Combating Covid-19: A birth of innovations

The pandemic has given rise to a slew of local inventions that optimise treatment, raise healthcare efficiency and prepare for future infectious disease risks. **Shabana Begum** highlights some of them.

A stroke patient at CGH undergoes rehabilitative therapy using the robotic device, Andago.

Robot assistant for post-critical Covid-19 patients

Used in: Changi General Hospital (CGH)

- Covid-19 patients who are on mechanical ventilation in the intensive care unit (ICU) for a prolonged time may need pulmonary rehabilitation right after, because of muscle weakness and breathing difficulties.
- A patient is harnessed to a robotic support system, called Andago, which bears part of the patient's weight as he tries to walk and strengthen his muscles without the fear of falling.
- Earlier this year, a recovered Covid-19 patient who was under mechanical ventilation for 15 days in the ICU used Andago during his in-patient rehabilitation.
- Initially, the 61-year-old was easily fatigued and could walk only 4m with assistance from therapists before his oxygen level dropped.
- After switching to the robotic device, he managed to walk 368m without any oxygen support or rest, after six sessions over 13 days.
- Andago was first introduced in CGH for stroke patients.

Self-reliance with 3D-printed face shields

Developed by: Tan Tock Seng Hospital (TTSH) and the National Centre for Infectious Diseases (NCID)

- Goggles can be uncomfortable for healthcare workers and tend to fog up.
- To make protective gear more comfortable, both hospitals conceptualised and invented their own face shields using 3D printing.
- One was a disposable face shield, and the other had a spectacle frame.
- With minimum contact with skin, users are more comfortable. They do not need to wear goggles under the face shields.
- The locally produced face shields also reduce reliance on overseas suppliers, who may face shortage or import disruptions.
- The face shields are currently used in some departments within TTSH and NCID, which includes the NCID Screening Centre, emergency department and pandemic wards.

3D-printed disposable face shield.

3D-printed spectacle face shield, where the spectacle frame can be reused.

Tele-audiology

Pioneered by: Ng Teng Fong General Hospital (NTFGH)

- Telemedicine has been thriving this year as more patients are opting for medical check-ups and rehabilitation from home
- But tele-audiology – where specialists help patients virtually with hearing loss management, such as by adjusting their hearing aids – is a new entrant to tele-health in Singapore.
- NTFGH's audiology department is believed to be the first to offer this service here.
- Through video consultation, audiologists can help patients with hearing difficulties or impairment use their hearing aids and optimise their residual hearing abilities.

A patient having a tele-audiology consultation session with Dr Gary Lee (left), head of the audiology department at NTFGH.

The UV-C light box, with medical supplies stored inside for disinfecting.

UV light box disinfects medical supplies

Developed by: Yishun Health and Republic Polytechnic

- The ultraviolet-C (UV-C) light inside the box can disinfect and prolong the use of items such as stethoscopes, goggles, face shields and even surgical masks.
- UV-C light kills around 99 per cent of bacteria and has been clinically proven to eliminate viruses.
- Most items are first cleaned with alcohol wipes before they go into the disinfecting box for three minutes.
- Once disinfected, the surgical masks and other protective gear can be reused throughout the whole work shift.
- The boxes were distributed to wards and departments across Khoo Teck Puat Hospital and Yishun Community Hospital.

Robots to the rescue

- Sengkang General Hospital is exploring the use of autonomous mobile robots in wards. The robots can deliver services and items inside the wards to assist the nursing and support staff.
- Confirmed and suspected Covid-19 patients at Alexandra Hospital receive their meals and medicine from a robot called BeamPro.
- From next month, a concierge and security robot will scan SafeEntry check-ins and record visitors' and patients' temperatures in NTFGH.
- SwabBot, which automates nasal swabbing to diagnose Covid-19, was developed by the National Cancer Centre Singapore, the Singapore General Hospital, Duke-NUS Medical School and Biobot Surgical.

PHOTOS: CGH, TTSH, KTPH, CHONG JUN LIANG, KELVIN CHNG STRAITS TIMES GRAPHICS