

THE WIN-MASK: INNOVATION FOR THE PEOPLE

As the COVID-19 pandemic swept across Southeast Asia, CHI's Co-Learning Network partner, the Faculty of Medicine, Siriraj Hospital at Mahidol University in Thailand, designed and developed a medical grade reusable face mask to protect healthcare staff, frontliners and civilians, which could effectively reduce the usage of disposable surgical masks.

The innovation, named WIN (Washable Innovative Nano) Mask, effectively filters dust and droplets with its combination of these three layers – a Siriraj dust-tight woven-type fabric with waterproof nano coating, an antibacterial Zinc Oxide microfibre fabric, and cotton.

“We started this effort to help our staff and the Thai people, who could not buy the surgical masks due to its current high price and trouble finding in the market. As such, we decided to develop a reusable mask, that we can distribute to our healthcare staff across the country, and subsequently to other essential workers on the frontline, and the people who need it most,” said Associate Professor Cherdchai Nopmaneejumsruslers, Vice Director, at the Faculty of Medicine.

The WIN-Mask was developed in collaboration with the Higher Education Ministry, the Thailand Institute of Scientific and Technological Research, the Thailand Centre of Excellence for Life Sciences and partner agencies, such as the Rajamangala University of Technology Lanna and the National Institute of Nuclear Technology with the support of the National Research Council of Thailand.



The WIN Mask

Win-Win Situation

The main challenge in making the disposable surgical masks was the lack of raw materials rather than the manufacturing process. Faced with this, the team turned towards finding suitable material available locally to design the WIN-Mask, which would have to pass all the required standards to be used safely and effectively.

Prof. Cherdchai shared, “The key thing for us when doing the design was to have empathy for those who need it (the staff and frontliners), then test the design with the staff, get their feedback, and then come up with the solution. In our design thinking, we take the ‘Fail fast, fail safe, fail cheap and fail forward’ approach.”



The team finally settled on the three layers for the mask based on its qualities:

Innermost layer

Made of cotton, this layer absorbs fluids and moisture produced by wearers, such as perspiration, and droplets from coughing and sneezing.

Middle layer

This anti-bacterial Zinc Oxide microfibre fabric prevents bacterial growth.

Outermost layer

The Siriraj dust-tight woven-type fabric, has a 270 thread count per square foot, a waterproof nano coat making it water-resistant, and can filter particles of 4-5 microns.

With the three layers put together, the mask was put to the test and found to be capable of filtering 65 percent of PM2.5, and effective in preventing water particles from going through the outermost layer of the mask.

It also performed well in the face seal fit test with its efficiency level of 68 percent in blocking the air from outside, as compared to the 62 percent efficiency level of the surgical mask.

For the permeability test, the mask scored 0.709, where the score of 1 means highly efficient air influx through a fabric, and the score of zero means air does not get through it.

As such, users can breathe comfortably with the mask on. To test the reusability of the mask, it was washed 30 times, and even after that, its quality test results were still maintained.

Opportunity in Diversity

Before the mask went into mass production, the product was tested by giving each staff 3 WIN-Masks with a specially designed zip pouch to store their masks hygienically.

Prof. Cherdchai recommends taking 2 masks to work, to enable a change of mask once a day, storing the used masks in the bag. In its first round of distribution, 7,000 masks were given to healthcare workers in major hospitals.

With the help of partners, Siriraj Hospital was able to source enough material to make between 2 to 3 million masks for healthcare workers.

Thanks to the generosity of the Thai people's contribution of 5.5 million Baht (US\$169,924), about 150,000 pieces of WIN-Masks can be produced for distribution to healthcare workers across Thailand.

Crowd funding has also been set up to raise 5 million Baht to make 100,000 pieces for healthcare worker, the police and other frontline workers.

The team is also in talks with companies who are interested in obtaining the license at no cost, on the condition that the WIN-Masks is made available to the Thai people at an optimum/fair price.

CHI thanks Associate Professor Cherdchai Nopmaneejumsruslers, Vice Director, the Faculty of Medicine, Siriraj Hospital at Mahidol University in Thailand. for the interview.

*For more information on Siriraj Hospital:
<https://www2.si.mahidol.ac.th/en/hospital/>*



Box Story:

Platform to Facilitate Innovation

When innovating in this COVID-19 era, speed is of the essence, and the Thai government and the regulatory bodies were supportive of the development of the WIN-Mask, and was given priority when being processed, cutting down the usual processing time significantly.

On the other hand, there were also all the other collaborative efforts to be taken care of.

Prof. Cherdchai said that prior to the COVID-19 outbreak, the hospital started the “Value Driven Care Unit” in October 2019, to facilitate innovation in healthcare to deliver care that focuses on values to the patient. The Unit is made up of the hospital’s Lean team, a doctor experience in health system research and design thinking process, a team of nurses, and staff with engineering background.

This proved to be a valuable move when the pandemic hit, as the unit was responsible for facilitating the new normal value-driven care processes and initiatives that would be useful during this pandemic.

One of the key projects is telemedicine, which will allow patients to talk to the doctors nurses and pharmacists via the LINE application, then get details of their condition and key business processes such as healthcare privilege approval billing through Siriraj Connect, the hospital’s mobile application.

The hospital will then deliver the patient’s medication with Thailand Post. Another initiative that is being worked on is the “Drive Thru Blood Sampling”, which allows patients to park their cars next to a blood sampling station to do the test, and then return home. Payment for the test can be made on Siriraj Connect.

CENTRE FOR
HEALTHCARE
INNOVATION ®

© Centre for Healthcare Innovation
Permission required for reproduction.
Email: chi@ttsh.com.sg