

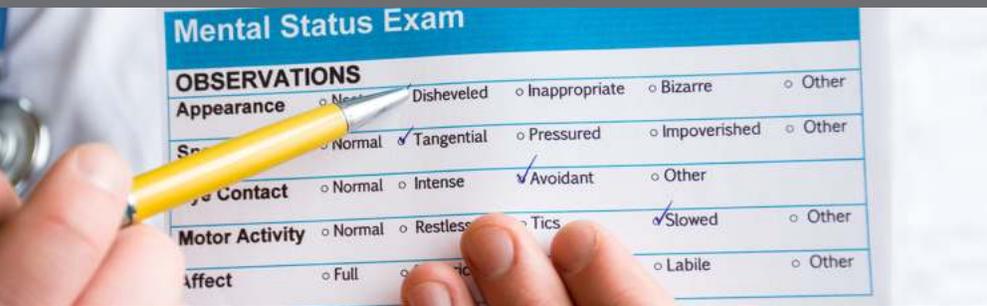


e-catalyst

ACCELERATING RESEARCH



Development and Validation of the Rapid Positive Mental Health Instrument (R-PMHI) for Measuring Mental Health Outcomes in the Population



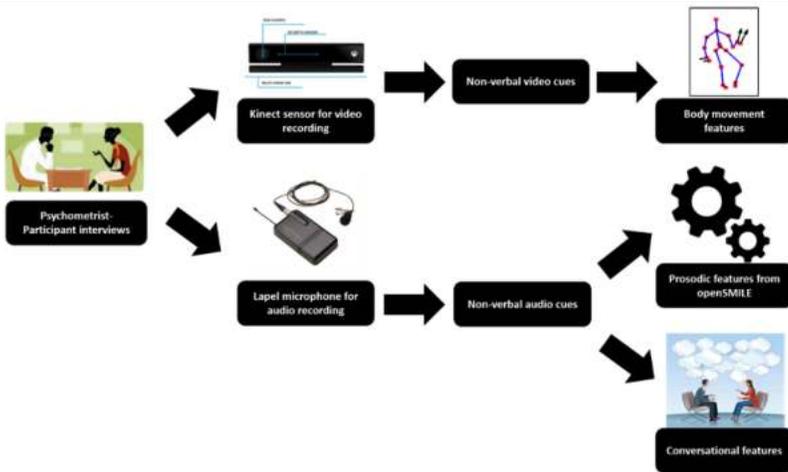
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Working on the Frontline Against COVID-19



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Automated Analysis of Negative Symptoms in Patients with Schizophrenia by Non-verbal Signals



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Of Mice and Men – How Mice Experimentation Sparked My Interest in Basic Science Research



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The Unwitting Researcher



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NHG CMTi COVID-19 MedTech Innovation Grant Awardees

In response to the need to seed and bridge MedTech developments around COVID-19 management, the NHG Centre for Medical Technologies & Innovations (CMTi) launched the COVID-19 MedTech Innovation Grant Call in April 2020. **The grant aims to fund development and clinical adoption of solutions (product or process) that are commercially viable to resolve unmet needs in healthcare**, including but not limited to the following areas relating to COVID-19 management: diagnostic technology, infection control, monitoring, supportive equipment, and operation capability for affected healthcare services. After a rigorous evaluation process, a total of 13 applications were selected for funding.

We look forward to the development of new solutions that would improve healthcare delivery amidst the pandemic and beyond!

Congratulations to the following successful grant awardees!

Project Title	Principal Investigator	Institution
Automating Hospital Cubicle Curtains to Reduce Environmental Contamination on High Touch Surfaces	Dr Yong Enming	TTSH
Re-inventing Technology- Enabled Clinical Pathways to Optimise Communication and Quality of Life	Ms Chua Huiling Christine	TTSH
Telerehabilitation Speech Therapy	Ms Lee Jia Wen	TTSH
Bedside Alarm Recognition (BAR)	Ms Wendy Leong	TTSH
Use of Smart Phone Application to Digitalise Monitoring of Access Flow and to Prompt Intervention for Dialysis Access Patients	Dr Yong Enming	TTSH
Heart Track 1.5, A Mobile Application for Complete and Individualised Cardiac Rehabilitation: A Prospective Cohort Study	Dr Hoon Hui Qing Violet	TTSH
“MoveVID” Mobile Application with Tele-Rehabilitation	Ms Cheryl Heng	TTSH
Autonomous Mobile Robot (AMR) UV Disinfection System	Ms Joycelyn Sin	TTSH
Realising the Telerehabilitation Care Model Through Integration of Virtual Reality Gaming Platforms with Reduced Face to Face Professional Consultation	Mr Kuah Wee Keong Christopher	TTSH
Automated Breast Assessments To Reduce Patient Visits To Hospital	Dr Tan Ern Yu	TTSH
Remote Home Gamified Rehabilitation for Patients with Shoulder Disorders (HomeRehab)	Dr Sean Ho Wei Loong	TTSH
Smart Self Triaging and Screening of COVID-19 Patients at Screening Centre	Dr How Kwang Yeong	TTSH
COVID-19 Naso Swab Shield	Dr Angeline Seah	KTPH

Contributed by:

CMTi Office, Group Research, NHG

A Common Data Model to Facilitate Data Sharing

The healthcare data from multiple institutions increase the potential for observational, longitudinal cohort studies, but the healthcare data set of each institution is often built using a wide variety of data models and local terminologies. These **multiple data models organise data in different ways, making it difficult to analyse these multi-institutional data in a comparable and consistent manner.** An analysis across multiple disparate databases must either tailor the analysis to accommodate each of the underlying data models and terminologies, or convert the databases to a common data model (CDM). **The Observational Medical Outcomes Partnership (OMOP) CDM is one of the choices to harmonise the data sets in multiple institutions,** so as to facilitate data sharing and analysis across multiple institutions. Please click [here](#) for more information about the OMOP CDM.



The Observational Health Data Sciences and Informatics (OHDSI) was subsequently formed. The OHDSI is a multi-stakeholder, interdisciplinary, international collaborative with a coordinating centre at Columbia University. Its goal is to create and apply open-source data analytic solutions to a large network of health databases, to improve human health and

wellbeing. Currently, it has >200 collaborators from 25 different countries, and records on about 500 million unique patients in >100 databases.

Click [here](#) to find out more information on OHDSI.



Contributed by:
Dr Shao Yi-Ming
Clinical Research Unit
KTPH

Automated Analysis of Negative Symptoms in Patients with Schizophrenia by Non-verbal Signals

Negative symptoms in schizophrenia are associated with significant burden and functional impairment. In routine clinical practice today, negative symptoms are not reliably and consistently assessed. A lack of objective and efficient assessment of negative symptoms hamper both accurate detection of impairments and monitoring of treatment effectiveness. This study aimed **to explore a novel and automatic method of evaluating negative symptoms in schizophrenia via analysis of non-verbal speech cues.**

The study sample consisted of 54 participants with schizophrenia and 26 healthy controls from the "Towards Socio- and Neuro Feedback Treatments for Schizophrenia" study, a prospective observational study funded by both the Institute of Mental Health (IMH) and the Nanyang Technological University (NTU). **This study, led by A/Prof Jimmy Lee (Senior Consultant, Chief, North Region, IMH) and A/Prof Justin Dauwels (Associate Professor, School of Electrical & Electronic Engineering, NTU) seeks to identify objective measures such as lexical features, non-verbal cues and movement/gesture signals extracted from audio and video recordings, for assessing behaviour in patients with schizophrenia.**

Participants were interviewed following the semi-structured interview guide of the 16-Item Negative Symptoms Assessment Scale (NSA-16), during which audio and video signals were recorded with lapel microphones and Kinect camera. This paper focused on prosody features such as speech frequency and amplitude, and conversational dynamic cues such as speaking duration and

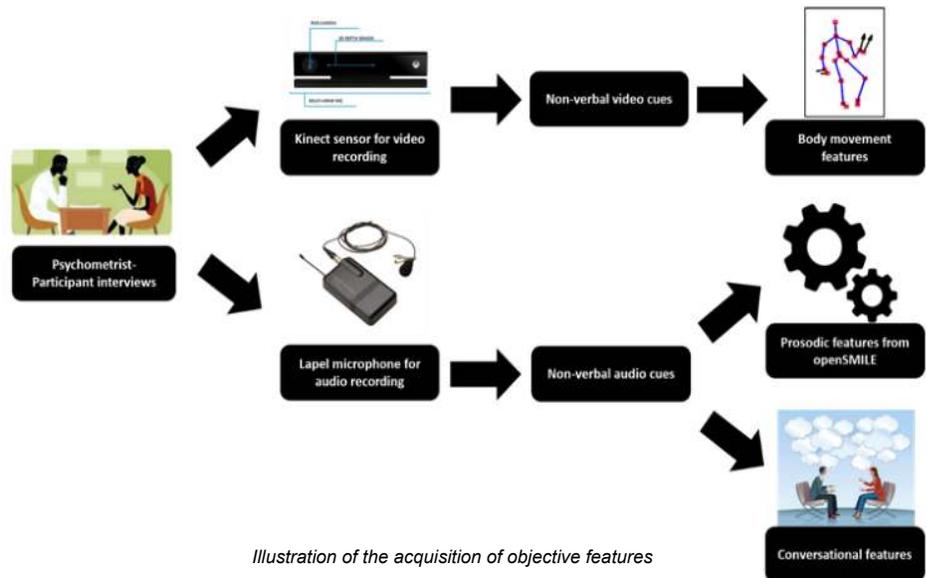


Illustration of the acquisition of objective features

interruption extracted from the audio signals. **We found significant moderate correlations between objective non-verbal speech cues and subjectively rated negative symptoms scores. Employing machine learning algorithms, we were able to distinguish patients from healthy controls with an accuracy of up to 81.3%.**

This proposed method of negative symptoms evaluation based on the automated analysis of non-verbal cues is unique and novel. **Using simple portable equipment to capture audio of conversation between patients and clinicians, the assessment of negative symptoms can be done accurately and in a timely manner** in a clinical setting.

Please click [here](#) to read more about the study.

Contributed by:
Ms Yang Zixu,
Senior Research Psychologist, IMH

On behalf of all paper authors:
- Dr Yasir Tahir
- Dr Debsubhra Chakraborty
- Prof Nadia Thalmann
- Prof Daniel Thalmann
- Ms Yogeswary Maniam
- Ms Nur Amira Binte Abdul Rashid
- Dr Bhing Leet Tan
- A/Prof Jimmy Lee
- A/Prof Justin Dauwels

The Unwitting Researcher

Research was something that was never part of my plans. Initially, it started as something to “boost” my chances of getting a coveted space in Residency or speciality training. After I was accepted into Residency, it became just another requirement that I needed in order to complete my residency. But **the NHG-LKCMedicine Clinician-Scientist Preparatory Programme (CSPP) changed everything.**

I joined NHG-LKCMedicine CSPP in my fourth year of residency and at that point in time, I innocently thought that CSPP was nothing more than a relatively easy way to hopefully win a small internal grant which came with a little extra training funds as an additional perk. My CSPP project was the “Study on Proximal Humerus fractures EffEctive Treatment/Rx” (SPHEER). Little did I expect how CSPP would ultimately change my view of research. The courses were intellectually enriching, and allowed me to lay a strong foundation in research. But **beyond the research training courses, CSPP provided me the platform to explore and immerse myself in the world of research through the interaction and exposure to many other esteemed researchers from a variety of fields.**

In the past, my impression of hard-core research was of a crazy scientist stuck in a remote lab mucking about, playing around with test tubes, cutting up mice, and completely out of reality with what true clinical medicine and patient care was really like. I had always thought that clinical

practice, particularly as a surgeon, was where the true action was. However, CSPP completely changed my impression!

It introduced me to **this wonderful world of health services research, where my interest in a variety of fields such as economics, psychology, social science, healthcare financing, and health policy intersected with my core clinical interest and practice.** As I delved deeper into it, I learnt about the key role that a clinician-scientist plays, through a dual understanding of both research methodology and clinical realities, acting as a bridge between clinicians, scientists and administrations/policy makers. I learnt that **while research can at times be laborious and time-consuming, good research has the great potential of changing clinical practice in a way that can impact thousands of patients.** That was ultimately the clinching factor for me, and the chance to truly MAKE A DIFFERENCE on a larger scale.

Through the strong support from the NHG Group Research led by Prof Lim Tock Han (former Deputy GCEO (Education and Research)), Prof James Best (Dean of LKCMedicine), and the department of Orthopaedic Surgery, I was fortunate enough to receive the NMRC Research Training Fellowship (RTF) and NHG-LKCMedicine Clinician-Scientist Fellowship (CSF). **It has allowed me to pursue a PhD at NHG-LKCMedicine exploring the different models of care in knee osteoarthritis**

through my project on “Collaborative Model of Care between Orthopaedics and Allied HealthCare Professionals Trial” (CONACT), while continuing my clinical practice as an Associate Consultant in Orthopaedic Surgery.

There are many people to thank for this amazing journey thus far, including Dr Ernest Kwek, Dr Lee Keng Thiam and friends from the Department of Orthopaedic Surgery; my current PhD mentors Professor Josip Car and Professor Julian Thumboo; my CSPP mentors Dr Heng Bee Hoon and Dr Pradeep Paul; my research partners-in-crime Dr Michelle Pereira and Dr Yang Su-Yin, but most importantly, I would like to thank my wife Lilian, and family, who have been amazingly supportive as I pursue this passion and chase the dream.

Dr Bryan Tan is an FY2017 awardee of NHG-LKCMedicine CSPP and FY2019 awardee of NHG-LKCMedicine CSF. Click [here](#) to find out more about the programme.



Contributed by:
Dr Bryan Tan
Associate Consultant
Orthopaedic Surgery
WHC

Of Mice and Men – How Mice Experimentation Sparked My Interest in Basic Science Research

Toxic epidermal necrolysis (TEN) and graft-versus-host disease (GVHD) are epidermolytic skin disorders mediated primarily by antigen-specific CD8+ cytotoxic T lymphocytes (CTLs). Although keratinocyte apoptosis is a hallmark pathological feature of these conditions, skin-infiltrating CTLs may be scanty in the epidermis, disproportionate to the extent of keratinocyte apoptosis. **To clarify the mechanism by which CTLs cause keratinocyte apoptosis, we performed multiphoton imaging on a cutaneous**



Mouse intubated under general anaesthesia, lying on a heated stage in preparation for two-photon microscopy, a live imaging technique which allows visualisation of cells in-vivo

GVHD-like model which allows us to visualise the dynamics of CTL-keratinocyte interaction in-vivo.

For this study, I learnt numerous skills and techniques that I would never have been exposed to as a clinician. The learning curve of laboratory experimentation was steep, and I had many self-doubts in the beginning. **Immunohistochemistry, flow cytometry, and fluorescent microscopy were some examples of previous concepts that have taken on a different meaning after I learnt how to perform them in the laboratory.** The most difficult part of the study was undoubtedly learning the basics of mice breeding, colony control, and trying to keep mice alive under anaesthesia for hours of live imaging – I failed umpteen times in the beginning, but finally managed to succeed after many setbacks.

For this, I would like to thank Prof Kenji Kabashima and Prof Tetsuya Honda, both inspirational clinician-scientists, who took me under their wings. This study was conducted

at Kyoto University, with the generous support of the National Skin Centre Health Endowment Fund, and the NHG-LKCMedicine Clinician-Scientist Preparatory Programme (CSPP). Through this precious experience, I have gained a deeper appreciation of the work of basic scientists, and come to realise how intrinsically linked basic science is to clinical medicine. **To clinicians who are considering getting started on basic science research, I would strongly encourage them to take the plunge and enjoy the ride!**

Dr Cheng Hui Mei is an FY2018 awardee of NHG-LKCMedicine CSPP. Click [here](#) to find out more about the programme.



Contributed by:
Dr Cheng Hui Mei
Senior Resident
NSC

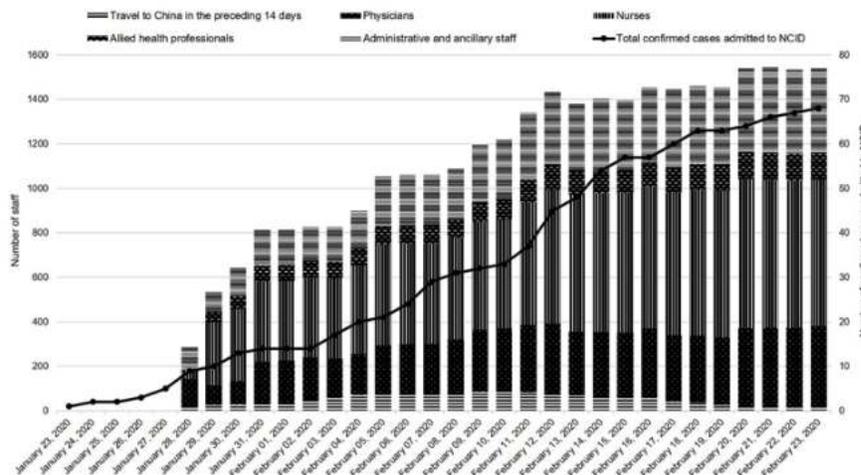
Staff Protection and Staff Health Surveillance in TTSH and NCID Amidst COVID-19 Outbreak

Coronavirus disease 2019 (COVID-19) is an emerging infectious disease caused by a novel coronavirus (SARS-CoV-2), which was first reported from Wuhan, China in December 2019. Since the SARS outbreak in 2003, during which more than half of the hospital-acquired infections occurred in healthcare staff, Tan Tock Seng Hospital (TTSH) has routinely fit-tested staff for high-filtration N95 respirators and established web-based staff surveillance systems. These routine systems were rapidly enhanced in response to Singapore's first imported COVID-19 case on 23 January 2020.

We conducted a cross-sectional study between 23 January and 23 February 2020 to review the effectiveness of these strategies at TTSH and its co-located National Centre for Infectious Diseases (NCID) in protecting staff from nosocomial COVID-19 infection, one month into the COVID-19 response. As of 23 February 2020, TTSH/NCID has managed 76% of confirmed COVID-19 cases in Singapore. The hospital adopted a multi-pronged approach to protect and monitor staff with potential COVID-19 exposures:

- risk-based personal protective equipment;
- internet-enabled staff fever and sickness surveillances in addition to the intranet-based Staff Health Surveillance System (S3), and;
- enhanced medical surveillance of unwell staff.

A total of 10,583 TTSH/NCID staff were included in the campus-wide fever and sickness surveillance, with an increasing number of staff being deployed for COVID-19 response as the number of cases increase (Figure 1).



(Figure 1) Number of closely monitored staff

On 23 February 2020, a total of 1,524 staff were closely monitored because of working in COVID-19 clinical or laboratory high-risk areas. Among them, a median of 8 sickness episodes were observed per day; almost 10% (n=29) resulted in hospitalisation.

However, none was found to be infected with COVID-19. Our findings highlighted that a robust staff protection and health surveillance system routinely implemented during non-outbreak periods and enhanced during the COVID-19 outbreak, is effective in protecting frontline staff from COVID-19.

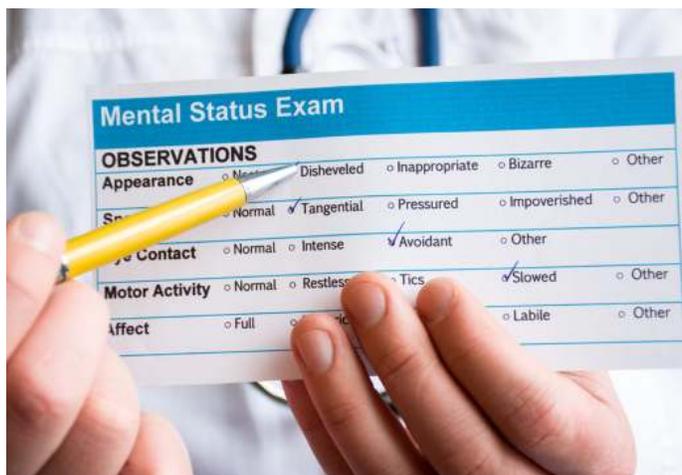
For more information about the study, please click [here](#).



Contributed by:
Dr Htet Lin Htun (Left)
Senior Epidemiologist

Associate Professor Angela Chow (Right)
Senior Consultant,
Department of Clinical Epidemiology,
Office of Clinical Epidemiology,
Analytics, and Knowledge (OCEAN), TTSH

GOOD TO READ!



Development and Validation of the Rapid Positive Mental Health Instrument (R-PMHI) for Measuring Mental Health Outcomes in the Population

With growing interests in adopting mental health and resilience as indicators of population health and well-being, having a reliable, locally validated and easy to administer scale for measuring positive mental health can offer advantages in population-level assessments and evaluation. How was a short measure - the Rapid Positive Mental Health Instrument, which takes less than 5 minutes to answer and can be widely and easily applied to multiple settings, developed and validated?

Click [here](#) to read now!

GOOD TO READ!



Working on the Frontline Against COVID-19

It is 8 a.m. on a Saturday. LKCMedicine graduate, Dr Julia Ng just arrived for her shift. Instead of heading to the Department of Orthopaedics at Tan Tock Seng Hospital where she has been posted since early January, the junior doctor heads across the road to Basement 1 of the National Centre for Infectious Diseases. She is about to start her shift at the national screening centre, fighting at the coalface of a global disease outbreak.

Click [here](#) to read about how the pandemic has changed Dr Ng's experience as a healthcare professional.

Training Calendar

Date	Training Courses	
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*	
30 Oct 2020	(PCR200) Study Conduct I Subject Recruitment and Informed Consent - <i>Register by 15 August 2020</i>	

*Blended learning courses involve 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)

CHICKEN SOUP FOR THE BUSY COORDINATOR

Education to facilitate high standards of research conduct

1. Feb 2020: How to Ensure Consistency of Study Documents Throughout the Duration of Research
2. Mar 2020: Responsible Conduct of Research - Managing Collaborative Research
3. Apr 2020: What Should Be Done If Study Procedure(s) Are Not Conducted in Accordance to IRB Approved Protocol
4. May 2020 (Part 1): Extraction of Data or Use in Research Study
5. May 2020 (Part 2): Translated Informed Consent Forms No Longer Required to be Submitted to DSRB

Click on the respective issues to find out more!