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ScienceTalk

# Lessons from a pandemic

**NCID's research has guided how Covid-19 is managed and prevented in S'pore**

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The National Centre for Infectious Diseases (NCID) was officially opened on Sept 7 last year.

Barely four months later, we were at the forefront of Singapore's outbreak efforts when Covid-19 hit our shores as it swept over the globe.

As Singapore was among the first countries in Asia to report a case after China, it was imperative for research here to guide how the disease was managed and prevented.

We would soon learn that this was a very unusual virus, one full of surprises. We had to watch it closely as we learnt to deal with it every step of the way.

We have fought back with three weapons: knowledge, flexibility and collaboration.

**KNOW YOUR ENEMY**

Sars-CoV-2, the name of the virus that causes Covid-19, had never been seen before.

Research was urgently needed to understand how infection could result in short- and long-term damage to the body, how the immune system responded and coped, and how genetic changes in the virus influenced the course of the disease and the epidemic.

As this information was being pieced together, we also needed to ensure that resources were allocated to combat the virus without compromising access to care and treatment of other illnesses.

Research was also needed to counter collateral damage arising from the pandemic, for example, to ensure the population's well-being by building up resilience.

NCID's community-based cohort study has been monitoring the population's resilience and the psychological impact and attitudes during the Covid-19 pandemic through regular surveys.

Preparation was key. Drawing lessons from the 2003 severe acute respiratory syndrome (Sars) crisis, NCID started reviewing in-house standard operating procedures and briefing units on the impending arrival of the virus.

The National Public Health Laboratory began working on laboratory detection systems, and the outpatient clinics and emergency department began screening returning travellers suspected of being infected.

The first case in Singapore was confirmed on Jan 23.

Just a day earlier, NCID had brought together a group of researchers from all research institutes and academic centres in the country, in preparation for Case 1.

As at end July, more than 500 Covid-19 patients have been recruited for NCID's intensive Proct study, which detects novel pathogens and characterises emerging infections.

They formed the core of our research cohort, allowing us to study the impact of the virus from multiple angles, from disease manifestations and viral shedding to immune response.

What we learnt from these patients provided the foundation for developing diagnostics and testing strategies, and modelling disease and transmission patterns.

The early findings from local studies, reported in reputable journals, attest to the high-quality research made possible by significant investment and effort in the 17 years following the Sars outbreak.

In the current pandemic, we reported higher viral shedding at the early onset of illness – which means a person is infectious very early into the illness, when symptoms are mild.

This was critical evidence which guided prevention strategies such as early testing and isolation policies.

Our data also demonstrated clearly that older patients fared



National Centre for Infectious Diseases (NCID) staff going through training in how to wear powered air-purifying respirator equipment. The writers say the teams at NCID were able to adapt to the challenges posed by the changing Covid-19 situation because they felt safe at work – they were well trained, and robust infection control measures were in place. PHOTOS: NATIONAL CENTRE FOR INFECTIOUS DISEASES



NCID staff had the assurance of knowing they had adequate personal protective equipment (above, left), and staff at the centre's National Public Health Laboratory (above, right) began working on laboratory detection systems in preparation for the impending arrival of the virus even before the first case here was confirmed.

worse, so seniors were urged to be extra careful and avoid getting infected.

The same data also told us who were at lower risk of complications, and informed policies on patients who could be safely cared for in community care facilities.

Amid the flurry of testing drugs for Covid-19 and pressure from the community to trial unproven therapies, our engagement with international partners paid off, as we were able to conduct and participate in robust trials and were early adopters of novel therapies such as the antiviral drug Remdesivir.

At this stage, though, there remain many unanswered questions. We expect Sars-CoV-2, like other RNA viruses, to mutate, but we do not know whether it will become more or less contagious, or more or less virulent.

It also remains to be seen how long patients have immunity after infection.

But with his head start in research, Singapore is poised to take the lead in answering these questions.

**FLEXIBILITY AMID A COMPLEX, FLUID SITUATION**

In the early stages, when much about the virus was unknown, we had to adjust rapidly and adapt to the evolving situation as we learnt about the virus on the fly.

A small policy tweak could trigger a whole chain of downstream activities.

Rapid changes in how a suspected case was defined – guiding screening and isolation procedures – was one example.

As the number of regions af-

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This was on top of the challenge at NCID (National Centre for Infectious Diseases) of working at new facilities where staff had to navigate a complex building designed to have clear segregation of materials and the flow of people, to avoid cross-contamination.

When case definitions were changed with new information of epidemiological links, workflow changes had to be rolled out across the entire healthcare setting.

These ranged from initial assessment of patients – such as contact and travel questionnaires – to subsequent downstream chains, including triage, clinical assessment, tests, isolation procedures and so on.

This was on top of the challenge at NCID of working at new facilities where staff had to navigate a com-

plex segregation designed to have clear segregation of materials and the flow of people, to avoid cross-contamination.

In spite of this, the teams were able to adapt, and also displayed initiative in seeking solutions as new challenges arose when we had to deal with large community clusters.

They were able to do so because they felt safe at work – they were well trained, had adequate personal protective equipment, and robust infection control measures were in place.

Everyone, including those brought in from other institutions to boost manpower, was united with the common purpose of giving patients the best treatment and stemming the outbreak in Singapore.

**WORKING TOGETHER**

Collaboration took place across institutions, as well as on the ground.

To operate NCID at the full capacity of 566 beds – four times its regular volume – additional manpower and other resources were needed.

Much manpower and expertise came from nearby Tan Tock Seng Hospital.

The neonatal-paediatric work group (from NCID, KK Women's and Children's Hospital and the National University Hospital), which was set up before the pandemic, was also put into action.

Workflows were formulated and implemented between multiple parties within a compressed period to ensure safety and optimal patient care.

The NCID intensive care unit received well-qualified nurses from other public hospitals, and extracorporeal membrane oxygenation

(ECMO) teams from SingHealth's National Heart Centre Singapore and the National University Health System were mobilised to support ECMO work at NCID.

The ECMO machine takes over the role of a diseased lung and artificially oxygenates the blood outside the body.

Private and community hospitals, and later, community care facilities helmed by public and private healthcare institutions and the Singapore Armed Forces, added much-needed bed space and strength to house and manage more cases.

These collaborative efforts attest to the cohesiveness of the local healthcare system.

NCID stands ready to work with partners from the Government, private sector, voluntary welfare organisations as well as the public to do our part.

The centre hopes to do more in terms of community engagement by assessing the Covid-19 risk level of diverse individuals, especially in multi-generational families.

The virus is forcing us to change and adapt.

One good thing that has come out of it is new attention to good hygiene practices, including masking up and keeping our private and public environment clean.

But when it comes to beating this health crisis, the road ahead is a long one. As NCID turns one next Monday, we are taking a moment during this reprieve – provided by lower community transmission in Singapore – to reflect and plan, so that we can stay ahead of the virus.

**About the writers**



Professor Leo Yee Sin is executive director of the National Centre for Infectious Diseases (NCID).

The face of the battle against infectious diseases in Singapore, she has led her team through multiple outbreaks, including when Nipah hit home in 1999, Sars in 2003, pandemic influenza in 2009 and multiple surges of vector-borne diseases, including the Zika outbreak in 2016.

She also successfully managed Singapore's first imported case of monkeypox in May last year.

She has won many awards, including the Public Service Star, for her outstanding efforts in battling Sars.

Her key research interests include emerging infectious diseases, dengue and HIV, with a focus on improving patient care and outbreak control.

A highly sought-after adviser and conference speaker, she has published more than 200 scientific papers.



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He also received clinical microbiology and infectious diseases training at the Mayo Clinic in Rochester, Minnesota.

Dr Vasoo oversees clinical and outbreak preparedness activities, and leads the Infectious Diseases Research Laboratory at NCID.

He also chairs the Covid-19 therapeutic work group in Singapore.

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