

PRESS RELEASE

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CO-CREATION AND CO-LEARNING FOR STRONGER FUTURE HEALTHCARE

Collaborations between Healthcare and Partners at CHI INNOVATE 2022 Conference

Ren Ci Hospital Clinches Excellence Champion Medal at the annual National Healthcare Innovation and Productivity (HIP) Awards

Singapore, 4 November 2022 – Healthcare systems worldwide will continue to face challenges presented by an ageing population, the prevalence of chronic diseases and a tight workforce. Stressing the need to balance the "Iron Triangle" of healthcare framed by cost, accessibility and quality, the Deputy Prime Minister and Coordinating Minister for Economic Policies, Mr Heng Swee Keat, underlined the urgency for healthcare institutions to embrace innovation together to tackle the challenges.

DPM Heng was addressing over 500 healthcare participants at this year's CHI INNOVATE, an annual thought leadership forum by local and overseas healthcare leaders on creating the future of healthcare together.

This year's conference, themed "*The Road from Innovation to Impact*", will discuss how healthcare innovations can be up-sized, re-focused and made more engaging, to deliver better value and impact to the people we serve.

This message has reverberated throughout healthcare and its related sectors. Though the pandemic has disrupted much of healthcare for more than two years, work on building a better future together persevered. This is evident in the many innovations by healthcare organisations and their partners recognised at the various CHI co-learning platforms.

"Digitalisation is not only about technologies. It is more than that. It leads to a more human touch, keeping complexity at the back and patients evolving needs and conveniences at the front. It is about leveraging technologies to redesign the way we work, to enable a more agile workforce and support new models of care collectively so that we can serve our population better," said Professor Eugene Fidelis Soh, Chairman of CHI Co-Learning Network and CEO, TTSH & Central Health.

Pursuing Excellence- National HIP

This year, we received nearly 100 submissions for the National Healthcare Innovation and Productivity (HIP) Medals, an award sponsored by the Ng Teng Fong Healthcare Innovation Programme and supported by the Ministry of Health (MOH). Eight winning projects are recognised for their excellence in Care Redesign, Automation, IT and Robotics Innovation, Workforce Transformation, and Adoption.

The top award – the National HIP Excellence Champion Medal - is presented to **Ren Ci Hospital** for its smart geo-fencing system that keeps its nursing home residents with dementia safe by alerting staff if they wander outside zoned areas. Residents are empowered to move about independently and safely with minimal supervision (see Annexe 1 for this year's National HIP projects).

Accelerating Innovation - CHISEL

CHISEL, a sandbox and marketplace supported by Temasek Foundation and MOH, aims to accelerate the adoption of healthcare innovations jointly developed with start-ups and small and medium-sized enterprises

for patients. It has been gaining much interest, with over 200 proposals received to date. Of these, nine solutions have gone through a robust assessment by Public Healthcare Institutions and will soon be test-bedded at various public healthcare premises.

Amongst the successful proposals accepted are:

1. **H-Man**, Singapore's first-of-its-kind portable medical artificial intelligence robot to help patients undergo upper limb rehabilitation therapy at home. Co-developed by Tan Tock Seng Hospital (TTSH), Nanyang Technological University and ArtiCares Pte Ltd, H-Man makes home rehabilitation more engaging and convenient and allows patients' performance and feedback to be sent to therapists wirelessly. The project is now entering its second phase with a pilot study to enhance H-Man into a potential tele-rehabilitation service for stroke patients to do home rehabilitation exercises safely with remote supervision.
2. **PreSAGE**, an artificial intelligence (AI) powered bed-fall surveillance and prevention prediction system, is co-developed by TTSH and CoNEX Healthcare Pte Ltd. It uses thermal sensing to provide round-the-clock automated surveillance, allowing timely interventions by healthcare staff for safer patient care. The project has been successfully trialled in TTSH wards and will soon be tested in community care settings and residential homes.

Reimagining Healthcare - CHIRP

CHI Reimagination Plaza (CHIRP) is a shared space for reimagining new sustainable models of care. Here, the mission is to tap digitalisation and technologies to create a Hospital without Walls, an ideology for the right and best care to be administered anywhere, anytime.

Some of the ideas discussed are:

1. **CHI Evaluation Framework (CHIEF)** is an evaluation metric framework developed by CHI in consultation with public healthcare clusters for shared understanding, assessment and application. This common framework ensures robust quality and scalability checks so that innovations can be smoothly transitioned and adopted in various care settings. For a start, CHIEF was used to assess the feasibility of the nine innovative solutions by start-ups and small and medium-sized enterprises under CHISEL.
2. **Healthcare 5G**, a concerted exploration of 5G applications in healthcare by CHI and Infocomm Media Development Authority (IMDA), starting with a 5G Use Case Workshop with TTSH to understand the demands within healthcare and how the sector will benefit from the implementation of 5G. One example would be the study of an existing pill delivery robot, the Pillbot, at TTSH. Currently, the innovation is limited to delivering medications with a teleconferencing feature to patients in the Emergency Department's high-risk zones. With a 5G Network, the robot can potentially host multi-channel conferencing capabilities scaled up for bedside care in the wards and augment manpower in other hospital operations such as security and portering.

"In a rapidly changing healthcare environment that will bring new challenges, the strategic collaboration between IMDA and CHI will further drive efforts in enabling digitalisation within healthcare. This partnership will enable us to reimagine, design and deliver exciting healthtech solutions with better enhanced experience and improved productivity," said Dr Ong Chen Hui, Assistant Chief Executive, IMDA.

With a vibrant innovation community of partners at its core, CHIRP is set for an upgrade to transform its existing co-creating space to leverage virtual reality technologies to create an experiential physical-virtual hybrid concept. Collaborators can look forward to an immersive learning experience to test their innovation in simulated care environments of the future.

A Joint Venture into Medical 3D Printing

Assimilating seamlessly into the ecosystem of Digitalisation, TTSH's Medical 3D Printing Centre now calls CHI its new home. Officially launched on 4 November 2022, the centre currently houses seven machines to meet the increasing demand and popularity of 3D-printed technology for healthcare applications. The centre has printed over 200 3D models for clinical, educational and research purposes.

Together with its industry partners, Eye-2-Eye Communications Pte Ltd, Medairum Pte Ltd and NHG's Centre for Medical Technologies & Innovations (CMTi), the centre will continue to leverage each other's expertise to scale up and expand its capabilities to other clinical specialities and research to benefit even more medical professionals and patients within the hospital and the community.

The patient-specific and customised anatomical models make it easier for patients to understand their medical conditions. They also enable surgeons to practise and plan their surgeries beforehand, saving precious intra-operative time and helping surgeons achieve more precise and efficient clinical outcomes.

Towards CHI INNOVATE 2023

With care going beyond hospital walls with digitalisation, save the date for CHI INNOVATE 2023, which will take place on 28 July 2023. Themed "*Health and Social Change for Sustainability*", the annual flagship event will bring together global thought leaders from across industries to engage with healthcare professionals in Singapore and beyond.

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For media queries, please contact
Centre for Healthcare Innovation
c/o Kristen Lee
Senior Executive, Communications Division
Tan Tock Seng Hospital
Contact: 9145 2999
Email: kristen_sh_lee@ttsh.com.sg

About the Centre for Healthcare Innovation

The Centre for Healthcare Innovation (CHI) is committed to transform healthcare, driven by its three thrusts: Promoting a culture of innovation through thought leadership, achieve better health and healthcare by enabling workforce transformation, and to catalyse value-based outcomes by effecting systems-level change.

Founded in 2016 on the concept of co-learning and collaboration, CHI and its network of like-minded local and international partners create thought leadership, as well as co-build initiatives and programmes to inculcate a culture of innovation within healthcare. Strengthened by this network, CHI has been able to customise and design signature programmes that aim to build a sustainable workforce via new andragogy and paradigms for our communities of carers and patients. To catalyse value-based outcomes and effect systems-level change, CHI's impactful platforms and initiatives drive innovation adoption and knowledge translation, consequently giving the healthcare community quicker access to the latest innovations.

CHI is enabled by our financial lever, the Ng Teng Fong Healthcare Innovation Programme that funds and supports healthcare innovation in collaboration with its partners through five (5) tracks – Strategic Training, Innovation, Community Enabling, Strategic Innovation, and Strategic Research. The programme is managed by the TTSH Community Fund and CHI.

Through meaningful and impactful collaborations, we will meet current and future healthcare challenges through innovative and value-driven care delivery to the populations we serve.

For more information, visit www.chi.sg.

ANNEXE 1: NATIONAL HEALTHCARE INNOVATION AND PRODUCTIVITY (HIP) 2022 MEDALS WINNERS PROJECT SYNOPSES

Excellence Champion Medal: Ren Ci Hospital

Project: Smart Geofencing System (SGS) for Residents' Safety

Ren Ci Hospital encourages its Nursing Home residents to move freely within designated areas as part of communal living and active empowerment. However, some residents, especially those with dementia, may abscond or unknowingly wander out of their households (i.e. living area) or facility. To keep residents safe, the team implemented the Smart Geofencing System (SGS), which uses RFID technology to track and record movement. Residents' clothes are RFID-tagged, and RFID readers are installed in each monitored area. Monitoring tablets are available at staff stations and security posts. SGS would immediately trigger warning alerts to the tablets if residents entered non-designated areas such as lift lobbies/ staircases. Care staff and security personnel will then be able to quickly stop residents from wandering off the premises and safely return them to the household.

Best Practice Medal (Care Redesign): St Luke's Hospital

Project: Community Management of Dementia by a Community Hospital (Community Response Team)

The multidisciplinary Community Response Team (CRT) at St Luke's Hospital assesses, diagnoses, and manages dementia in the community to address the gaps in management and access to mental health services identified by the National Dementia Strategy. The CRT provides quick assessment, rapid care coordination and service linkages to Persons Living with Dementia (PLWDs) with Behavioural and Psychological Symptoms of Dementia (BPSD) and Seniors with suspected dementia, as well as supports the caregivers. CRT served 114 clients and avoided hospital admissions for dementia-related behavioural issues from FY19 to FY21, providing relief to families and cost savings to the healthcare system.

Best Practice Medal (Care Redesign): National Healthcare Group

Project: Diabetic Foot in Primary and Tertiary (DEFINITE) Care: A Health Services Innovation in Coordination of Diabetic Foot Ulcer (DFU) Care within a Healthcare Cluster

The National Healthcare Group (NHG) 's Diabetic Foot in Primary and Tertiary (DEFINITE) Care is an inter-institutional and multidisciplinary team health systems innovation programme. It aims to achieve coordinated care across primary and tertiary care for diabetic foot ulcer (DFU) patients across the NHG cluster. At 18 months after the implementation of DEFINITE Care, amongst 3,475 patients with DFU, there was a significant 76% relative risk (RR) reduction in minor Lower-extremity amputation (LEA), from 36.4% to 8.7% and a 22% RR reduction in major LEA, from 6.5% to 5.1%. There was also a significant improvement in cardiovascular profile: diabetes and hyperlipidaemia control, with improved average blood sugar level from 8.4% to 7.9%.

Best Practice Medal (Automation, IT & Robotics Innovation): Ng Teng Fong General Hospital and Jurong Community Hospital

Project: Placing Sustainability at the Core of Everything We Do at Juronghealth Campus

Environmental footprints like electricity, CO² emissions, and waste production have the potential to harm people's health and the environment. Jurong Health Campus Green Committee (JHCGC) embarked on a "Go Green Journey" since 2020, incorporating sustainable practices into daily business to improve energy and water efficiency to mitigate climate change and improve people's and the planet's health. The JHCGC ensures sustainability strategies are fully executed across Ng Teng Fong General Hospital (NTFGH) and Jurong Community Hospital (JCH), manages and tightens goal-setting and reporting processes, and

strengthens relationships with external stakeholders and overall accountability. NTFGH and JCH emitted at least 20,000,000kg of CO² yearly for electricity consumption. Working with the users and specialist vendors to identify and explore the potential for energy efficiency improvement, JHCGC leveraged technology and implemented intervention strategies to achieve at least 2,464,061kWh energy savings and reduced 1,005,337kg CO² emission as of 2021.

Best Practice Medal (Automation, IT & Robotics Innovation): National University Health System

Project: NUHS Group Facility Management Strategic Transformation – From Preventive to Predictive Maintenance

NUHS Group Facility Management (NUHS-GFM) keeps the NUHS hospitals operating smoothly whilst maintaining a safe and healthy environment that is conducive to meet the needs of patients, staff and the public. With Hospital Facilities Management (FM) operations growing fast and an ageing workforce, continuing with the traditional manual operations approach is no longer sustainable and effective. FM is manpower-intensive and has inherent inefficiencies as the processes rely heavily on hard copies and manual workflows, which are prone to errors and lapses, if not safety risks. NUHS-GFM embarked on a "Go Digital Journey" and moved from Preventive to Predictive Maintenance. Preventive maintenance is typically scheduled based on our operational experience and time-based. With Predictive Maintenance, NUHS-GFM can leverage technology to improve workplace safety, efficiency, and productivity and develop a future-ready engineering workforce.

Best Practice Medal (Workforce Transformation): Tan Tock Seng Hospital

Project: The Clinical Diabetics Educator Programme: A Novel Transdisciplinary Model for Diabetes Care

A person with diabetes is often thrust into a complex system of care delivered by a large team of healthcare professionals (HCPs) of doctors, nurse clinicians, pharmacists, dietitians, podiatrists, social workers, and others deliver various aspects of therapy and preventive care. With so many HCPs caring for a patient, healthcare delivery can become fragmented. Duplicated services and uncoordinated visits may result in patient dissatisfaction, high default rates, and poor treatment outcomes. The Clinical Diabetes Educator (CDE) programme was conceptualised to reduce care fragmentation, with the central idea to systematically cross-train and elevate the capabilities of the diabetes Allied Health Professional (AHP) workforce. For example, a pharmacist could teach glucose self-monitoring skills through the programme; a nurse could perform foot screening; a dietitian could adjust insulin doses—collectively streamlining diabetes care. With these transdisciplinary innovations in workforce capability, the team achieved greater cost-effectiveness while improving patient compliance and maintaining outcomes.

Best Practice Medal (Workforce Transformation): Singapore General Hospital

Project: Enhancing Workforce Productivity through Digital Workers – SGH's RPA Journey

Manpower cost accounts for at least 60% of healthcare costs in Singapore. Yet, traditional business processes in a hospital, especially in operations, comprised of huge amounts of rule-based, repetitive and manual tasks that do not necessarily need to be performed by a human. Robotic Process Automation (RPA) can be the solution to cut costs, save time, create sustainable processes and maximise the use of resources. SGH started using RPA in late 2020, and the gains were substantial – ranging from headcount savings to be able to do more with the same amount of resources, reduced turnaround time, increased quality time with patients, and increased staff satisfaction, as they are relieved of doing repetitive tasks. As of July 2022, SGH reaps S\$646,780 in productivity gains each year (and counting) through RPA alone.

Best Adoption Medal: Alexandra Hospital, St Luke's Hospital, Stroke Support Station, NTUC Health, St Luke's Eldercare, Jurong Community Hospital

Project: Improving Mobility Via Exoskeletons (iMOVE) - Implementing wearable robotic exoskeleton use across the continuum of rehabilitation care, from hospital to community

Rehabilitation of mobility after acquired neurological injuries such as strokes is labour-intensive. Robotic Exoskeleton Training (RET) is more effective than conventional physiotherapy (CP) in achieving independent mobility and improving walking speed. RET is implemented across the continuum of rehabilitation care (hospital to the community).

Of 441 patients who underwent 12 sessions of RET to the CP across settings, 81.6% were from inpatient and outpatient rehabilitation facilities. Patients were stratified by Functional Ambulatory Category (FAC). For dependent patients (FAC 0-1), RET resulted in 3 times more step count and distance walked compared to controls. Clinical Outcomes Variable Scale (COVS) gain was 34% better in RET than in controls. Although Functional Independence Measure (FIM) motor sub score gain was not significantly different between groups (i.e., RET patients required 1.9-person assistance for walking outside the device, controls required 1.6-person assistance), RET can be undertaken with 1 trained therapist and represents significant cost savings. For stroke patients $FAC \geq 2$, there were no differences in walking speed gains between RET and controls. A critical operational size is needed to cater holistically to the complex rehabilitation care needs of RET patients. Most of their centres have successfully implemented the programme and will be incorporating the use of exoskeletons into clinical care.

For media queries on the respective winning projects, please contact:

Alexandra Hospital	Susan Koh Communications Mobile: 9829 1906 Email: susan_koh@nuhs.edu.sg	
National Healthcare Group	Benetta Lim Senior Executive, Group Communications Mobile: 9222 1291 Email: benetta_sm_lim@nhg.com.sg	
National University Health System	Winnie Lim Assistant Director (Media & Crisis Communications) DID: 6772 3622 Email: lim_winnie@nuhs.edu.sg	
Ng Teng Fong General Hospital and Jurong Community Hospital	John Li Manager, Communications Mobile: 9820 1795 Email: john_cl_li@nuhs.edu.sg	Iqbal Saifuddin Ahmad Mobile: 9772 7456 Email: iqbal_saifuddin_ahmad@nuhs.edu.sg
NTUC Health	Clara Lee Head, Corporate Communications and Branding Email: clara.lee@ntuhealth.sg	Kwok Zhishan Communications and Branding Email: zhishan.k@ntuhealth.sg
Ren Ci Hospital	John Tang Corporate Communications DID: 6355 6402 Email: john_tang@renci.org.sg	Chia Ying Mei Corporate Communications DID: 6355 6373 Email: yingmei_chia@renci.org.sg
Singapore General Hospital	Candice Lee Communications Department Mobile: 9146 3107 Email: candice.lee.l.f@sgh.com.sg	
St Luke's Hospital	Jennifer Tay Senior Executive, Corporate Communications & Partnerships Mobile: 8128 2504 Email: jennifertayyh@stluke.org.sg	
St Luke's ElderCare	Elaine Tan Director, Communication and Partnerships Mobile: 8720 5354 Email: elainetan@slec.org.sg	
Tan Tock Seng Hospital	Kristen Lee Senior Executive, Communications Email: kristen_sh_lee@ttsh.com.sg	
Stroke Support Station	Brenda Lee Head, Advocacy and Strategic Communications Mobile: 9730 1044 Email: brenda.lee@s3.org.sg	