SINGAPORE

SMART WARDS

Institutions here turn to smart tech to tackle staff shortage and care for ageing population

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Reaching an elderly patient within seconds before he gets off his hospital bed and falls, or using hands-free wearable devices to update doctors off-site on the patient's condition.

Such advancements, deemed as the future of hospitals, are already in Singapore as healthcare institutions here shift to smart technology to address manpower shortage and to look after a rapidly ageing population.

The smart ward team at Tan Tock Seng Hospital (TTSH), for instance, leverages digitalisation, robotics and artificial intelligence to change the way its staff work and care for elderly patients.

"Innovation is no longer a wait-and-see luxury but one that is mission-critical," said chief nurse Hoi Shu Yin.

With its gadgets and automated equipment, TTSH's smart ward engages patients, improves services, lightens the load of a limited and ageing staff, and allows healthcare

The smart ward team at Tan Tock Seng Hospital leverages digitalisation, robotics and artificial intelligence to change the way its staff work and care for elderly patients. Gadgets and automated equipment improve services and lighten the staff's load. ST PHOTO: DESMOND WEE

The smart predictive patient monitoring system at TTSH uses thermography, machine learning and predictive algorithms to predict when a patient is getting out of bed, giving nurses time to intervene. ST PHOTO: DESMOND WEE

The automated bed-turner ensures bed-bound patients are regularly turned, so they do not develop pressure injuries. It also helps reduce the potential for staff injury as the job requires a lot of effort and strength. ST PHOTO: DESMOND WEE

A bedside tablet gives patients real-time information of their care schedule, medical data, and educational materials. They can also play games that promote cognitive engagement and facilitate rehabilitation. PHOTO: SGH

An unobtrusive digital wearable at Singapore General Hospital monitors the vital signs of patients minute-by-minute without disrupting their rest, while also relieving nurses of the task. PHOTO: SGH

What makes a ward smart?

Here are five smart devices local healthcare institutions are using to cope with future challenges:

1 SMART PREDICTIVE PATIENT MONITORING

Mere minutes and even seconds can make a difference in nurses and doctors being able to intervene and save lives. To anticipate falls, a sensor mounted in the ceiling of the smart ward at TTSH is powered by AI to detect and predict fall-risk patients trying to get off the beds on their own, allowing a 15-second lead time for staff to reach them before they do so.

2 AUTOMATED BED TURNER

Bed-bound patients need to be turned every two hours to prevent pressure injuries caused by lying on one side for too long. Often, the task needs nurses to use intensive physical strength, sometimes resulting in staff injury. The automated turner helps the nurses do that every two hours, reducing labour-intensive work.

3 SMART TABLET AT BEDSIDE

Patients at both TTSH and Singapore General Hospital (SGH) will be given a tablet at their bedside to allow them real-time access to their care team, personal medical data and educational information. They can better manage their own health while in a hospital ward by monitoring their vital signs, and can check for scheduled scans, tests and therapy sessions.

4 HUMANISTIC LIGHTING

The lighting in the smart ward at SGH is programmed to follow the 24-hour internal clock of patients, as studies have shown that such lighting can improve their mood and sleep pattern, as well as help with healing.

For safety, night lights placed along the walls automatically turn on if they sense someone moving towards the toilet. Lights in the toilet will brighten gradually to allow the patient's eyes to adjust comfortably.

5 WEARABLE DEVICES

In the smart wards in SGH, patients can put on digital wearables if their vital signs need to be monitored more frequently. These medical-grade wearables automate the reading of these signs minute-by-minute, relieving nurses of the task while enhancing patient safety and rest.
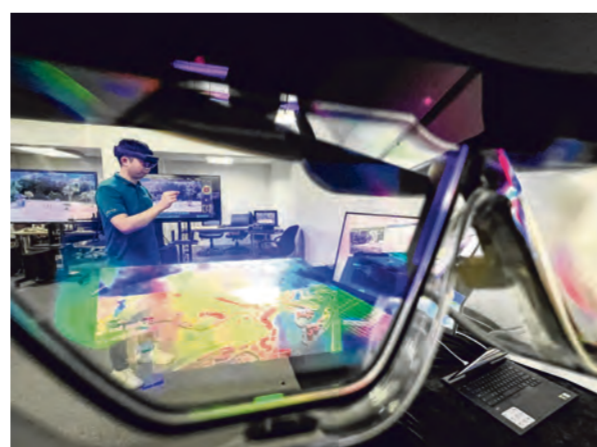
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Healthier SG health plans will get more personalised with tracking

Physicians will track participants' health goals on apps and personalise plans further

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The health plans that participants of Healthier SG will get from their primary care physicians will become more and more personalised as they use apps to track their health, said Health Minister Ong Ye Kung, explaining how the potential of precision public health is being harnessed here.

The initial versions of the personalised health plans under Singapore's preventive care strategy are likely to be more generic, Mr Ong said. But over time, this will change as individuals use apps such as Healthy 365 or LumiHealth to track their health goals and nudge them to stay on top of their plans.

"When you see the doctor again, the doctor will look at what the health app says and further personalise your health plan. So there will be an iterative process."

Mr Ong made the comments on Thursday in his opening address at the third edition of the Precision Public Health Asia Conference, which is being held at the Centre for Healthcare Innovation.

Precision public health, an emerging field, refers to the use of data, analytics and other technologies at the population level to improve how interventions are tailored in order to prevent diseases, improve health, and reduce health disparities.

"The convergence of digitalisation, big data, wearables and AI (artificial intelligence) is that we can collect and analyse data, and influence population behaviour much more than before," Mr Ong said.

On the other extreme end of the healthcare spectrum is precision medicine, which focuses on personalised clinical approaches – no different from how Instagram or TikTok tracks your consumption behaviour on social media and feeds you the right videos and advertisements, he noted.

The starting point for this is that people possess unique genotypic characteristics, and may respond to external health factors, medication and treatment differently, he said.

"Public health and precision medicine continue to be at the opposite ends of the healthcare spectrum – one dealing with large numbers imprecisely, the other about customised treatment of one individual. But both ends are now brought together by digital technology," said Mr Ong.

In December 2022, Mr Ong launched the SG100K research programme, which will sequence and analyse the whole genomes of 100,000 Singaporeans across different backgrounds and ethnicities over three years.

The findings of SG100K will pave the way for better prediction and prevention of chronic diseases and the provision of effective healthcare, he said.

Healthier SG can be a "powerful receptacle" for the adoption of innovation in healthcare, as the clinical processes, IT systems and funding mechanisms, for instance, are already in place.

On Saturday, Mr Ong said that about 67,000 people have signed up for Healthier SG. It was formally launched on July 5 for those aged 60 and above, though the pre-enrolment exercise for those aged 40 and above who have existing chronic illnesses had started in May.

The two-day conference, which ends on Friday, is co-organised by the National University of Singapore Saw Swee Hock School of Public Health and the Precision Public Health Asia Society, the founding of which was announced at the second edition of the conference in April 2021.

More than 500 delegates from Asean and beyond have signed up for the event, including policymakers, health sector leaders, industry experts, clinical researchers and academics.

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Health Minister Ong Ye Kung speaking on Thursday at the third edition of the Precision Public Health Asia Conference at the Centre for Healthcare Innovation. More than 500 delegates from Asean and beyond have signed up for the event, including policymakers and health sector leaders. PHOTO: LIANHE ZAOBAO

14 innovations at TTSH after testing over 20

personnel enough room for efficiency and upskilling.

"We've been given the agility and autonomy to ensure collective decisions can be made and implemented fast and safely without being belaboured by conventional approval processes," said smart ward lead and senior nurse manager Lim Mei Ling.

One in four Singaporeans will be at least 65 years old by 2030 – up from one in six today. This means more healthcare staff will be needed to run hospitals, clinics and eldercare centres.

In his speech in Parliament in October 2022, Health Minister Ong Ye Kung said his ministry estimated that another 24,000 people are needed, to grow the current number of 58,000 healthcare personnel to 82,000 by 2030.

An alternative to merely increasing manpower could lie in harnessing digital technology to provide better and safer care to patients, hospitals have found.

Helmed by a multi-disciplinary care team of doctors, nurses, allied health professionals and administrators, TTSH set up its smart ward late in 2022 in the general medicine speciality division, where the patients are mainly the elderly with the most complex of needs.

"As a hospital with high ambitions for the transformative bene-

NIMBLER WORKFORCE

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TAN TOCK SENG HOSPITAL CHIEF NURSE HOI SHU YIN

fits of innovation, it is important that our ideas are test-bedded in the most real and intensive of environments and not in extended spaces," said the smart ward's co-lead, associate consultant in general medicine Keefe Tan.

"Real problems are explored and exposed this way, and we can then realise the proofs of concept and value of these forward initiatives for our patients and workforce," he added.

"As our society becomes older, so will our patients and our workers. It is crucial that we leverage innovation to tackle new determinants of health such as frailty and create a nimbler workforce not burdened by repetitive and labour-intensive tasks," Dr Hoi said.

He added that initiatives and ideas in the smart ward are constantly being rapid-tested, repurposed and planned for scaling up.

To date, more than 20 innovations have been tested at TTSH, with 14 initiatives introduced and waiting to be scaled up to other wards. In the next couple of years, another 20 initiatives will be in line to be rapid-tested.

TTSH is not the only hospital in Singapore that has adopted smart technology in its wards.

The two smart wards at Alexandra Hospital have been up and running since 2022. At the Singapore General Hospital (SGH), Smart Ward 45 opened for service in September 2021.

Initiatives like the bedside tablets and wearables were first piloted in various locations at SGH before they were implemented at the smart ward.

SGH nursing division deputy director Ang Shin Yuh said the hospital will be launching version 3.0 of the tablet to empower patients and family members during hospitalisation by enabling self-charting of food and drinks consumed.

Patients in the smart wards who need frequent monitoring of vital signs get medical-grade wearables that read minute-by-minute vitals, relieving nurses of these tasks.

"By the end of this year, the ward will be equipped with exciters that enable real-time tracking of equipment. This would allow higher efficiency as nurses will have real-time information on equipment location and reduce the time they take to search for them when needed," Ms Ang said.

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