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Centre For Healthcare Innovation's (CHI) New Academy and Innovation Framework to Boost Capabilities for Health and Social Change

National Healthcare Innovation and Productivity Awards Recognises Seven Innovative Projects for their Impact on Care and Workforce Challenges

This year's CHI Innovate conference strived to highlight that building better capabilities for health and social care organisations and embracing digital innovations are crucial to complement Healthier SG, a national initiative by the Ministry of Health which focuses on preventive and population health.

Recognising that innovations are key to tackling the future challenges of healthcare, the conference celebrated seven winning projects from five healthcare institutions under the annual **National Healthcare Innovation and Productivity (HIP) Awards** in three award categories: Care Redesign; Automation, IT and Robotics Innovation; and Workforce Transformation (Refer to Annex 1 for list of winners).

CHI also launched two key initiatives – the **Health and Social Change Academy** and the **CHI Evaluation Framework** – aimed at strengthening the abilities to care for residents in the community, beyond patients in hospitals.

“Frailty, social isolation, disabilities and lifestyles are key social drivers of health. These drivers can only be tackled effectively through collaborative Communities of Care (CoCs) in every neighbourhood where national and social agencies, family doctors, healthcare organisations and residents join hands to care for the more vulnerable, and proactively empower health for everyone. We hence need to build new and better capabilities that help us to better work together across health and social care,” said Professor Eugene Fidelis Soh, Chairman of CHI Co-Learning Network. Professor Soh also heads National Healthcare Group's (NHG) Group Integrated Care for population health, and is concurrently CEO, Tan Tock Seng Hospital (TTSH) & Central Health.

CHI Health and Social Change Academy - Building New Capabilities

The CHI Health and Social Change Academy (HSC Academy) will enable social and health care agencies to develop critical skills for building and sustaining CoCs through its four strategic programmes:

- a. **Population Health Science** - participants learn how funding mechanisms and incentives drive population health programmes, and to apply socio-behavioural norms to activate healthy habits in individuals and communities
- b. **Social Prescribing** - participants learn the importance of setting up and connecting residents based on their needs to a range of health and social services to improve well-being.
- c. **Leading as a Collective** – participants learn the concepts and tools to build relationships and enable care collaborative networks.
- d. **Movement for Health and Social Impact** – participants learn to design large scale change movements to empower residents, and improve their health

The Academy will host more than 30 local and international experts from academia, health and social care, and government agencies under the CHI Co-Learning Network. (Refer to Annex 2 for fact sheet)

“The Academy’s curriculum is designed around the premise that building healthier, happier communities requires a collective commitment and effort. Hence, it aims to nurture the environment for various stakeholders to come together to understand one another’s roles in the community, learn the new skills and concepts and take collective action to design care that will keep our people and future generations healthier and happier,” said Associate Professor Wong Hon Tym, Clinical Director, CHI.

The Digital CoC Playground – Building Digital Solutions

Alongside the HSC Academy, a sandbox (the Digital CoC Playground) has also been set up to facilitate collaborations, specifically on digital solutions that will more easily engage and activate residents to adopt healthy behaviours. All digital CoC solutions have to achieve three aims to ensure relevant impact and outcome – (i) care has to follow the resident, (ii) outreach has to be to a wider resident population, and (iii) integrate to enable a resident centricity so that they may own their health with the care and support needed.

Community partners will bring their problem statements into this Digital Playground and CHI will facilitate the matching with like-minded organisations, sponsors, technology experts and funders to pursue the creation of a digital CoC solution together.

Health Kampung – Partners’ Portal

NHG recently launched their digital Health Kampung which offers residents in Central and North Singapore access to some 800 health and social care programmes for healthier living. NHG and its partners are now working on a shared Health Kampung

dashboard and portal, in the Playground, for cross referrals and joint health planning for residents

Community Rehab and Medication Literacy

Community care agencies AWWA and Care Corner Singapore shared the need to enhance community-based rehab to manage frailty, and to improve medication adherence for the seniors in their community. They have expressed keen interest to explore feasible solutions in the Playground.

Two TTSH solutions that would be useful are **Allycare** and **MedCoach**.

Allycare is an artificial intelligence (AI) powered mobile application developed to improve compliance of home exercises for back, neck and ankle conditions for patients. Allycare performs pain assessment, conducts exercises and evaluates the patients' recovery journey, minimising in-person specialist visits. TTSH physiotherapists will use Allycare to monitor rehab progress from the backend and check up on their patients in a timely fashion. While Allycare is being piloted with TTSH's patients, it will concurrently be enhanced in the Playground with the two partners to make it viable for easy adoption by community partners and even by residents at large for general pain assessment, monitoring and advisory.

MedCoach is a mobile application that assist patients to improve medication literacy and compliance. Through co-development with other NHG institutions and medical technology partner MeshBio, it uses smart technology to present drug information and administration instructions and present them in any of the four local languages to facilitate understanding. This application will be worked on further in the Playground with community partners to see how residents at large could use it and how else they could benefit from it.

Associate Professor Tan Cher Heng, Executive Director of CHI said, "The Digital CoC Playground will complement the efforts of the HSC Academy in empowering collaborations among carers to produce practical, meaningful and scalable digital solutions to bring about better health and care for the community."

CHIEF - Faster, Better and Safer Adoption of Innovation

Despite the innovation landscape evolving faster than ever, the rate of adopting innovations in healthcare is difficult. This is because healthcare is a high stakes industry due to the inherent risks around caring for lives. Moreover, healthcare is complex as it involves many parties and processes. The CHI Evaluation Framework (CHIEF) mitigates risk and adopts a holistic evaluation of innovations seeking real world deployment. The framework recommends best-practice methods to optimise

design of trials, ensure reliable results, and provide cost-benefit analysis. The CHIEF Guidance document is already available for public viewing.

“Innovation is important to help us meet our nation’s healthcare challenges. To capture the value from innovations, adoption is key. CHIEF prompts our innovators to take a structured and robust approach to design and critically evaluate innovations to ensure they are clinically and cost-effective while minimising risks. This will give care providers and investors the confidence to adopt and scale,” shared Dr Cheong Wei Yang, Deputy Secretary (Technology) at the Ministry of Health, Singapore and Chair of the CHIEF Steering Committee. (Refer to Annex 2 for list of committee members).

CHIEF will be used to guide and assess the value of innovations proposed to the National Health Innovation Centre and those deployed through the CHI Healthcare InnoMatch international call for innovations that address critical and emerging healthcare needs. In time, the innovations designed in the HSC Academy’s digital CoC playground will also be evaluated by CHIEF for scaling up and for community adoption.

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About 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.

Annex 1: Full list of National Healthcare Innovation and Productivity (NHIP) Award Winners

Excellence Champion Medal

Tan Tock Seng Hospital

Project: Nurse-led Intravitreal Injection (IVT) Team

The “Nurse-led Intravitreal Injection (IVT) Team” project by Tan Tock Seng Hospital has paved the way for nurses to perform a transformative new role.

With an ageing population comes the increase of common eye complications. These complications require IVT treatment. With the injections previously administered only by doctors, TTSH’s Department of Ophthalmology challenged norms to implement an unprecedented solution to tackle the demand for IVT and protect the vision of Singapore’s ageing population.

Selected eye nurses underwent a rigorous training over three months to receive a special accreditation which would allow them to administer IVTs safely themselves. The nurses have since set up nurse-led IVT clinics in TTSH. Doctors now see patients and list them for these injections, which are performed by the nurses. This allows the doctors to have more time for patients with much more complex cases while nurses are also empowered to perform at the top of their nursing licenses. In 2022, nurse-led IVT cases accounted for more than 70% (more than 8000) of the total IVT cases (11,000).

This transformative project has enabled more patients to get faster intervention and better outcomes to their eye problems.

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Best Practice Medal (Care Redesign)

National Healthcare Group

Project: Living Well @ School: Activating & Sustaining Healthy Behavioral Changes in Children and their Families

As chronic diseases become more prevalent and the population ages, healthcare costs and utilisation are increasing. It is essential to shift towards prevention and develop effective strategies to build protective factors among the young.

LivingWell@School is designed to address two critical areas of concern: i) Addressing Burgeoning Childhood Obesity Levels, and ii) Building Mental Resilience and Self-Motivation. The team created a cost-effective, scalable and sustainable school health working model to be embedded into schools eco system and implemented by teachers.

After two years of the pilot, positive changes on targeted eating behaviours were sustained by 1,280 students – i) general increase in the number of students consuming fruits and vegetables every day, ii) decrease in consumption of snacks and sweet drinks every day.

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Tan Tock Seng Hospital

Project: Innovative Healthcare Delivery Models in AMK Specialist Centre

To empower health in the community, TTSH developed and launched new models of care that are accessible, sustainable and convenient for patients and residents through the TTSH Ang Mo Kio Specialist Centre (AMKSC) These care models have not only brought in-demand specialist care out of the hospital and into the heartlands but also partner GPs and polyclinics to ensure care is joined up.

Conditions involving diabetes mellitus, musculoskeletal, eye, and ENT were main issues faced by residents – and the team addressed this need by introducing:

- a) **Trans-disciplinary diabetes care** – Patients with diabetes, who would normally need multiple visits to various healthcare professionals at the main hospital, can now be seen by specially trained Clinical Diabetes Educators (CDEs) at AMKSC. These CDEs have received special cross-training to holistically carry out various aspects of diabetes care and patient education. This change makes it possible for patients to better manage their condition closer to their home with fewer visits to the hospital; from the previous eight or more hospital visits a year previously, a patient may now only require three to five visits at AMKSC.

- b) Integrated Musculoskeletal (iMSK) Therapy Services** - Many musculoskeletal conditions can be resolved with physiotherapy or occupational therapy and do not necessarily require surgery. Prior to the new Integrated Musculoskeletal (iMSK) shared care model patients had to see a specialist in the hospital before being referred to these allied health services. Now, patients with specific conditions such as can be referred directly by their GP to therapists with advanced practice skills at AMKSC. Referring GPs are also kept closely updated on their patients' therapy progression so that they can make better overall care plans for their patients. This programme has resulted in a 66% improvement in patients' pain score.
- c) Optometrist-led Community Eye Care** – Demand for specialist eye care has been increasing with an ageing population, resulting in long wait times for hospital appointments. TTSH has upskilled their team of optometrists who can manage chronic eye conditions at Community Eye Clinics at AMKSC and elsewhere. This model of care has enabled Ang Mo Kio residents to access faster eye appointments and nearer care. On average, 93% of stable eye patients received an appointment within 60 days of their referral in 2022.
- d) Audiologist-led Community Hearing Evaluation** – With more health screening in the community to uncover hidden hearing issues in the elderly, there is a need to follow up on these suspect cases with faster and accurate hearing diagnostics. TTSH's team of audiologists provide both specialist and basic hearing examinations and services, as well as hearing aid interventions at AMKSC. Residents diagnosed with more complex hearing conditions will be referred to specialists at the main hospital. This coordinated approach has allowed more residents to be followed up after the initial community screening and catch potentially serious hearing-related issues earlier.
- e) Pharmacist-Led Smoking Cessation Clinic** - Guides clients through the process of quitting
- f) Day Surgery Centre** - To make it easier for residents to undergo basic diagnostic endoscopic procedures such as gastroscopy, a day surgery centre has been set up at AMKSC. This enables GPs to make direct referrals to the endoscopy team at AMKSC, who would keep them updated on their patients' progress for continuing care post-procedure.
- g) Integrated Health and Social Care and Support** – The co-location of TTSH's Community Health Team (CHT) and SGO within AMKSC enables active coordination and collaboration. SGO reaches out to residents in the area and refers relevant cases to TTSH through its CHTs, and this co-location allows

both teams to work seamlessly together to identify residents in need, plan community-based programmes, and coordinate health and social care plans with other partners in the community.

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Singapore General Hospital

Project: Enhanced Recovery After Surgery for Total Knee Arthroplasty Patients

In Singapore, patients who undergo total knee arthroplasty (TKA) surgery would typically stay in the hospital for about 4-5 days after surgery.

The SGH team develop a more financially-viable patient-centred rehabilitation pathway which includes pre-op patient education by a physiotherapist, reducing length of hospital stay to a maximum of one night, home visits post-discharge, and the establishment of a hotline number for patients to call during office hours.

This resulted in a reduced average length of stay for TKA patients from 4.55 days to 2.92 days, and a deep appreciation levels recorded by patients on the level of personalised care by the healthcare team.

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Best Practice Medal (Automation, IT & Robotics Innovation)

Singapore General Hospital, SingHealth

Project: Using Digital Twin for Infectious Disease Surveillance and Outbreak Investigations

Existing surveillance systems were largely laboratory based and pathogen or disease specific. They lacked capacity to promptly identify syndromic infectious disease patient clusters. Hence, outbreaks were detected late, mostly after laboratory confirmation.

To address the gaps, the team developed a digital twin surveillance system (4-Dimensional Disease Outbreak Surveillance System), that integrates ward environmental and patient data with machine learning and mathematical models to detect clusters early and better understand the hospital transmission of pathogens. This enhanced surveillance and outbreak management capabilities and better prepare

the healthcare system to be more resilient to the threat of pandemics and detect outbreaks.

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Ng Teng Fong General Hospital

Project: [OTSight] Data-driven Workforce and Process Transformation For Operating Theatre (OT) Optimisation

NTFGH observed increased surgical workload in 2021 amidst a national healthcare manpower shortage, posing a challenge to patient safety, care quality and hospital finances.

Addressing these challenges, the team designed and developed OTSight ecosystem which aimed to empower a broad-scope analysis to improve OT organisation and processes through a data-driven and value-based approach. These initiatives include redesigning of ambulatory ward layout & workflow, redesigning of administrative workflow, new letter of guarantee (LOG) workflow for non-residents, implementation of post-op care videos, streamlining patient-flow from AO to discharge, and creating new platforms for communication.

These implementations saw improved efficiency and staff satisfaction, optimised education outcomes, and relieving hospital bottlenecks. OT utilisation rate increased from 86.8% to 100.5% with no corresponding manpower increase, contributed by: reduction in overall turnaround time between surgeries and late starts, efficient processes that shortened patient processing by 24 minutes.

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Best Practice Medal (Workforce Transformation)

Singapore General Hospital

Project: Developing a Digital-Ready Workforce through Process Improvement and Innovation

When COVID-19 struck, many administrative staff needed to pivot their work processes quickly to adapt to varying situations as reporting demands were time-sensitive.

To address the challenges, the team adopted five programmes:

- DOM e-Learning Programme – Provide entry-level access to staff to learn digitally and asynchronously.
- DOM Digital Skills Sharing Programme – Share relevant digital skills to bridge implementation gap to address real work challenges.
- QI Education Programme – Teach staff about improvement principles and match QI projects to empower staff to improve work processes.
- DOM RPA Community Programme – Develop RPA champions, engage in RPA projects and build-up capacity.
- University Partnership Innovation Programme – Having DOM staff to participate in system innovation projects with NUS and SMU to learn about project management and working with developers.

The programmes had major impact to our staff and operations. Key observations were:

- Significant time savings resulted from the multiple quality improvement projects, enabling processes to be more streamlined and faster with average about 58% reduction in turnaround time. Time saved renders staff to deploy more time to improve residency training and faculty development, which in turn provides better patient care.
- Process optimisation and work automation raised literacy among staff to adopt changes and technology more readily,
- Improved staff morale minimisation of voluminous routine work and need for OT, resulting in better staff well-being.
- Projects involvement empowered staff, aided growth and development, as well as raising their employability for future-proofing.

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Annex 2: Factsheet on CHI Health and Social Change Academy (HSC Academy) and CHI Evaluation Framework (CHIEF)

List of Programmes and Objectives:

Focus Area	Modules	Partners
Population Health Science	<ol style="list-style-type: none"> 1. Building a Population Health System 2. Population Health Management 	<ol style="list-style-type: none"> 1. AWWA 2. Agency for Integrated Care (AIC) 3. Care Corner
Social Prescribing	<ol style="list-style-type: none"> 3. Basic Preventive Health 	<ol style="list-style-type: none"> 4. Health Promotion Board (HPB)
	<ol style="list-style-type: none"> 4. Getting Started with Social Prescribing 	<ol style="list-style-type: none"> 5. IHiS 6. Methodist Welfare Services (MWS)
Leading as a Collective	<ol style="list-style-type: none"> 5. Building Shared Visions 6. Engaging in Trusting Relationships 7. Teaming for Collaboration 8. Networking for Collective Actions 	<ol style="list-style-type: none"> 7. Ministry of Health, Singapore (Infocomm, Technology & Data Group) 8. National University of Singapore (Saw Swee Hock School of Public Health)
Movement for Health and Social Impact	<ol style="list-style-type: none"> 9. Movement for Health & Social Impact 	<ol style="list-style-type: none"> 9. Tan Tock Seng Hospital 10. TOUCH Community Services

List of Steering Committee Members for CHI Evaluation Framework (CHIEF):

1. A*STAR Innovation & Enterprise Group
2. ALPS Pte Ltd.
3. Centre for Healthcare Innovation (CHI)
4. Centre for Innovation in Healthcare (CIH)
5. Enterprise Singapore
6. Health Innovation Netherlands (HI-NL)
7. Health Products Regulation Group (HPRG)
8. Ministry of Health, Singapore (MOH)
9. National Healthcare Group (NHG)
10. National Healthcare Innovation Centre (NHIC)
11. Research for Impact (RFI)
12. Tan Tock Seng Hospital