Source: *The Straits Times,* pA9
Date: 4 November 2020



With the new wireless system, the dashboard can be accessed via a laptop, tablet or smartphone and will display the user's name and pulse oximeter readings. Green indicates that both the user's blood oxygen and heart rate readings are normal. Orange suggests that one of the readings is abnormal, while red signals that both measurements are abnormal. ST PHOTO: CHONG JUN LIANG

New wireless system tracks blood oxygen for virus symptoms

Dorm residents check oxygen levels on Bluetooth-enabled devices; readings from thousands displayed on dashboard

Clara Chong

A new weapon has been added to Singapore's arsenal against Covid-19: an automated system that monitors oxygen levels in the blood.

Low blood oxygen levels could be a symptom of Covid-19.

The new system utilises Bluetooth-enabled pulse oximeters to measure blood oxygen levels.

It will help automate manual tasks and compile pulse oximeter readings from thousands of individuals neatly on a dashboard.

A team of researchers from the National University of Singapore (NUS) – in consultation with clinicians from the National University Hospital and Singapore General Hospital – worked on the new system from April to June. The project was also supported by both Temasek Foundation and the National Research Foundation.

This new system consists of several components: wireless nodes to capture data from the Bluetooth-enabled pulse oximeters, individual Bluetooth-enabled pulse oximeters which people can use to take their readings, Wi-Fi stations and a dashboard that presents the data.

Workers residing in dormitories need to measure and record their oximeter readings twice a day as part of precautionary measures to identify new cases of infection.

This is now done manually.

With the NUS wireless system, workers start the monitoring process by clipping the Bluetooth-enabled pulse oximeter onto their index finger while they are positioned within 6m of the wireless node. After 30 seconds, the measurement is completed.

The data is then sent by the wireless nodes – via Wi-Fi stations – to the cloud for storage and displayed on the dashboard.

The dashboard can be accessed via a laptop, tablet or smartphone and will display the user's name and pulse oximeter readings.

These readings will also be colour coded. Green indicates that both the user's blood oxygen and heart rate readings are normal. Orange suggests that one of the readings is abnormal, while red signals that both measurements are abnormal.

The individual will also receive a text message on his mobile phone about the readings and whether they are within the normal range.

Users can choose to receive messages in English, Chinese, Tamil, Bengali or Hindi.

If an abnormal reading is obtained, the person will be advised to retake the measurement after 30 minutes.

If the reading is still abnormal or if he fails to retake the measurement within the hour, he will get another alert to contact the relevant healthcare workers for further examination.

For workers in dorms, the dorm operators will also be alerted.

Assistant Professor John Ho from the NUS Institute for Health Innovation and Technology, who is the lead on this project, said: "Our aim is to bring the convenience of digital technology to the pen-and-paper process currently being used to take health measurements.

"We hope that the system helps to address the challenge of monitoring the health of migrant workers during this difficult period."

This system can also be deployed in community care facilities.

To test the efficacy of the system, the NUS team conducted a two-month pilot programme in four rooms within a dorm which houses workers from Soilbuild Construction Group.

The pilot involved 24 workers, all of whom had previously tested negative for Covid-19.

They had to take oximeter readings four times a day. The results showed that the workers could be reliably monitored, with a compliance rate of above 85 per cent.

There was minimal intervention by dorm operators.

Mr Tushar Nath, the digital innovation lead at Soilbuild Construction, said: "With the app and dashboard, I can see all the information at one go.

"With many workers under our care, the system is able to show immediately who needs attention, and it is easier for supervisors to track the health of their workers."

Moving forward, the NUS team also hopes to add more sensors, such as those which measure temperature, to build an integrated health monitoring system.

The team also hopes to deploy the system in other worker dormitories and community isolation facilities.

Mr Yeoh Keat Chuan, senior managing director at the Enterprise Development Group in Temasek, said: "The ability to remotely monitor oxygen levels of large groups of people in a timely manner is especially pertinent to provide businesses with peace of mind as the economy reopens."

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IMPORTANT FOR BUSINESSES

The ability to remotely monitor oxygen levels of large groups of people in a timely manner is especially pertinent to provide businesses with peace of mind as the economy reopens.

MR YEOH KEAT CHUAN, senior managing director at the Enterprise Development Group in Temasek, on the automated system that monitors oxygen levels in the blood in checking for symptoms of Covid-19.

INSTANT READINGS

With the app and dashboard, I can see all the information at one go. With many workers under our care, the system is able to show immediately who needs attention, and it is easier for supervisors to track the health of their workers.

MR TUSHAR NATH, digital innovation lead at Soilbuild Construction, on the new system's convenience.

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