 2020 and is a first-of-its-kind locally and regionally, in terms of health service delivery and innovation for DFU care across care settings. The programme has enhanced service and care delivery for patients with DFU across all polyclinics and hospitals in NHG, translating to **improved clinical outcomes (i.e. reduced major and minor LEA, improvement in cardiovascular profile) for patients with DFU.**

Under the guidance of NHG Diabetes and Metabolic Steering Committee, DEFINITE Care has brought together a team of more than 60 healthcare professionals consisting of endocrinologists, vascular surgeons, orthopaedic surgeons, primary care physicians, nurses, podiatrists and administrators across all NHG institutions (NHGP, TTSH, KTPH, WH), with strong support by Health Services and Outcomes Research (HSOR) unit and Group Integrated Care (GIC). Through bi-monthly clinical review meetings, DEFINITE Care provides a collaborative framework for clinical improvement and research endeavours. Quarterly DEFINITE Journal Club sessions encourage adoption of guidelines-recommended and evidence-based practice.

Interim results of DEFINITE Care were presented at Singapore Healthcare and Biomedical Congress in 2021, with subsequent 18-month results published in International Wound Journal late 2022. In November 2022, DEFINITE Care was awarded the **National Healthcare Innovation and Productivity Medal (Care Redesign).** Through improvement of diabetic foot screening via Foot Surveillance (FS) services within NHGP, DEFINITE Care aims to next target further upstream in the disease process with secondary prevention of DFU. We hope that both clinical and health economics findings from DEFINITE Care will advise and guide future policies, hence improving healthcare delivery and outcomes for patients with DM foot conditions.

https://youtu.be/0y7M_8a_7CI?t=70

A video on National Healthcare Innovation and Productivity Awardees, with DEFINITE Care featured

Contributed by:
Dr Joseph Lo, Consultant, WH
Dr Elaine Tan, Assoc Consultant, NHGP
Dr Liew Huiling, Consultant, TTSH
Dr Shaun Chan, Assoc Consultant, KTPH
Dr Hoi Wai Han, Senior Consultant, WH
Dr Gary Ang, Consultant, HSOR
Ms Deborah Lim, Assistant Manager, GIC

On behalf of DEFINITE Care Collaborators and NHG DM Steering Committee

DEFINITE Care Appreciation Dinner on 13 January 2023, with the National HIP Award Medal

Nursing Has a Part to Play in Research

The basis of research is clinical equipoise requiring the generation of knowledge to understand the unknown. Nurses interact closely with patients/clients to develop deep understanding of their needs. **Findings from research provide a body of knowledge to inform effective clinical practices to improve patient care.** The National Institute of Nursing Research (NINR), a renowned nursing organisation, suggests that research methods aid in resolving pressing health challenges to inform policy and advance health equity, in addition to optimising patient care.

Even when research responsibilities may not be the typical responsibilities of an entry-level nurse, evidence-based practice is. **Even when nurses do not conduct their own research, they can use research findings in their everyday practice and teach others using existing research evidence.**

Globally, there is the NINR that provides scientific programs, funding criteria as well as training and policies to advance nursing research. Locally there are research divisions in all institutions providing similar services.

My work at IMH Nursing department, involve the provision of **similar services for nurses to support their pursuit of scholarly work.** Together, we provide guidance to ensure research activities by fellow nurses are in line with the national and institutional requirements. Consultation on research methods, provision of mentorship and conduct of journal clubs to promote interest in research are some examples of our work.

Together with a team of nurses, we also manage the Joanna Briggs Institute-Institute of Mental Health, Centre for Evidence-based Practices in Mental Health Care (JBI-IMH). Activities centre around **(1) Research:** collaborating with the multi-disciplinary team to advance mental health research, **(2) Synthesis:** appraising and developing reviews on to identify the latest evidence to address clinical problems, **(3) Dissemination and translation:** engaging stakeholders to apply evidence into practice and **(4) Capacity building** to promote nursing research through group educational platforms and individualised coaching.

Contributed by:
***Dr Xie Huiting**,*
Senior Nurse Educator,
Nursing (Education), IMH

(Re)Searching Youth Positive Mental Health in Middle Age

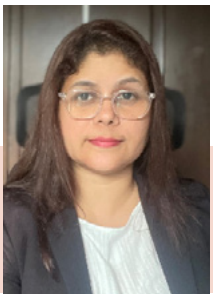
I received the coveted National Medical Research Council's Research Training Fellowship (RTF) award to pursue a **PhD in Public Health** four years ago. I have always realised that, like all successful researchers, getting this degree would open many doors and avenues to reach my potential. With the strong backing from my mentors, Prof Chong Siow Ann and Assoc Prof Mythily Subramaniam; my husband's (nearly) unconditional support, and my parents' blessings, I embarked on this enriching (yup, that's the word!) adventure.

Before starting my doctorate, I had spent ten years at the IMH, understanding what adults thought about **positive mental health.** It is a state of mind that is not bound by the limits of illness; persons diagnosed with disorders can also possess mental well-being and demonstrate positive functioning and feelings. I decided to look upstream at Singaporean youths and understand what positive mental health meant to them. **Youth is a dynamic period in one's life,** and many times, what we do, think, and assimilate in this age influences the rest of our life through the relations we form, the goals and standards we set for ourselves, and the reserves we build to stay healthy and resilient. Gen Z - as they are called in popular culture - have **newer demands, pressures, and habits,** including access to global news, sensationalism, and online interactions. These experiences have shaped youth mental health very differently. Service providers and policymakers must **break the lens of psychopathology** and understand how young people define mental well-being in the contemporary setting to appropriately meet their needs.

My PhD project used **mixed-method research to understand the phenomenon of positive mental health from a youth perspective.** As I conclude my final year, it sparks reflection on what new I have gained at my age from youngsters that can strengthen my mental health further. My ethos is best summarised by this teenage research participant -

"It all comes down to, "Can you be happy with who you are, what you have, and what you can achieve?"; "Do you have people in your life whom you can trust, who genuinely care for you, and whom you care about?". That's it!"

My learning journey continues...



Contributed by:
***Ms Janhavi Ajit Vaingankar**,*
Deputy Director,
Research, IMH

Repurposed Molecule, Reverse Thinking

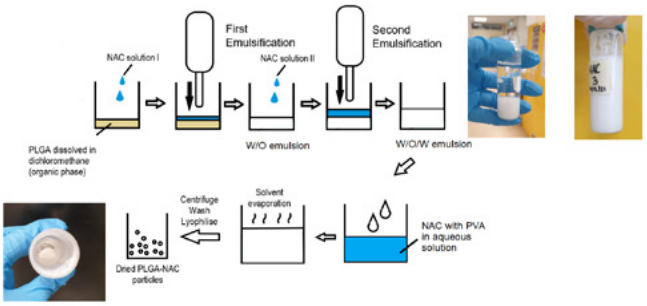
As a compounding pharmacist in National Skin Centre, my job entails into an interesting area of crafting preparations that are not available commercially. In the sea of literature, I have come across N-acetylcysteine (NAC) as a potential molecule which can be repurposed for topical acne treatment.

NAC is a mucolytic used to dissolve phlegm in productive cough. NAC had been published as a topical lotion for the treatment of lamellar ichthyosis in children and in aqueous gel for treatment of mild to moderate acne. **Albeit being an effective treatment option, published papers have unanimously pointed out the poor stability of NAC leading to short shelf life and increasing pungent smell over time.**

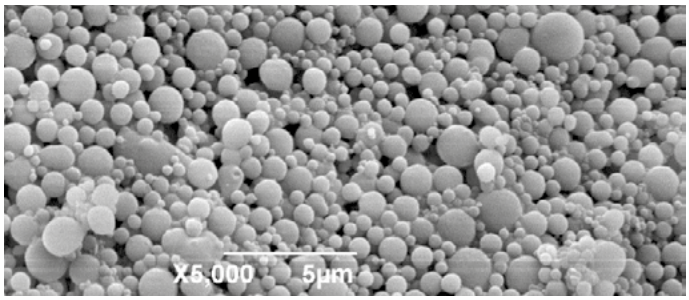
I have had the great honour to work in a research laboratory under Assoc Prof Sierin Lim from Nanyang Technological University, School of Chemical and Biomedical Engineering and her former PhD student, Dr Juhi Singh. NAC was encapsulated in hydrophobic poly lactic co-glycolic acid (PLGA) polymers using double emulsion method. The hypothesis was the encapsulation with PLGA can stabilise NAC in aqueous environments and increase the skin permeability of hydrophilic NAC.

Encapsulation has been shown to increase the retention of NAC in the synthetic membrane, Strat M® which was chosen for permeability tests. **However, the encapsulation did not stabilise NAC further.** Encapsulated microparticles was only stable when kept in -20 °C and thus impractical for topical use.

Although the project outcomes were unfavourable, this journey has built up my resilience. **I accepted the outcomes, reviewed my thought process and addressed them with another approach.** Rather than pursuing expensive cutting-edge technology, removal of water from the cream seems to be sensible because water is the required reactant for hydrolytic degradation of NAC. Even so, work remains to be done to improve the scent of the anhydrous formulation.



Encapsulation steps: double emulsification method with external water phase doped with NAC



SEM imaging (JEOL JSM 6390LA) of microparticles: spherical particle morphology which is the characteristic of the double emulsion method

Contributed by:
***Ms Winnie Choo**,*
Senior Pharmacist,
NSC

Come Meet The NHG innovators

Dr Violet Hoon is a consultant with the Department of Cardiology at TTSH. She leads the Cardiac Rehabilitation Services and is part of the Heart Failure Service team. A passionate clinician innovator, Dr Hoon actively pursues innovation and research in areas of interest including heart failure, cardiac rehabilitation and MedTech, encompassing devices, digital health and AI solutions.

Dr Grace Leong is a senior project manager at NHG CMTi. She is an experienced member in the supporting system of NHG's innovation and enterprise ecosystem, having been with the NHG CMTi team since its inception in 2017. Being the lead secretariat of the National Therapeutics and Vaccines (TxVax) panel – an expert committee consisting of scientists and clinicians, Dr Leong has also played a key role in supporting the landscape scanning of new therapeutics and vaccine candidates for Singapore to combat the COVID-19 pandemic.

Ms Nicole Lim is the youngest member of the NHG CMTi team. Her journey began as a research assistant with LKCMedicine (Population Health) to conduct social research in chronic conditions. She then ventured to develop and optimise product formulations with a Global Ingredient Supplier. She now brings her industry knowledge to value-add her role as an assistant project manager with NHG CMTi, facilitating collaborations between clinicians and companies to co-develop healthcare solutions.

Our heartiest congratulations to Dr Violet Hoon, NHG's newest Singapore Biodesign Innovation Fellow 2022 Graduate! In this interview with Grace and Nicole, Dr Hoon gets personal and shares her journey as she grows from a clinician to the clinician innovator she is today. Read on to have a glimpse into her learning journey, learn about her inspirations and support system, and her advice to budding innovators.

Nicole: Hi Dr Hoon! A warm welcome back from your innovation fellowship. We're all excited to hear about your experience. You were away for a full 6 months and had the opportunity to participate in probably the fellowship's most exciting segment, the overseas immersion. Tell us more! Where did you travel to?

Dr Hoon: We went to Melbourne, Australia and San Francisco, USA for the overseas immersion segments of the fellowship.
The trip to Melbourne mainly revolved around immersing and speaking to experts at The Alfred Hospital, a leading tertiary hospital in Melbourne, Victoria, and also meeting key players in the innovation ecosystem. We were able to validate the clinical needs and our project. We also identified Australia as a potential clinical trial site for our project.

The trip to San Francisco was eye opening. We had the honour and privilege to spend time in both Fogarty Innovation and Stanford Biodesign. Meeting Medtech giants like Andrew Cleeland, the CEO of Fogarty, who headed successful startups like Radiant Medical, Ardian and Twelve Inc and his team of seasoned professionals in the MedTech industry like Marga Ortigas-Wedekind, Gayle Kuokka and Greg Bakan, just to name a few, was truly amazing and fruitful. They offered customised guidance for our team's project in all aspects including prototyping, commercialisation reimbursement and regulatory; and helped sharpen our pitch deck.

They welcomed us and guided us like family, and we left Fogarty feeling like we truly were part of the Fogarty Innovation family, and I am sure our relationship will continue far into the future.

Nicole: Any part of the trip that was especially memorable for you?

Dr Hoon: This special mention will have to go out to a personal inspiration of mine, Dr Frederick St Goar. He is the interventional cardiologist who founded Evalve Inc, the company that developed the MitraClip device, and also part of two other companies HeartFlow Inc. and Nanostim Inc. He is an amazing human being, kind, humble and nurturing. He validated our project and even offered a letter of support. It was really a privilege to meet a senior cardiologist who has had so much experience in clinical innovation in cardiology and has made a great impact

2022 Singapore Biodesign Fellows with Dr Josh Makower,Co-Founder of Stanford Byers Center for Biodesign

on our patients.

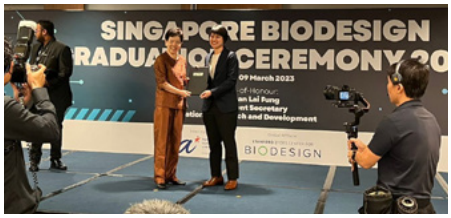
Nicole: In your opinion, among all the centres and institutions you have visited, which do you think is a good role model in terms of clinical innovation?

Dr Hoon: Stanford Healthcare is a world-renowned healthcare system that has a strong focus on innovation, which makes it a good role model. Within Stanford, the Stanford Biodesign program has led to the development of many groundbreaking medical devices and therapies. Their Center for Digital Health is focused on leveraging digital technologies to improve healthcare delivery and patient outcomes including mobile health apps, telemedicine solutions and remote patient monitoring systems. Other initiatives include funding for innovation and a strong site for clinical trials and precision health related work.
I think NHG can emulate Stanford in terms of its commitment to innovation with the different initiatives. All these have helped Stanford Healthcare to improve patient outcomes, advance medical knowledge, and develop new medical technologies and solutions.

Possibly as a first step, NHG could build a Biodesign Program within NHG for NHG clinician innovators.

Grace: Sounds like you had an enriching learning and networking opportunity, one spent in the presence of the experts who are grounded in the MedTech scene. If you could sum up your fellowship experience into three key takeaways, what would they be?

Dr Hoon: 1 The Biodesign process of innovating medical technologies is an excellent framework that should be used and applied by anyone who wants to innovate in healthcare. The key phases of "Identify" (understanding the clinical need and context), "Invent" (developing and evaluating solutions) and 'Implement' (implementing the solutions/ideas) is a simple process that can be easily applied to a wide variety of clinical areas.



2 Always ask 'So What?' (quote from Mr Peh Ruey Feng, Founding Fellowship Head of Singapore Biodesign and our Singapore Biodesign mentor). Understanding the impact of an unmet need and the implications of the solution in all aspects is important.

3 As Tom Fogarty, surgeon inventor extraordinaire, founder of Fogarty Innovation says: "A good idea unimplemented is no more worthwhile than a bad idea. If it doesn't improve the life of a patient, it doesn't count."

> ***"As long as we innovate for our patients, to improve our patients' outcomes or to improve their experience, then it's a worthwhile innovation."***

Nicole: Share with us, how did you go about applying for the programme? What was the process like? And apart from having the backing of your department and HOD, how were you supported by NHG?

Dr Hoon: The application was straightforward. For the first round, we had to submit an essay on why innovation was an important part of my career pathway and how the Innovation Fellowship would help me achieve my short and long-term goals. The second round involved filming a video essay and I engaged some help from my media savvy friends. I had immense support from CMTi throughout the entire process and CMTi was probably one of the reasons for my success in the application. So a big thank you to Grace, Hannah, Amanda, William, Louis, Prof Thomas Lew, Dr Tan Cher Heng, and Dr Loh Yong Joo for your guidance!

The final interview was conducted via Zoom and questions revolved around the innovation projects, my research interests, problem solving and leadership skills. I prepared for the interview by anticipating questions about my innovation projects, but otherwise it was just being confident and being prepared mentally for any questions that may come.

Nicole: Any encouraging words to fellow colleagues who may be keen to apply for the fellowship?

Dr Hoon: **Be yourself, be confident, open minded and humble. It would be good to demonstrate or have some prior experience in MedTech related projects. A plus point if you have other skillsets that are important in the MedTech industry.**

Follow NHG CMTi on LinkedIn to learn more about NHG Group Research's latest research & innovation highlights!

Grace: CMTi has been on this journey with you since the early days when you started out in innovation. To name a few, we have worked with you to understand and refine your clinical needs, seen you through grant applications, and helped to manage your intellectual property and collaborations. What we are most proud of is to see you grow from a clinician into a clinician innovator, and witnessing your projects take flight from ideas into an impactful healthcare products that can help your patients, such as the Heart-Track App. Take us back to the beginning, how did you get started?

Dr Hoon: As a young trainee, I encountered multiple systemic issues and unmet patient needs which resulted in poor patient outcomes and often avoidable suffering. I always felt a strong need to innovate and invent but was always too tied down by clinical work or lack of experience.

Growing up, I wanted to be a scientist and invent something that could win a Nobel Prize and make a difference to people's lives. Choosing medicine instead has allowed me to do both inventing as part of innovation and healing with my clinical skills.

My journey in innovation truly began as I took on a leadership role in the cardiac rehabilitation service in TTSH and as a consultant in the heart failure service. I saw immense potential for the adoption and long-term sustainability in the novel cardiac rehabilitation mobile application led by the cardiac physiotherapists in my team. It excited me that this foray into digital health technologies for cardiac rehabilitation could enable better engagement and compliance for our cardiac patients. In addition, I had the opportunity to work with a startup on a heart failure diagnostic device. So, I guess these were the 2 core experiences that begun my innovation journey.

Grace: Was there a reason why you decided to pursue the clinician innovator route over the clinician scientist track?

Dr Hoon: The clinician innovator route was ideal for me as I was always interested in emerging healthcare technologies and its role in improving healthcare delivery and clinical outcomes for patients. In addition, I am by nature, someone who likes to ideate, invent, and solve problems, and am relatively tech-savvy. I like to think of myself as forward thinking and open to new ideas and new collaborations with different people. I truly enjoy working with people from diverse backgrounds like engineers, scientists, allied health professionals that can offer an alternative perspective to a problem. I love generating new ideas and working on them to create a feasible and tangible device or product to solve unmet needs. In summary, **being a clinician innovator enables me to translate ideas and acquired knowledge into devices or processes or systems that help to improve health outcomes for patients.**

Traditionally, most would define clinical research as applying scientific methodologies to acquire knowledge about a certain subject, while clinical innovation is about applying the acquired knowledge for the improvement of devices/ processes/ services. I strongly feel that both complement each other – scientific knowledge does need to be researched on to show real outcome measures and these new knowledge should be translated to real world innovative bedside solutions that could potentially help patients.

Nicole: Tell us about your experience working with MedTech startup, Szone Medical.

Dr Hoon: This collaboration opportunity was given to me by both CMTi and Dr Loh Seet Yoong, Head of Heart Failure Services, and with support by Dr Chia Pow Li, Head of Department of Cardiology. As a young company from Israel, they had difficulty translating their novel technology into clinical application. I was able to provide the clinical perspective and understanding of fluid management for cardiac patients which value-added to the co-development and validation of the device, with the goal to deliver a product that would meet the needs and benefit patients. Working closely with the engineer in the team to improve the device was definitely exciting and interesting. Conducting the clinical trial was sobering but definitely taught me important principles that I will apply in subsequent projects.

Grace: Considering this was your first innovation project, no doubt a sizeable collaborative project with a MedTech startup that is a spin-off of NHG and Trendlines Medical Singapore, a world renowned medtech incubator. Was there anything that helped ease you through the project experience and to make sure you were on the right track?

Dr Hoon: The CMTi team was key during the entire process, from understanding of the base technology, their intended business model to IP matters etc., and guiding myself and the team through the different phases of the project. Through the CMTi team, I was able to accelerate my learning and understanding of the innovation ecosystem and at the same time be exposed to the local MedTech industry.

Nicole: A common concern we hear from our healthcare colleagues is that it's hard to find time for innovation out of their busy clinical work. Has there been a workaround for you?

Dr Hoon: Late nights. To essentially integrate my daily work with innovation work, I take the opportunity to constantly identify unmet clinical needs in my daily work and I am constantly thinking of ideas and solutions to improve the current status quo.

The support network in NHG CMTi definitely eased the journey. The team at CMTi are made up of wonderful people who believe in clinical innovation and are skilled in the innovation ecosystem. They are always ready to help and I am blessed to consider them as trusted team members in every project that they have been involved in.

Nicole: As lead for the NHG HAP Digital Health Applications user group that focuses on condition specific or related digital health applications with specialized intervention episodes, and with your experience in several digital health projects, are there any learning points you can share to guide our innovator community?

Dr Hoon: Adoption of a digital solution is largely dependent on the payor. Reimbursement determines the success of adoption and implementation of a digital health solution. There needs to be a clear plan on early adoption otherwise the digital solution will not be able to be scaled up. Thankfully, NHG and TTSH have made it mandatory to truly digitalize our healthcare system to improve our patient's experience and outcomes, which has made the journey of innovation with digital technologies slightly easier.

Set clear goals and objectives for the project. Do the necessary research prior to starting one, which include evaluating applicability of the digital solution in the specific disease state, the existing treatment landscape, (try not to reinvent the wheel), the stakeholder analysis and market analysis.

Most importantly, ignore the naysayers (no lack of critics in the public healthcare system) **Connect with people you trust and who believe in your cause. Stay focused and hang on to your idea and dream.**

CMTi Centre for Medical Technologies & Innovations
Enabling Innovation through MedTech

The Centre for Medical Technologies and Innovations (CMTi) is NHG's primary engine that drives innovation through the translation of ideas into implementable products, bridging the gap between unmet clinical needs, MedTech development, and innovative healthcare solutions.

Share your clinical needs, innovative ideas, or questions about innovation here!

Speak to us today.

We welcome you to connect with us.

Training Calendar

Date	Training Courses	Course Provider
Monthly	Good Clinical Practice (Online)	NHG Group Research
	(PCR100) Study Start-Up: Budgeting, Case Report Form Design and Database Design*	
	(PCR200) Study Conduct I: Subject Recruitment and Informed Consent*	
	(PCR300) Study Conduct II: Documentation, Safety Reporting and Investigational Products*	
	(PCR400) Monitoring, Audits and Inspections*	
20 Jul 2023	Designing Research Studies	TTSH CRIO
2 Aug 2023	Basic Biostatistics	
15 Sep 2023	Basic Grant Writing	
27 Sep 2023	Basic Biostatistics	
6 Oct 2023	Basic SPSS	

*** Blended learning courses involving Online Lectures coupled with a Classroom Workshop on a stipulated date.**

Dates are subject to changes without prior notice.

For registration and full details on courses by:

NHG Group Research
Please visit www.research.nhg.com.sg (Training & Education → Register for Courses and Other Events)

TTSH CRIO
please email to CRIO_publication@ttsh.com.sg

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Jan 2023:
Using FormSG as a Research Data Capturing Tool »

Nov 2022:
Regulatory Guidance on Consent Requirements for Clinical Trials involving Collection and Use of Human Tissue »

Feb 2023:
Tips to Prevent Informed Consent Non-Compliances »

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Mar 2023:
How to Obtain informed Consent from Subjects with Cognitive Impairment »

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