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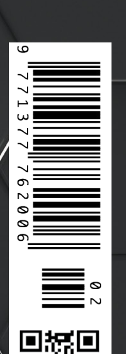
Cover Story

New Care Delivery



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Building a Hospital Without Walls

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In the pursuit to achieve better population health, the Central Health Model of Care is designed to look beyond the hospital walls, and achieve the Five Population Health aims of Better Health and Better Value with Better People delivering Better Care to build a Better Community.

Key Points

- A contextualised population health model is necessary to address the issues of Singapore's changing healthcare needs.
- Four Principles guide the Central Health Model of Care by outlining the fundamental shifts required from the current healthcare delivery system to achieve its Five Population Health Aims.
- Six Strategies detail the approach taken by Central Health towards actualising Population Health Management for 1.4 million residents.

Singapore has a resident population of 5.7 million. It has experienced rapid economic development over recent decades and built a fairly well-regarded healthcare system (Lim 2017; Miller and Lu 2018). The country has one of the lowest infant mortality rates at 1.7 per 1,000 live births (Singapore Department of Statistics 2020) and life expectancy at birth has risen from 83.2 years in 2010 to 84.8 years in 2017 (Ministry of Health 2019).

However, her health system now faces significant challenges. Singaporeans live about ten years of their lives in ill health, and with an ageing population, frailty, dementia, isolation and disabilities would be key social drivers of health (Gan 2019). These social drivers cannot be managed with a medical model alone. There is a need to integrate health and social care in the community and to support ageing in place.

Where Healthy Life is Central

In 2017, Singapore's public healthcare system was reorganised into three integrated clusters; each responsible to provide comprehensive care across the care continuum for the population in their respective region. The National Healthcare Group (NHG) integrated cluster, of which Tan Tock Seng Hospital (TTSH) is part, serves the central-northern region of Singapore. The region is divided into three population zones to better cater to the local needs of each zone. TTSH has been tasked to go beyond its walls to look after the 1.4 million residents living in the central population zone of the cluster.

Residents in Singapore's central zone are comparatively older than elsewhere in the country; 17% are aged over 65 years compared to the national average of 14% (Singapore

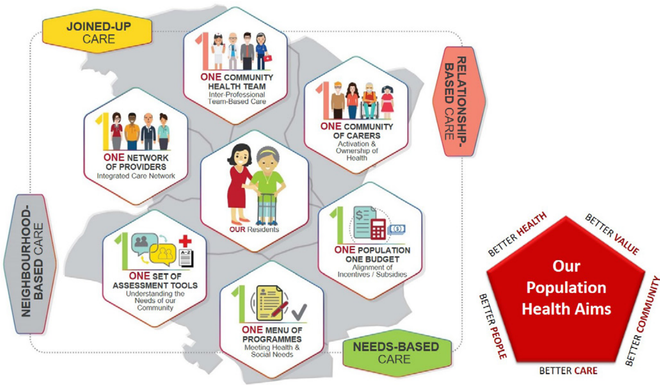

Figure 1. The Central Health Model of Care (4 Principles, 6 Strategies and 5 Population Health Aims).

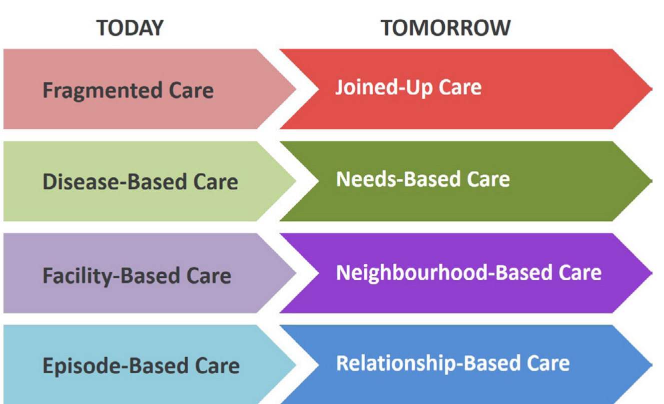

Figure 2. The Care Principles of Today Versus Tomorrow.

Department of Statistics 2019). About one-fifth of the elderly population there live with mild to severe frailty, and the needs for fall prevention, dementia care and palliative care are growing.

In 2017, TTSH started to redesign care and expand its mission towards population health. It rallied its primary and community care partners around Central Health, a new integrated care model to bring care beyond the hospital into the community. In 2019, this network of 75 partners committed to the shared mission of building health together for the residents in Central Singapore. Central Health as an integrated care network for the central population zone was launched.

Central Health Model of Care

The Central Health Model of Care uses a value-based population health approach that recognises the importance of health determinants, focusses on health outcomes, and is driven by evidence and data. It adopts Kindig and Stoddart's (2003) population health definition of "the health outcomes of a group of individuals, including the distribution of such outcomes within the group".

The Central Health model describes 'Four Principles' (4P) and 'Six Strategies' (6S) to achieve its Five Population Health Aims of Better People, Better Care, Better Community, Better Health and Better Value. The Five Population Health Aims extend from the Institute for Healthcare Improvement (IHI)'s Triple Aim. Better Care aims to improve patients' experience through the pursuit of care excellence and integration; Better Health seeks to improve the health of the population and staff through the promotion of healthy living and health ownership; and Better Value aims to control healthcare costs and to optimise value-driven care. Associated with IHI's latest quadruple aim, Joy in Work, is Better People where workforce growth and transformation are the focus. The final Better, Better Community, envisions a conducive environment with strong community-embedded relationships to support the delivery of quality care.

The 4P outlines the fundamental shifts required from the current healthcare delivery system to achieve population health while the 6S describes the approach towards actualising population health in the community (see Figure 1). At the centre of the model are the residents, who have the potential to be activated for self-care and are the focus of the network's care efforts.

The model creates an ecosystem, which focusses on health, not disease, and on serving residents, not patients. It supports residents by building a body of lay carers in the community, such as family members, friends and volunteers, who assist and care for those who live around them. Formal service providers, such as community health teams and health and social care providers, complement these lay carers in the provision of relationship-based and joined-up care. The care in the ecosystem is enabled through the application of assessment tools to determine the population needs, which will be met by a menu of health and social interventions available in the central population zone. Lastly, as a lever to drive integrated needs-based care, the healthcare financing model is evolving to facilitate the alignment of incentives across payers, providers and patients to ensure delivery of value-based care.

Four Principles – 'How' Singapore's healthcare delivery system should evolve

The Four Principles (4P) in the Central Health Model of Care represent fundamental mindset shifts from those that underpin the traditional model of care (see Figure 2).

These are:

i) Joined-up care

A network of providers that work together to coordinate care efforts such that residents receive seamless care across the care continuum over time. Each provider contributes interventions that join up with other providers to make progress in residents' health goals.

ii) Needs-based care

Understanding and characterising the needs of residents to design and deliver care that is matched to their needs.

These needs may be health status or determinants of health. Recognising the multidimensional nature of health and its determinants, the aim is to achieve health-social integration in care delivery.

iii) Neighbourhood-based care

The care is anchored in local communities, which makes it more accessible for residents. Neighbourhood-based care allows care to be customised to local needs and preferences. It reflects the centrality of the community in the care model and the potential for local communities to be empowered to take charge of their health

iv) Relationship-based care

Shifting from an episodic transactional provider-patient exchange to a care partnership with residents built on understanding and trust, relationship-based care is continuous and longitudinal. Over time, it empowers residents to achieve greater levels of self-care.

Six Strategies (6S) – 'What' the enablers necessary to achieve population health are

Central Health aims to build healthier, happier communities where residents are activated and cared for by one community of carers, supported by one community health team and one network of providers. This integrated care network of providers uses the enablers of one set of assessment tools to identify needs, which are met by one menu of programmes. To ensure alignment of payers, providers and patients, transformation of the financing system is required to care for one population with one budget. The strategies, collectively known as the 'Six Strategies' (6S), are described below.

Strategy 1: One Community of Carers

Residents desire and have the capacity to care for themselves, their families and others who live around them. This is observed even in elderly residents and those living with serious chronic diseases. In Singapore, many residents live with their extended families and it is common to see three generations of the same family live together.

The role of a carer is mostly informal and can be taken on by anyone – volunteers, peer group leaders, caregivers and residents themselves. This strategy of building 'One Community of Carers' aims to activate individuals and promote a relationship-based care by equipping individuals with the necessary skills, knowledge and confidence to assume critical roles in managing health and social well-being in the community.

The Centre for Health Activation (CHA) was launched with a focus on Activation, Research and Training, also known as the 'ART of CHA' to empower residents to make effective decisions about their own health and well-being, as well as the opportunity to become healthcare volunteers. They are the bridge for other residents transiting from the hospital into the community. Some activated residents also assume the

Figure 3. Community Health Posts Across Central Zone's Seven Subzones.

role of Peer Support Leaders and lead their fellow residents in community-based activities such as exercise and healthy eating, allowing neighbourhood-based care to flourish.

To date, CHA has over 500 active volunteers that support the growing suite of 33 programmes to meet the evolving health and social care needs of the population. CHA also works closely with community partners to develop and conduct programmes like Charge Up! Learning Programme that has so far equipped more than 115 carers with paraclinical skills and knowledge, such as managing chronic diseases and doing gait assessment.

Strategy 2: One Community Health Team

Complementing the community-based lay carers to better address the residents' unique needs, the central zone is geographically divided into seven subzones, where 'One Community Health Team' is assigned to each subzone. The goals of the community health teams (CHTs) are to build relationships with residents and work closely with local partners across health and social care to enable health engagement, care coordination and ageing in place. To this end, CHTs are co-located with partners in the community and currently operate 91 community health posts at partners' sites (see Figure 3). CHTs remain as the main physical presence and visibility in the community, and each team member is a local ambassador. They have intimate knowledge of ground needs and circumstances, and the information is incorporated into population health planning and interventions co-developed

with the Central Health partners.

CHTs are multidisciplinary teams from TTSH. Each team is anchored by community nurses and health coaches, and supported by doctors, allied health professionals, pharmacists and administrators. The team delivers care in three main areas: wellness, preventive care and transitional care. In the latter, they support and empower residents with skills and knowledge for self-management of health issues and delay frailty progression. Additionally, team-based convergence of skill sets and competencies can be achieved through cross-trainings. In the long term, the CHTs contribute to building a Hospital Without Walls by delivering care for residents in the community. CHTs will work alongside the Community of Carers to ensure strong care support in the neighbourhoods. (See appendix for stories from the CHTs on patient care beyond the hospital.)

Strategy 3: One Network of Providers

In 'One Network of Providers,' the co-creation of a common vision and shared goals guide the collaborations amongst partners with an aim to evolve the relationships into long-standing partnerships characterised by multilateral collaborations. An integrated care network delivers seamless care for residents in a holistic and concerted manner, where the convention of facility and episodic-based care is broken down and residents' needs are considered in totality, shifting towards relationship and neighbourhood-based care.

To date, Central Health has built a network of strategic partners who work in the central population zone. They include 'vanguard partners' for overall care integration, institutions which manage residents who are transiting from hospital to community care, and expert partners in specialised care areas such as End-Of-Life (EOL) services. The network also admits primary care providers and community partners, which are major touchpoints in the central zone. Collectively, an integrated care network is envisioned to better integrate care delivery across the care continuum and simultaneously foster alignment across health and social care providers.

Strategy 4: One Set of Assessment Tools

With greater collaboration with partners in care delivery, there is an impetus to establish a common language amongst partners. To enable this, the 'One Set of Assessment Tools' strategy allows insights into the population's needs, for planning and implementation of interventions, and evaluation on the effectiveness of interventions.

The tools are broadly categorised in two areas:

1. Population-level assessment tools: The applications enable segmentation of population for analysis at the macro (i.e. country), meso (i.e. specific subpopulation such as residents grouped by chronic conditions) and micro levels (i.e. high-risk population of certain outcomes like readmission) (Vuik et al. 2016). Stratification of population is necessary for population health management to design the right interventions for the right population. It also identifies unmanaged needs by comparing care interventions that should be delivered against care that has been delivered for the same population segment. In Central Health, a two-pronged approach is explored, where first, a global risk stratification tool is used to categorise residents based on their health status and other factors. Based on the categorisation, a needs-based segmentation tool would then be applied to match appropriate interventions.

2. Individual-level assessment tools: These applications are further subdivided into clinical and social assessment tools. Despite Singapore's small geographical area, there is currently little harmonisation of tools across institutions and in different care settings. A shared set of clinical assessment tools creates a common language for providers to join up care and enables collaboration.

Strategy 5: One Menu of Programmes

In 'One Menu of Programmes,' the strategy aims to consolidate all interventions available across the care continuum into a common directory of health and social care programmes. This comprehensive list of programmes is derived on two levels. Firstly, it leverages the existing services offered by health and social care providers, and secondly, it identifies gaps in addressing the population's needs. This gap identification creates opportunities for Central Health partners to collectively co-create new programmes to ensure that the population has the access to resources that would benefit their health.

TTSH has developed six care workstreams to provide direct care services that complement and bridge gaps in 'One Menu of Programmes.' These workstreams target different segments of the care continuum, ranging from Preventive Care to Long-Term and EOL Care. All workstreams are co-developed and implemented with the Central Health community partners, and are joined up to ensure care integration. Preventive Care optimises the bio-psycho-social well-being through outreach, screening and health coaching. The Primary Care workstream right-sites appropriate services to reduce unnecessary demand for specialist services. Frailty-Ready Hospital Care provides evidence-based care to support the older and frail population. To ensure seamless care post-hospitalisation, Intermediate Care and Transitional and Community Care workstreams establish downstream rehabilitation and transitional care. The Long-Term Care and EOL workstream assists residents to maintain quality of life and dignity in their final days.

Building on 'One Community of Carers,' the assessment and list of programmes (recommended based on needs) would be made public to encourage self-servicing amongst activated residents. Residents who require more assistance are not left out, as they can turn to the CHTs for identification of suitable programmes, based on needs and geographical

proximity. This blends with social empowerment, where social interventions are recommended to residents. This is a shift towards person-centred care where social and environmental determinants of health are incorporated.

Strategy 6: One Population, One Budget
In the last strategy, 'One Population, One Budget,' a new financing model is required to align the incentives of the payers, providers and patients. The alignment seeks to focus on health outcomes and sustainability of the health system. The current pay-for-service model at the point of care drives volume and does not give attention to outcomes. It increases overall system cost and is unlikely to be sustainable. Central Health aims to establish a population-based financing model that aggregates, aligns and anchors on the health ecosystem and what the population values.

Medical Technology and Operations Technology). DITs support pilots to address relevant use cases and operations. It develops the technological platform and middleware to integrate the use of these technologies. Successful technology pilots can be incorporated into the innovation roadmap for an SIP.

The first two SIPs have been initiated – Wards Without Walls (WoW) and Clinics Without Walls (CoW). WoW focusses on the use of technologies and robotics in enabling inpatient care transition from hospital to home. CoW leverages telehealth and digital applications to build a care relationship that transcends episodic clinic visits and activates patients to own and manage their health. Another five SIPs are in the works, and each programme extends the hospital beyond its walls into the community.

The community health teams remain as the main physical presence and visibility in the community, and each team member is a local ambassador

So far, incremental steps have been taken to transform the current financing model. Central Health is a collaborator in pilot financing projects that enable value-based care and right-siting. An example is the bundled payments of Diagnosis-Related Groups (DRGs) in tertiary and intermediate care facilities. The bundled payment methodology prescribes the shared amount that care providers from different settings can receive based on a DRG code. It incentivises care providers to work together to optimise care for the residents such that any savings could be shared amongst the providers.

Hospital Without Walls Through Digitalisation

Digitalisation will be a key enabler to building a Hospital Without Walls. It enables care to be delivered beyond the hospital anytime and anywhere. Today, patients come to the hospital to receive care. Tomorrow, care follows the patient. The hospital's digitalisation effort comprises a matrix of Strategic Innovation Programmes (SIP) and Digital Innovation Technologies (DIT). SIPs serve to integrate multiple innovation projects into a coherent development roadmap towards a strategic goal. SIPs adopt the hospital's innovation cycle, which is an iterative process to redesign care, stack up technologies and redesign jobs. This process ensures that technologies support new care models and empowers a digitally-ready workforce. DITs, on the other hand, are technology-driven workgroups that focus on a technology (e.g. Artificial Intelligence & Analytics, Telehealth, Digital Applications,

Just the Beginning Amidst Challenging Times

TTSH marked its 176 years of care in 2020 amidst the COVID-19 pandemic. COVID-19 has illustrated that an integrated care model can help in the hospital's business continuity to shift care into the community to free up bed capacity for the hospital's outbreak response. The model also enabled closer collaboration with primary and community care partners to fight the outbreak in the community. TTSH repurposed its CHTs as community swab teams for testing of COVID-19, conducting staff training and reviewing infection control practices at residential and convalescent facilities belonging to our community partners. In the new normal ahead for Central Health, TTSH will work closely with partners to plan and prepare the community for the next outbreak response.

In taking on the expanded mission, TTSH is establishing itself as a Hospital Without Walls where its patients can continue to be cared for beyond the hospital; where the residents in the community can stay safe and healthy and age well in place; and where care is focussed on supporting the people to lead healthier and more meaningful lives. The next chapter of the hospital will be written together with its partners as Central Health, and it promises to be one of greater resilience, reinvention and renewal.

Conflict of Interest

None. ■

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Appendix

Stories from the Community Health Teams (CHT)	
First home visit condition Photo credit: TTSH	CHTs collaborate closely with community partners for home visitations and co-management of care. An example is Mr K., 60-year-old Chinese gentleman who lives alone in a one-room rental flat. Mr K. has been known for frequent admissions due to falls that result in multiple injuries on the cheeks, elbows, knees, back and hip. At his last admission, Mr K. was referred to the CHT to assess his ability to cope at home and review his wounds. A joint home visit assessment was arranged with a social worker from a nearby Senior Activity Centre due to suspicions of elder abuse based on the wounds that were sustained. During the first home visit assessment, the CHT noticed that the home was not 'fall-safe' as it was cluttered with items stacked almost up to the ceiling, slight flooding observed from the kitchen sink to the bathroom and the sink and drain had been clogged for at least two weeks. Mr K. also had not changed his wound dressing since discharge, with a layer of slough and pus observed to have leaked from the dressing. Together with home services, the CHT worked closely to manage the wound dressing of Mr K. Arrangements were made with social workers to de-clutter his home, coordinate services for meal delivery and provide home personal care. With close monitoring and follow-up by the CHT and partners, Mr K. was well enough to return to work as a cleaner after two months. To ensure continuity of care for Mr K., the case was handed over to a social service care provider for follow-up.
Photo credit: TTSH	Another example is Mrs Z., who has mild Alzheimer's disease and often forgets to take her medications. She was referred to a CHT to review her medication compliance and coping abilities at home due to fall risks in view of her bilateral knee weakness. During home visitations, the CHT nurse would carry out physical check-ups and provide medication education to Mrs Z., while the occupational therapist did home environment assessments, reviewed her function and recommended appropriate walking aids to assist with her mobility. Based on the condition of Mrs Z., onsite referral was done for Mrs Z. to a Senior Activity Centre near her home. Home nursing services was also brought on board to assist with medication packing to help Mrs Z. with medication compliance. Mrs Z. also brought up the mental health issues that her son was facing. The team was able to help Mrs Z. to make the appropriate referral for her son to the relevant support services. Mrs Z. is now able to walk for short distances with the help of a walking frame to meet her friends in the neighbourhood, and her son assists her with the use of a wheelchair to attend her medical appointments at the polyclinic.

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