Hotel to Hospital in 14 days: Expidited Transformation of a Hotel into a Covid-19 Community Care Facility with Remote Vital Signs Monitoring

BACKGROUND

I had the opportunity to visit the Community Care Facility, Connect@Changi, during a recent trip to Singapore in May 2022. I was also lucky enough to meet with the medical service provider in charge of setting up this facility.

Connect@Changi, a facility near Singapore airport, was opened in February 2021 as a pilot short stay facility to allow business travellers from around the world to stay and conduct meetings without needing to undergo quarantine on arrival in Singapore during the COVID-19 pandemic. The aim was to facilitate business exchanges and support the revival of Singapore's status as an international business hub, and the hospitality sector as the country gradually reopens its borders. The initiative was subsequently suspended as the COVID-19 pandemic continued and international travel remained limited.

Connect@Changi was subsequently converted into a Community Care Facility (CCF) for people infected with Covid-19 in August 2021. Having a total of 660 air-conditioned isolation rooms with ensuite bathrooms, a manual workflow with spot-check vital sign monitors would be logistically challenging for medical staff to administer due to the sheer size and physical layout of the CCF. In addition, opaque doors prevent medical staff from conducting visual checks on patient conditions without entering their respective isolation rooms. Lastly, a worldwide shortage of medical staff further reinforced the need for a technology-assisted solution to decrease the ratio of medical staff to patients.

While pulse oximeters, blood pressure monitors and thermometers are made available to every patient, elderly patients are not familiar with the usage of such devices and it poses an issue in monitoring their own health.

The provision of a continuous vital signs remote monitoring solution was helpful in the following areas:

- **Increase patient safety by allowing early detection of silent hypoxia in patients from high-resolution, continuous vital signs data as compared to an hourly spot-check model**
- **Increase staff safety by minimizing physical contact between infectious patients and medical staff**
- **Reduce Personal Protective Equipment (PPE) burn rate as patient vital signs can be retrieved by medical staff without needing to enter the isolation zone**

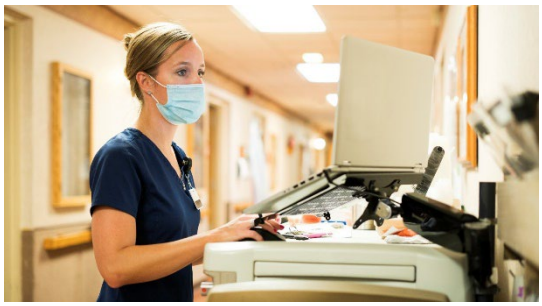
Masimo SafetyNet® with Radius PPG™ was evaluated together with several other similar continuous vital signs remote monitoring solutions based on the following criteria:

- Accuracy and reliability – The solution should provide accurate and reliable readings for patients across different age groups, including children, adults, and elderly
- Cost – The solution should be reasonably priced to keep the price of healthcare affordable
- Scalability – The solution should be able to handle a large number of patients during a surge in patient loads
- Availability – The solution should be ready to deploy within a short time (approximately 2 weeks)
- Ease of Use – The solution should be intuitive and easy for non-technical medical staff to use
- Infection Control – The solution should comply with existing infection control guidelines and must withstand frequent disinfection

For meeting and exceeding the above-mentioned criteria, Masimo SafetyNet was eventually selected as the continuous vital signs remote monitoring solution for the CCF.

IMPLEMENTATION

The CCF is separated into two zones ("Green" and "Red"), with boundaries demarcated by doors armed with card access control systems to prevent unauthorized traveling and minimize the risk of unintended contamination across zones. Both the Green and Red zones had their own respective ACMV system whereby the air between both zones would not mix. Each ACMV is coupled with HEPA filters and UV sterilisation to ensure that the exit air is cleansed before being released into the environment.



A patient who is admitted into CCF would first be triaged by the nursing team. Most patients who are asymptomatic are only required to submit their vital signs once every morning using spot-check pulse oximeters. Patients at higher risk of deterioration such as the unvaccinated elderly or those with other underlying conditions are placed on continuous monitoring for oxygen saturation, respiration rate, and pulse rate.

As above, patients were selected based on risk of deterioration, mainly the unvaccinated patients and those with underlying medical conditions at risk of deterioration such as chronic lung disease. With the assessment by the medical team, patients who meet the eligibility criteria were placed onboard the Masimo SafetyNet system. A representative from the medical team will onboard the patient at the dedicated training counter (located after the triage stations) and the onboarding process is as follows:

- Issuance of mobile phone preloaded with Masimo SafetyNet mobile application to patient
- Application of Masimo Radius PPG Tetherless Pulse Oximetry disposable sensor on the patient
- Training for basic troubleshooting and reapplication of Masimo Radius PPG disposable sensor

A medical command centre was set up in the Green zone where a team is deployed to monitor patient vitals using the Masimo SafetyNet web-based clinician dashboard. The setup, consisting of laptops and monitors, did not require any infrastructural changes or permanent fixtures other than Internet connectivity. Masimo adopted a train-the-trainer approach, where the medical and operations team was trained to train patients on how to perform basic tasks such as troubleshooting and reapplication of the Masimo Radius PPG disposable sensors.

In the event whereby the team in the command centre spotted a patient whose condition was deteriorating, a medical team staff within the Red Zone would be activated to check on the patient.

OUTCOME

The continuous vital signs reported by Masimo SafetyNet enabled early and accurate detection of silent hypoxia in several patients at the CCF. These patients appeared generally well and had no complaints of other symptoms. Timely identification of clinical condition deterioration in this group of patients would have been challenging, if not impossible, through spot-check vital signs reporting. This contributed to an increase in patient safety and the quality of care provided by the medical team.

CONCLUSION

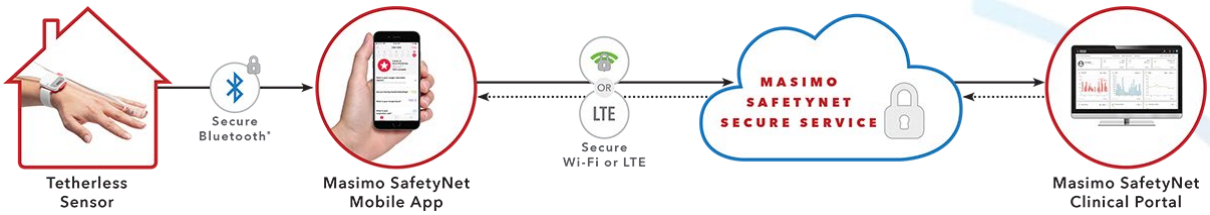
Compared to other systems evaluated for the CCF, Masimo SafetyNet was able to maintain reliable connectivity and provided consistent, stable access to patient vital signs in a physically enclosed environment. This minimised unnecessary contact with patients, as well as the number of trips required by the medical team to verify clinical conditions which would otherwise be required in times of frequent disconnection.

A CCF like Connect@Changi becomes increasingly important in relieving hospitals from Covid-19 patients as they cater to their Business As Usual (BAU) load. Although the majority of Covid-19 patients will recover well, tele-surveillance allows for the optimisation of precious medical manpower to cater to those patients at higher risk and those who deteriorate.

WORLD HOSPITAL at HOME COMMUNITY™

Masimo SafetyNet with Radius PPG

Designed to help providers remotely manage patient care, Masimo SafetyNet is a secure, scalable, cloud-based patient management platform featuring clinical-grade continuous measurements, digital care pathways, and remote patient surveillance. Patients receive a multi-day supply of disposable sensors or reusable devices, along with access to the Masimo SafetyNet mobile application.



The main components of the Masimo SafetyNet system available for home use are: Continuous Wearable Sensor Kit Radius PPG, a tetherless pulse oximetry and respiration rate powered by clinically proven Masimo SET®,

Radius T°™, wearable temperature sensor featuring trended data.

These connect via a smart phone App to Customised CarePrograms™ delivered to patients' smartphones, offering a digital replacement for traditional home-care plans. In addition to automatically pushing data to the hospital for evaluation, the app allows patients to report their symptoms. Once the data are transmitted via a secure cloud-based connection to a Clinical Portal, clinicians can track patient status and care-plan compliance from the hospital. With automated symptom reporting and customisable notifications, institutions can more easily deploy home-care monitoring at scale while helping clinicians stay informed about important developments in patient's condition.

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ABOUT THE AUTHOR

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