



National Centre for  
Infectious Diseases



Photo credit: Pearl Gan



# **COURAGE IN ACTION**

**COVID-19 PHOTOBOOK**

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## MISSION

Protecting the people of Singapore from infectious diseases



## VISION

Strong, trusted and united in keeping Singapore safe from infectious diseases



## CORE VALUES

### Nurturing

We foster growth within a safe and supportive environment

### Compassion & Collaboration

We care for everyone and work with all

### Integrity & Innovation

We do the right things and embrace creativity

### Dedication

We are ready to respond anytime

## MESSAGE



NCID had only been officially open for four months when COVID-19 hit Singapore in January 2020. The first case in Singapore was diagnosed on 23 January 2020, and NCID received our first case a day later. Of course, managing an outbreak was not unfamiliar for us at NCID. During our time as the Communicable Disease Centre (CDC), we battled outbreaks like Nipah in 1999, Severe Acute Respiratory Syndrome (SARS) in 2003, pandemic H1N1 influenza in 2009, and Zika in 2016.

However, the magnitude and speed of spread of COVID-19 was unprecedented. We had to quickly respond to the surge in cases, and soon, the wheels were in motion to face the pandemic head-on. The new NCID building and organisational infrastructure comprising clinical, public health, research, training, and operations teams sprang into action, and together presented a strong and united front that would soon earn international recognition.

Our staff are well-trained, had adequate Personal Protective Equipment (PPE) and robust infection control measures in place. When hints arose that this novel pathogen could be another coronavirus, the National Public Health Laboratory

(NPHL) responded by using pan-coronavirus PCR testing for suspect cases to rule out other common respiratory pathogens. With the subsequent release of the specific genetic sequence, NPHL developed a SARS-CoV-2 PCR assay which was ready when the first case was detected in Singapore.

Knowing the enemy became a key weapon in our armamentarium, allowing us to stay ahead of the virus, understand how patients manifest clinically, how the virus behaves, and how it can be transmitted. It was opportune that the National COVID-19 Research Workgroup, which guided research efforts on the pandemic, was set up just one day before the first case in Singapore was confirmed. This group of experts from public healthcare institutions, research institutions and academic centres generated important research findings on science and evidence with direct impact on local prevention and treatment strategies, as well as numerous high-impact publications garnering regional and global recognition.

To enhance NCID's readiness to handle outbreaks, we implemented and continually refined a structured training

programme for staff. This was coupled with Just-in-Time training on the use of PPE and Powered Air-Purifying Respirator and on caring for patients with higher acuity needs. We extended training to Community Care Facilities, Swab Isolation Facilities, and private and community hospitals on using PPE, N95 mask fitting, infection control, hand hygiene, and nasopharyngeal, nasal and throat swabbing for staff working at these facilities.

At the peak of the pandemic, we ramped up the use of our facilities beyond the original design of 330 beds to more than 500 beds. Our pre-designed principle of being ever-ready to respond to surge capacity allowed for such scalability. We mobilised more than 1,600 staff from NCID, Tan Tock Seng Hospital (TTSH) and other healthcare institutions and treated some 500 cases at NCID at the peak of the pandemic. Our staff have done a remarkable job, stepping up to our mission of protecting the people of Singapore from infectious diseases. I am grateful for their commitment and teamwork. We are thankful for the support from TTSH and other healthcare institutions. Through this pandemic, we see how the public

healthcare sector rallied together to support one another in our best efforts to safeguard Singapore's public health.

This book captures the raw moments at NCID in response to COVID-19 – providing the best care and treatment for our patients, diagnostic testing and surveillance, collaborative research efforts, staff training and community engagement efforts, and staff accounts on the frontlines. I hope it gives you a glimpse into our efforts.

This book is a tribute to all who supported the fight against COVID-19 – NCID staff, colleagues from TTSH and other healthcare institutions, and our research collaborators from public healthcare, research and academic institutions.

The battle is not over. We must continue to practice safe management measures to keep ourselves and the community safe.

**Professor Leo Yee Sin**  
Executive Director  
National Centre for  
Infectious Diseases

# MESSAGE



Just a few months after the National Centre for Infectious Diseases (NCID) opened in September 2019, it had to respond swiftly and decisively to care for patients with novel or atypical communicable diseases including Monkeypox and subsequently COVID-19. I am glad that NCID was completed just in time to play a key role in the coordinated national response to the COVID-19 pandemic, following the detection of the first case in Singapore on 23 January 2020.

NCID was set up to seamlessly integrate clinical, research and public health functions, to enable Singapore to mount a coordinated, quick and effective response to infectious disease outbreaks. Early in the COVID-19 pandemic, the National Public Health and Epidemiology Unit established a system to help assign patients to appropriate

levels of clinical care. The National Public Health Laboratory developed a Polymerase Chain Reaction testing protocol to detect COVID-19 cases and ramped up testing capacity in support of public health investigations. On the ground, the NCID operations team rapidly stood up the COVID-19 screening centre and expanded the capacity of the isolation beds. These are just examples of how NCID has adapted nimbly to the rapidly evolving situation.

NCID's emphasis on fostering inter-institutional collaborations has also greatly facilitated a coordinated and effective response to the outbreak. Even before the first COVID-19 case was reported on our shores, NCID already brought together a group of researchers from various institutions and academic centres to form the National COVID-19 Research Workgroup. The Workgroup has since fuelled several national research efforts which contributed towards a deeper understanding of COVID-19 transmission in Singapore. These efforts also helped to guide the government's strategies.

Beyond the Workgroup, COVID-19 has also highlighted the importance of collaborations with other healthcare stakeholders and agencies, to support NCID in its mission. We are grateful to the many nurses and healthcare workers from other public hospitals who augmented staffing at NCID's intensive care unit at the peak of the pandemic. United in their resolve to care for every patient, COVID-19 or otherwise, our healthcare workers formed

close partnerships and developed a strong sense of camaraderie as they stood shoulder to shoulder at the frontlines, and fought the battle together.

NCID also played an important role in supporting the community care facilities and swab isolation facilities which were pivotal in containing the infection and caring for the patients in the community.

This photobook has succinctly captured far more than can be conveyed through words alone. It tells the story of a COVID-19 patient's journey through the hallways of NCID. It captures the behind-the-scenes work of the research, training, and community engagement efforts during the pandemic, and much more. The powerful images encapsulate the spirit of strength, camaraderie and perseverance in the face of danger and uncertainty, and highlight the NCID team's professionalism and dedication.

The fight against the pandemic is not over but we have come a long way since the initial days of the COVID-19 outbreak. I would like to express my deepest appreciation to all in NCID and our healthcare family for your indomitable spirit and unwavering commitment in safeguarding our nation and protecting our people. As long as we continue to stand together in solidarity, I am confident that we will be able to overcome this crisis of a generation and emerge from this even stronger.

**Mr Gan Kim Yong**  
Minister for Trade and Industry  
Co-Chair of the Multi-Ministry  
Taskforce on COVID-19

# MESSAGE



NCID has seen an exceptional first year. All new organisations go through some teething issues at the start. But this was a luxury not afforded to NCID.

Shortly after its official opening, NCID was called on to be at the forefront of Singapore's outbreak efforts when COVID-19 hit our shores in January 2020. Within just a few months of operations, NCID had to accelerate and bring forward capabilities that would typically have taken years to build up.

Today, NCID plays a crucial role in treating, managing and combating the COVID-19 pandemic, working with the entire healthcare system.

These partnerships, forged in the fire of crisis, will remain valuable long after this pandemic has passed, and will help us to face future pandemics with greater confidence. NCID's pioneering research work and collaborations with local and global research and healthcare institutions has also helped us stay ahead of the curve in our fight against the virus.

This photobook speaks volumes of NCID's tremendous efforts over the past year. I have visited NCID on several occasions and each time witnessed first-hand the passion, commitment and unwavering determination from NCID staff and volunteers. I am glad that those who peruse these pages will get to share these perspectives, through all the moments captured in pictures.

Singapore owes a deep debt of gratitude to everyone in NCID for rising to the challenge and going above and beyond the call of duty in our national fight against the virus. As some say, this has been a baptism of fire. NCID has emerged from this crucible proven, tested and stronger than before. I look forward to seeing NCID's progress and contributions in the years ahead.

**Mr Lawrence Wong**  
*Minister for Finance*  
*Co-Chair of the Multi-Ministry Taskforce on COVID-19*

# PATIENT JOURNEY

NCID was at the forefront of the battle against COVID-19. Providing the best care and treatment for our patients was utmost on the minds of the multidisciplinary team of doctors, nurses, pharmacists and allied health professionals who provided direct patient care to suspect and confirmed COVID-19 patients. Behind the scenes, staff in the National Public Health Laboratory, National Public Health and Epidemiology Unit, Infectious Disease Research and Training Office, Operations team and support service staff were also battling the virus. At the peak of the pandemic, NCID had around 500 patients in our wards. This chapter looks at the patient care journey at NCID from their admission through to their discharge.



STAGE **1**

## HOW SUSPECT/CONFIRMED COVID-19 CASES CAME TO NCID

### NCID Operations Command Centre - Joint Crisis Call Centre (NOCC - JCC)

NOCC - JCC provided command and control for the COVID-19 outbreak response. It communicated with various government agencies to facilitate patient conveyances. NOCC - JCC also enhanced operations plans for managing patients effectively.



Staff at NOCC - JCC facilitate the conveyance of suspect/confirmed COVID-19 cases to NCID for clinical care

The Emergency Preparedness - Disease Outbreak unit which is in charge of manning the NOCC - JCC, work around the clock to ensure seamless back end support to COVID-19 outbreak response



Ambulances arriving at Screening Centre with COVID-19 patients



### Conveyance of COVID-19 cases to NCID

NOCC - JCC worked with government agencies to facilitate conveyances of suspect and confirmed COVID-19 cases to NCID in a safe and coordinated manner.

After the ambulance dropped off cases, the ambulance crew decontaminated the vehicle before leaving NCID.



### BEHIND THE SCENES



Ambulance crew decontaminating ambulance equipment

# PATIENT JOURNEY



## STAGE 2

### SCREENING OF SUSPECT COVID-19 CASES

#### Screening Centre

The Screening Centre is the facility within NCID that was used for mass screening of suspect COVID-19 cases and run by Tan Tock Seng Hospital Emergency Department (ED) and NCID. It was opened on 29 January 2020 and remained open till 7 December 2020.

When COVID-19 cases spiked, the Screening Centre had to be expanded and was helmed by the ED. Additional tentage was set up in the adjoining outdoor area in March. It was subsequently modified for further expansion and another tentage near the Ambulance Bay was set up in April to further expand its capacity. With the decrease in the number of cases in December 2020, COVID-19 screening was merged with NCID outpatient Clinic J's services.



Triaging of patients



The clinical team at work in the Screening Centre



The clinical team attending to a patient



Attending to a patient in the tentage set up in the adjoining outdoor area to the Screening Centre

# PATIENT JOURNEY

## BEHIND THE SCENES



Preparation for Screening Centre opening

\* Photos taken before the implementation of safe distancing measures and mask mandate.



PPE don and doff stations



Ramp up of Screening Centre capacity



Pharmacist preparing medication to be dispensed



# PATIENT JOURNEY

## Clinic J and Special Precaution Area

Clinic J provided clinical services to suspect, confirmed or recovered COVID-19 cases, including swab and serology tests and convalescent plasma therapeutic screening.

Patients undergo pre-consult screening before entering the clinic. Those who are identified as requiring isolation precautions are escorted to a Special Precaution Area (SPA) where treatment, X-ray and medication dispensing services are rendered within to minimise movements.



Triaging

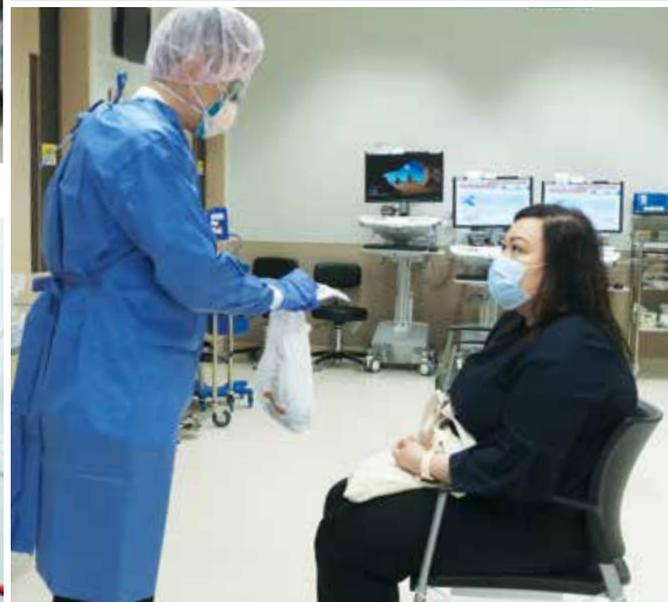


Photo credit: Pearl Gan

Patient being swabbed at SPA

## Outpatient Pharmacy

Pharmacists prepare and dispense medication to patients in SPA who do not need to be admitted.



## BEHIND THE SCENES



Pharmacist preparing medication in the outpatient pharmacy



Pharmacist donning Personal Protective Equipment before entering SPA to dispense medication to a patient who is fit for discharge

# PATIENT JOURNEY

STAGE **3**

## INPATIENT CARE

### General Wards

Suspect and confirmed COVID-19 patients were warded in an isolation room at NCID. Besides providing clinical care, NCID's healthcare professionals care for the emotional and physical needs of patients to help in their recovery.

The right siting of care ensured that only critical and high-risk group cases were warded in NCID. At the peak of the pandemic, the capacity was ramped up from 330 beds to 586 beds to provide care for more patients.





Performing swab test on a patient



Placing patient sample in specimen collection box



Medical Social Worker providing psychosocial support to a patient who is in an isolation room



Patient room being cleaned



Pharmacist dispensing medication to a patient who is going to be discharged

# PATIENT JOURNEY

## BEHIND THE SCENES



Bed movement for ramping up of bed capacity



Fitting of additional bed in patient room



Nurse donning Personal Protective Equipment before entering isolation room to attend to a patient



Daily rounds in the outbreak ward



Nurses' roll-call



Sending patient samples to laboratory

## ICU Wards

Patients who need critical care are admitted to the Intensive Care Unit (ICU) at NCID.



Staff attending to a patient in the ICU

## BEHIND THE SCENES



Doctors and nurses in discussion about a patient



Preparing for specimen collection



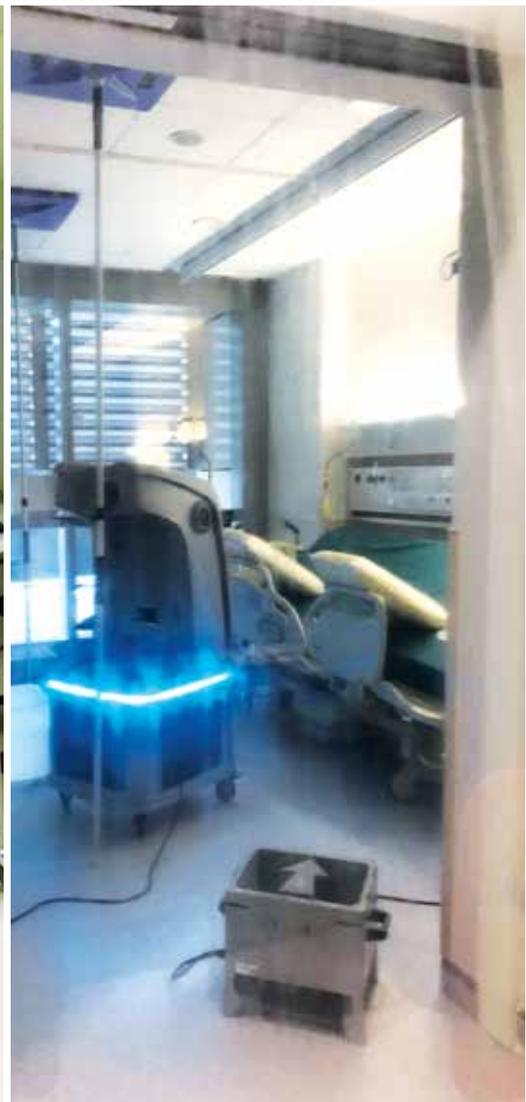
Specimen collection boxes

# PATIENT JOURNEY

STAGE 4

## DECONTAMINATING THE PATIENT ROOM AFTER DISCHARGE

After the patient has been discharged from NCID, the patient room has to undergo thorough cleaning and decontamination to ensure that it is free of pathogens and ready for the next patient.



Hydrogen Peroxide Vapour decontamination of patient room

# DIAGNOSTIC TESTING AND SURVEILLANCE

Specimens collected from COVID-19 suspect cases and patients are sent to the National Public Health Laboratory (NPHL) for diagnostic testing. In addition to diagnostic testing, NPHL performs virus isolation and whole genome sequencing to support public health investigation.



Receiving of specimens



Photo credit: Pearl Gan

Medical technologists donning Personal Protective Equipment. The Powered Air-Purifying Respirator provides respiratory, head, face and eye protection for the medical technologists



Photo credit: Pearl Gan

Testing for SARS-CoV-2 using a Polymerase Chain Reaction (PCR) test

# DIAGNOSTIC TESTING AND SURVEILLANCE



Testing of community surveillance specimens



Loading of sample strips into a Real-Time PCR System



Performing bioinformatics analysis

The National Public Health and Epidemiology Unit (NPHEU) performed horizon scanning and surveillance by daily tracking of reports from Singapore and other countries on the COVID-19 situation. It provided daily updates to the Ministry of Health (MOH) on the number of positive cases and the analysis of the clinical data on these cases. It also supported the efforts of the MOH Epidemiology team by studying the epidemiological data of the positive cases admitted to NCID to identify links among the cases. In addition, NPHEU was able to ascertain that the proportion of cases needing oxygen and ICU care increased exponentially with age from analysing the clinical profile of COVID-19 cases. This guided NCID to project ICU capacity and prepare bed complements to meet increasing demand at the peak of the outbreak.



Weekly briefing to the NPHEU team on the COVID-19 situation, including epidemiological investigations and sense making of data



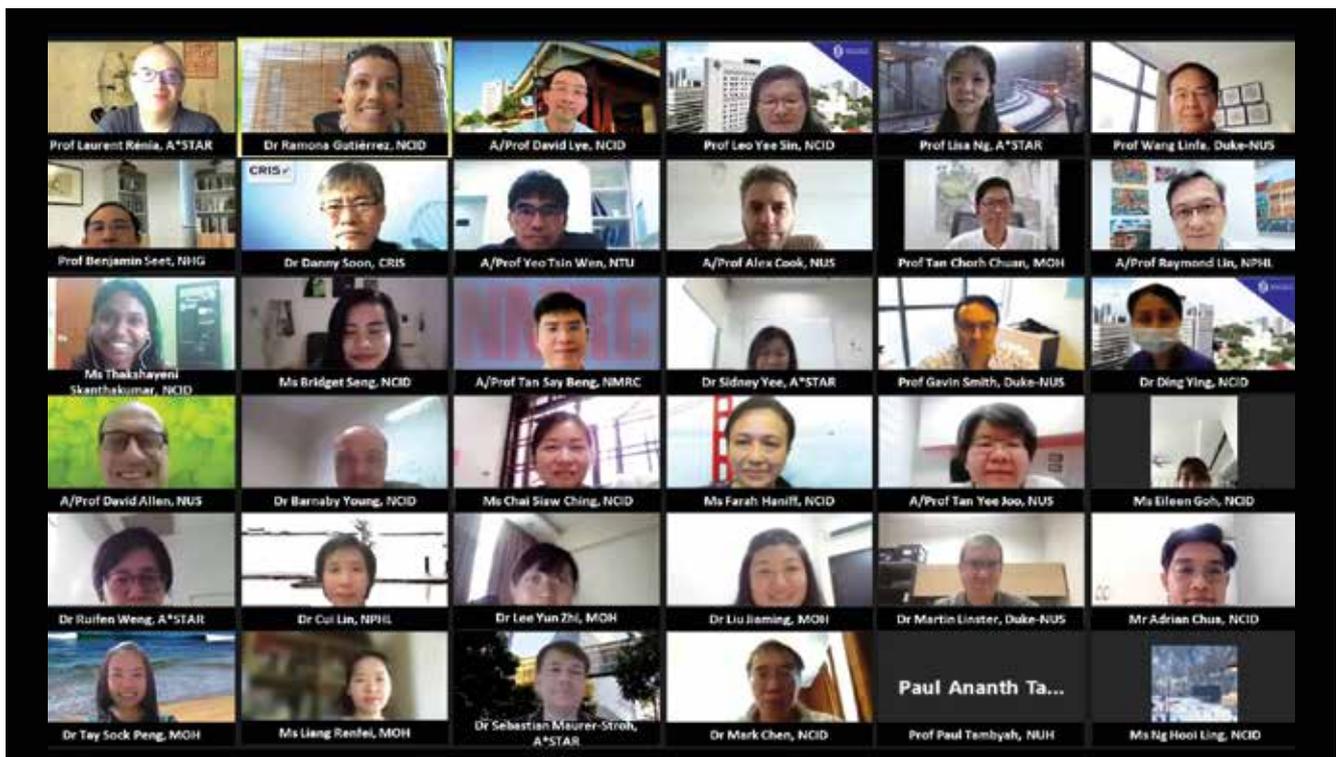
NPHEU staff performing activity mapping interview which contributes towards national contact tracing efforts during the outbreak



NPHEU team providing situational update on the rapidly evolving COVID-19 pandemic internationally and in Singapore at a daily management meeting

# RESEARCH MILESTONES

Clinical and academic research on infectious diseases and public health is a vital component of Singapore's preparedness and defence against the threat of emerging infectious diseases. NCID has, either on its own or in collaboration with other institutions, been involved in research efforts on COVID-19 in the areas of disease pathogenesis and transmission, development of serology testing platforms, modelling of disease spread, and socio-behavioural aspects of the impact of COVID-19 on the population. NCID has also been at the forefront of global research into novel therapeutic development and evaluation through clinical trials.



RWG members posing for a photo during an online meeting



Members of RWG reviewing findings on transmission trends

\* Photo taken before the implementation of stricter safe distancing measures and mask mandate.

## National COVID-19 Research Workgroup

NCID formed the National COVID-19 Research Workgroup (RWG) on 22 January 2020 just one day before Singapore reported the first confirmed COVID-19 case. The RWG chaired by Professor Leo Yee Sin, NCID Executive Director and advised by Ministry of Health Chief Health Scientist Professor Tan Chorh Chuan, comprises members from NCID, Agency for Science, Technology and Research, National University of Singapore, Duke-NUS Medical School, Ministry of Health, National Research Foundation, National University Hospital, Nanyang Technological University, National Medical Research Council, DSO National Laboratories, Singapore Clinical Research Institute and National Healthcare Group. The Workgroup guided research efforts on COVID-19 which contributed to Singapore's success in managing and controlling the pandemic.

## PROTECT Study

A key backbone of the research by NCID and collaborators to better understand COVID-19 is PROTECT, a multi-centred prospective study to detect novel pathogens and characterise emerging infections. This study involved collecting information and biological samples for research purposes from over 600 COVID-19 patients across all public hospitals in Singapore.



Obtaining patient consent at the NCID Ward



Explaining the procedure for collection of blood samples to a recovered patient during a follow-up visit at NCID Research Clinic



Collecting blood samples from a recovered patient at NCID Research Clinic



Daily debrief of researchers

# RESEARCH MILESTONES

## Examples of COVID-19 research studies conducted

### COVID-19 Seroepidemiology Multi-Site Study of Healthcare Workers

Nosocomial transmission and healthcare worker (HCW) infections were a key concern during the COVID-19 pandemic in Singapore. Hence, NCID conducted a multi-site sero-epidemiology study to assess the risk of potential transmission of COVID-19 amongst HCWs and evaluate the effectiveness of various public health and infection control measures.

More than 1,400 HCWs working in COVID-19 and non-COVID-19 areas from NCID, Tan Tock Seng Hospital (TTSH) and other public healthcare institutions and primary care clinics voluntarily enrolled in the longitudinal study. Supported by the Infectious Disease Research Laboratory and the National Public Health Laboratory, initial serology results at enrolment between February to early April 2020 from more than 400 HCWs in TTSH and NCID showed no evidence of SARS-CoV-2 seroconversion.



Healthcare worker volunteers responding to study questionnaire



Collecting a blood sample from a healthcare worker volunteer

### Study on COVID-19 Environmental Contamination

The study published in *Nature Communications* in May 2020 was conducted by NCID, Duke-NUS Medical School and DSO National Laboratories to determine patterns of environmental contamination and particle size distribution of SARS-CoV-2. The study showed that contamination of surfaces by SARS-CoV-2 particles peaks in the first week of illness and reduces significantly in the second week suggesting that the possibility of a patient infecting others through contaminated surfaces is negligible from week two of illness. This is one of the first studies in the world where the researchers also detected SARS-CoV-2 in particle sizes of less than 4 microns, contributing to the accumulating evidence supporting aerosol-based transmission of SARS-CoV-2.



Collecting SARS-CoV-2 samples from floor of patient's room



Collecting SARS-CoV-2 samples from vent in patient's room



Collecting SARS-CoV-2 samples from patient's bed

## Infectious Disease Research Laboratory

The Infectious Disease Research Laboratory (IDRL) supports clinician researchers and scientists to conduct their infectious disease laboratory-based research. In 2020 more than 30 projects were supported by IDRL.

Specifically for COVID-19, IDRL was involved in sample processing for COVID-19 research studies, for example, a sero-epidemiology study of healthcare workers and employees in healthcare institutions, a study on comparison of host immune responses, and a study on sero-prevalence and exposure risk factors among close contacts of COVID-19 cases.

IDRL houses the National Infectious Diseases Biorepository (NIDB) which begun in earnest in 2020 with COVID-19 where it processed, inventorised and stored COVID-19 related biospecimens. It also assisted to culture, isolate and enumerate bacterial environmental microflora from high touch points in an infection control study on environment contamination in the context of the COVID-19 pandemic. In addition, IDRL was involved in several studies on the utility of volatile organic compounds (breath-studies) for diagnosis of COVID-19 and the evaluation of rapid COVID-19 diagnostic test kits.



Nucleic acid amplification using a Real-Time PCR System



Research Assistant performing sample processing in the Biosafety Cabinet



Storage of biospecimens

# STAFF TRAINING

As a global hub for business and travel and with a dense population, it is critical that Singapore continues to be vigilant to the importation and spread of emerging infectious diseases. Strengthening our readiness and preparedness to respond to an outbreak through the training of our staff is important to keep the people of Singapore safe from infectious diseases. At NCID, we adopt a structured outbreak training and education programme with regular drills and exercises for staff.

During the COVID-19 pandemic, a series of Just-in-Time training sessions were conducted for healthcare workers in areas like the use of Personal Protective Equipment (PPE) and Powered Air-Purifying Respirator (PAPR) and on caring for patients with higher acuity needs.

Just-in-Time training session for Tan Tock Seng Hospital and NCID doctors who provided care for patients in the NCID ICU, and for doctors, nurses and perfusionists from the Extracorporeal Membrane Oxygenation (ECMO) teams from the National Heart Centre Singapore/Singapore General Hospital and National University Hospital who provided ECMO support for COVID-19 patients in the NCID ICU.



Training on the donning process using PPE and PAPR



Training in the importance of proper infection control practices during procedures



Practicing the intubation process on manikin to understand the challenges involved in performing intubation while wearing PAPR

\* Photos taken before the implementation of safe distancing measures and mask mandate.

**Doctors' and Nurses' Launchpad Programme – A Just-in-Time simulation-based team training to launch healthcare workers safely into an outbreak ICU during the COVID-19 pandemic.**



Training of outbreak ICU team in donning PAPR



Training of outbreak ICU team in donning PPE



Team simulation in intubating a COVID-19 patient, involving doctors, nurses and respiratory therapist

**Training on caring for high acuity patients**



# OUTREACH TO COMMUNITY

During COVID-19, NCID worked with various external organisations to equip them with the knowledge, skills and capability to manage COVID-19. NCID also worked with partners to reach out to different segments of the community to educate them on minimising the spread of COVID-19.

## Training to manage COVID-19 for external organisations

During COVID-19, NCID provided training to equip public and private organisations with the knowledge and skills to manage the virus within their premises and protect their staff and the people they serve. NCID collaborated with Community Care Facilities (CCFs), Swab Isolation Facilities (SIFs), and private and community hospitals to provide training to support these organisations in adopting best practices in managing the virus. NCID also provided advice on the design of facility and process flows at CCFs and SIFs and cruise ship facilities to enhance infection control and reduce infection risk.

## Webinars on COVID-19 for the community

NCID's Training and Education Office worked with partners in the community to conduct public education programmes aimed at enhancing community preparedness against disease outbreaks and educating the public on measures to protect themselves from COVID-19, as well as the benefits of influenza and pneumococcal vaccination. These talks were highly relevant for the target audiences during COVID-19.



N95 mask fitting and PPE training



N95 mask fitting



Training on performing of nasopharyngeal, nasal and throat swab

# STORIES FROM NCID STAFF

Behind the scenes, staff from the different units in NCID had a role to play in the battle against COVID-19. Here are some of the personal accounts of their experience working during the pandemic.



As a new nurse manager, I felt a sense of uncertainty during the COVID-19 pandemic. I had to step up and motivate my young team to face this pandemic and to ensure that every staff was aware of the infection control practices and safe management measures, in addition to monitoring their health so as to prevent possible COVID-19

transmission within the clinic. The constant workflow changes also posed huge challenges as I had to find ways to condense this information to ensure that all my staff understood and adhered to the changes. There was a lot of working after office hours and last minute activations for COVID-19 screenings.

The main challenge was to motivate myself that no matter how stressed I was, to put my problems aside and to stay strong for the team. It was heartening when patients that I had nursed previously would contact me to ask how I was coping with COVID-19, and to remind me to stay safe. I am really thankful to the team and their families for the personal sacrifices and no words can describe my gratitude to them.

**Imrana Banu, Nurse Manager**



After some COVID-19 patients were intubated, family members could no longer communicate with them. As such, I would make "cold calls" to family members of the patients who are in the ICU to see who needed our support, and this could be a source of comfort to them. A family member told me that she did not want to cry

when talking to her children or relatives as she did not want them to worry, so it helped that she could express how she felt to a stranger.

The work with COVID-19 patients and their families could be emotionally exhausting and we were taught in training to be objective and draw boundaries. But when we are overly protective of our emotions and lose our ability to feel and empathise, we lose our effectiveness as carers. The work of a medical social worker is meaningful as I support patients and their families as they undergo change and be part of the same journey with them, and that in itself is a reward.

**Dr Ho Lai Peng, Principal Medical Social Worker**

The most hectic period for me was at the start of the pandemic in late January 2020. I had volunteered to work during the Chinese New Year and that week was when Singapore had its first COVID-19 case. I was on call 24/7 for 8 days straight with phone calls for medical decisions in the middle of the night and in lots of urgent and very long meetings, working out the workflows for a major outbreak of a respiratory virus, brought in by travellers from China.



I was also the infectious diseases physician on call the week when SARS broke in 2003, so there was this sinking dread in my stomach as it became clear this was the Big One for which we had been preparing for years.

As a doctor taking care of patients, it is heart-breaking to see real people suffering. As a public health expert, I find COVID-19 tremendously fascinating, watching all the twists and turns in the evolution of this pandemic.

**Associate Professor Lim Poh Lian, Director, High Level Isolation Unit and Senior Consultant**



I was involved in the coordination of several exchange platforms for research on SARS-CoV-2, including the National COVID-19 Research Workgroup (RWG) chaired by NCID under guidance from Chief Health Scientist. I remember the first meeting was held on 22 January 2020, and there were

no confirmed COVID-19 cases in Singapore then. Like many in the room, I did not quite know what we were about to embark on. The next day, Singapore confirmed its first COVID-19 case. More than one year on, we have all come such a long way. By bringing multiple agencies, disciplines and experts together, the RWG platform has enabled rapid conduct of collaborative research on critical areas of concerns, such as understanding disease pathogenesis and transmission, and developing and validating diagnostics tools. It has been a very challenging yet extremely fulfilling journey and I am very proud to have supported the workgroup.

**Dr Ramona Gutierrez, Manager, Infectious Disease Research and Training Office**

## STORIES FROM NCID STAFF



There was a feeling of helplessness because of the uncertainty due to all the unknowns in the early days of COVID-19. However, as time went by, we learnt so much more about the illness that helped us with our work in taking care of patients.

One memorable encounter was this patient I treated, a migrant worker, who needed oxygen to breathe as he was so sick. The healthcare team was worried about him, but he managed to make a recovery and also enrolled in one of the studies we were conducting. We cannot be sure what helped him with recovery, but the gratitude he had in his eyes when he got better is what motivated me.

It was a challenge keeping pace with the expanding information and many changes to workflows and processes during this period. Nonetheless, it was a humbling experience that taught me to embrace uncertainty and know my limitations.

**Dr Mucheli Sharavan Sadasiv, Consultant**



The biggest challenge in the ICU was helping patients and their family cope with the anxiety of separation because of the isolation. We provided updates through the phone and facilitated visitations through video calls.

I also remember having to manage a COVID-19 death which happened during the peak of the outbreak. For COVID-19 cases, family members are not allowed into the patient room, and they can only view their loved ones via the glass door. After we cleansed and dressed the patient, we had to place the patient in two layers of body bag. Family members were not allowed to handle the body or to hold the patient's hands, and we handled the last office. Thankfully, together with our medical social worker, we were able to provide support to the family members to help them through their grief. Each time I care for patients in the ICU, including COVID-19 patients, I always hope and pray that they get well soon and be reunited with their loved ones.

**Abdul Wahab Bin Hassan, Nurse Clinician**

Whenever I look back at 2020, the song "You'll Never Walk Alone" comes to my mind. What I treasure most is the strong support and camaraderie of National Public Health and Epidemiology Unit colleagues, and invaluable guidance from the senior leadership.



On occasions when I had to complete data analysis within very tight timelines, my colleagues stepped in immediately to cover me for other work tasks. I am heartened to know that my work contributes to shape protocols for right-siting of care and provides evidence for timely clinical treatment and management of COVID-19 patients at NCID.

As the saying goes, tough times never last but tough people do. I had no doubt that we would pull through it together. Because we will never walk alone.

**Ang Li Wei, Principal Medical Statistician,  
National Public Health and Epidemiology Unit**

When I joined the National Public Health Laboratory (NPHL), I knew a pandemic situation is something I may potentially face. However, I was not prepared for the huge impact when COVID-19 hit. It has been a stressful and challenging period for us in NPHL. We had to adjust to the changes made to our daily work due to the formation of COVID-19 teams, which I am a part of, working on shift rotations mainly on COVID-19 testings. We were fatigued but knew that we had to press on. We always strive to give our best knowing the importance of our timely and accurate results to the management of the pandemic in Singapore. Working under immense pressure towards a common goal has made us closer. I hope this camaraderie will continue even after the pandemic is over. I am also thankful to have the support of my family and friends who understand the demands of my work.



**Siti Zulaina Md Said, Senior Medical Technologist,  
National Public Health Laboratory**



Healthcare workers from all sectors were chipping in to help at the frontlines so I was prepared to return to work earlier from my maternity leave that was scheduled to end in March 2020. Out of the many COVID-19 patients I have encountered, one was a healthy middle-aged

Singaporean who had acquired COVID-19 from his overseas travels and had developed pneumonia. As I explained to him the nature of his medical condition and the possibility of deterioration, tears welled up in his eyes, possibly wondering if he would ever see his family again. As we were in the early stages of the pandemic where relatively little was known, I offered him what little I could in the form of encouragement and a silent but strong reassurance that we were doing our best for him, and for everyone. This patient pulled through and I received a lovely note containing his expressions of thanks a few weeks later. To know that we can and are making a difference in the lives of our patients is what keeps us going every day.

**Dr Glorijoy Tan, Associate Consultant**



As a nurse clinician, my duties were to ensure the wards in NCID were ready to take in patients affected by COVID-19, ensure the wards were adequately staffed, and be a resource person for nurses, including those deployed to NCID, and for patients and their loved ones.

I acted as the liaison person between the patients and other healthcare professionals, and referred them to the medical social workers should patients require interventions from them. Staying in an isolation room may be stressful to patients as contact with their families and loved ones are severely limited. I had patients who were anxious and fearful being in NCID and isolated in the room. We would update them on their care plan to allay their anxieties. I also referred personnel to the appropriate translation services so that our patients who speak languages such as Bengali and Thai may be able to communicate with us and provide us with vital information which would aid us in their care.

Patient welfare is very important to us nurses as we aim to have them get better as soon as possible so that they can return safely to their loved ones.

**Amy John, Nurse Clinician**

The multifaceted applicability of pharmacy services in healthcare was demonstrated during the COVID-19 pandemic. Supply chain disruptions, ramping up of medication delivery services, provision of swift and decisive clinical recommendations were some of the key battles fought against time. It was heartening to see the concerted effort, dedication and sacrifices of colleagues going more than the extra mile during these difficult times. I was privileged to be involved in the outbreak wards and Screening Centre setup. This exposed me to drug conservation strategies and public health considerations that I could never understand during peacetime. Other efforts included preparation for ramping up of our outbreak wards and ICU wards while ensuring our regular functions were still maintained and kept operationally ready. The dynamic progression of the crisis required timely monitoring of drug utilisation patterns to ensure that the critical medications were identified alongside with the growing demands on our stockpiles. I am very thankful for the many partnerships and guidance by senior management, peers, medical, nursing, operations, and ancillary colleagues that made 2020 so enriching and more manageable for me.



**Tay Jun Xin, Senior Pharmacist,  
NCID Inpatient Pharmacy**

## STORIES FROM NCID STAFF



The demands on a specialist nurse in the ICU during the pandemic were immense, both mentally and physically taxing. On top of closely monitoring patients and administering treatment, we had to endure extended periods of time in full Personal

Protective Equipment and practice robust infection control measures.

COVID-19 infections are usually sudden and unexpected and illness severity also varies greatly between patients, in comparison to other chronic diseases and complications that usually have an expected progression path and outcome. Multiple times have I had my patients look me in the eye, hold my hand and ask me directly "Am I going to die?". This was a question that was almost impossible for me to answer and it pained me greatly.

Thankfully the majority of patients suffering from COVID-19 infections recover and they have always expressed their heartfelt thanks to us. Working with COVID-19 patients has therefore not only been humbling but also extremely fulfilling.

**Joel Quek Wee Teck, Senior Staff Nurse**



As head of the team at the NCID Operations Command Centre, I have been working round-the-clock alongside my cohesive team especially during the peak of the COVID-19 pandemic, planning and coordinating admissions of COVID-19 patients to NCID and Tan Tock Seng Hospital.

This included coordinating the transfer of patients to NCID as well as transferring recovering patients in NCID to Community Care Facilities.

Although it has been exhausting for everyone due to the prolonged and intensive nature of operations required during this outbreak, I felt humbled by the hard work, dedication and great team spirit amongst colleagues working very closely together, doing their best to care for each patient and to keep Singapore safe.

**Philip Tan Tiong Ghee, Deputy Director,  
Executive Director's Office**

When Singapore was hit by the first wave of COVID-19 cases, I was energised to be involved as NCID was the epicentre of the COVID-19 pandemic. Everything was fast paced and it was an adrenaline pumping experience to be part of the operations team which I was deployed to help in. We saw increasing admissions each day and at NCID Operations Command Centre we had to ensure that the operations went seamlessly. My colleague and I were also deployed to Ministry of Health to help establish the activity mapping group and coordinate the national efforts for activity mapping amongst the healthcare institutions and later in contact tracing operations. Our job helped ensure that the right contacts get quarantined quickly to reduce further spread of the virus. Although the work seemed never ending as the number of cases grew, the camaraderie built with people from other organisations involved in this effort and knowing that we were all in it together, was what kept us all going.



**Runni Simm, Senior Executive,  
National Public Health and Epidemiology Unit**



Getting ourselves familiarised with the updated protocols and evolving precautionary measures day-to-day could be challenging as there could be a lot of information that we needed to digest and we could not afford to make any mistakes. It was also challenging to carry out various

procedures in the patient's room due to the different room settings, equipment needed and space constraints but everything was made possible with great teamwork.

It was truly heart-warming when patients and their family members appreciated and encouraged us during this trying period. I remember receiving a thank you card with words of appreciation and a drawing by the children of one of the patients I had cared for.

As I cared for COVID-19 patients, my friends and family were concerned about me. I often reassured them that I am safe as I know that there are good infection control practices and protocols in place at NCID. They are supportive and proud of me for working on the frontline during this pandemic.

**Wong Yee Qing, Senior Staff Nurse**

The most rewarding part about working in the outbreak team was the camaraderie that was formed. I was involved in the set-up of the NCID Screening Centre with my team members. We had to ensure that the COVID-19 protocols were followed such as the implementation of safe distancing measures and our team worked around the clock to get the Screening Centre ready. We also had to ensure that all those on the front line were trained, appropriately kitted out and kept informed. The planning and preparation in the beginning phase was undoubtedly overwhelming for the team, but we were grateful for all the support. Everyone made sacrifices, but we do this willingly in the battle against the pandemic.



**Paige Phoon Long Yoke, Assistant Nurse Clinician**

As we worked through the COVID-19 pandemic, a sense of camaraderie was forged amongst those who worked at the frontline. It was the support from family, friends and colleagues that allowed us to soldier through the initial uncertainties clouding this wholly new enemy.



I will not forget the coming together of people of various fields to work together tirelessly – sharing expertise, planning operations, implementing work processes – in a short amount of time. A remarkable testimony to the human spirit.

**Dr Tay Jun Yang, Senior Resident**



Majority of the COVID-19 patients I cared for recovered from the infection. For patients and families that did require deeper emotional and psychological support, I found that it was not significantly different from the work that I had previously been doing –

which is to acknowledge their grief and bereavement process, help them to make sense of their loss of health or loss of a loved one in the instance of a death, and journey with them as they find new meaning in their lives.

I remember once speaking to the family of a patient who was critically ill, and asking them to share about the patient's life – his relationships with people, his hobbies and his career. It was the first time I saw the family smile (albeit through tears) in a while. Oftentimes, the gut reaction to someone who is grieving is to offer sympathy, avoid bringing up the person who has passed on, and encourage them to 'move on', when actually the bereaved person is more than capable of having a conversation about their loved one and in fact, would probably feel better because they are given the space to express their emotions.

It has been a privilege to be able to care for COVID-19 patients, listen to their stories and alleviate their feelings of anxiety and loneliness during their admission.

**Daniel Chee, Medical Social Worker**

## STORIES FROM NCID STAFF

During the first few months of the outbreak when we were so busy that we did not have time to go for our breaks, the medical officers on duty offered their help to triage the patients and to draw bloods. This allowed the nurses to go for our lunch break before returning to our duty, and I am extremely grateful to work alongside these wonderful colleagues.



Another memorable encounter was with a patient who was referred to NCID for COVID-19 swab. She shared with me that her husband was diagnosed with COVID-19 and was admitted to the ICU at NCID. She felt anxious as she was at high-risk of contracting the virus, and was initially fearful of being tested for COVID-19 but I reassured her that we were there to help and support her. The day after, the patient conveyed her appreciation for my actions through her medical social worker, as she was very touched by my attentiveness and care.

All these helped us keep our spirits up during these challenging times, and motivated us to carry on with our duties confidently.

**Alicia Chua, Staff Nurse**



My department was formed for outbreak research studies, but it never occurred to me that we would one day be activated on such a scale. The day when we were informed to stop all our peacetime studies and switch to COVID-19 studies, I was

apprehensive as there were so many unknowns around COVID-19 and we needed to collect samples from COVID-19 patients.

However, when I stepped into the ward for the first time during this pandemic, I was surprised that the nurses and doctors in the ward were calm and professional, like it was business as usual. That assured me right on the spot that if I were to adhere to proper infection controls and protocols, there was nothing to be afraid about. If I was to do my job well, there would be no risk of transmission to my loved ones. The support from my superiors, co-workers and family really helped to keep me going. It was tough to adjust but day by day our team worked hard together to complete our tasks, going with the mind-set that one more patient's samples collected can help our scientists better understand this virus.

**Jonathan Jordon Lim Cailu, Research Assistant,  
Infectious Disease Research and Training Office**

Fighting the COVID-19 pandemic together with the NCID pharmacy team was an eye-opening experience. During the COVID-19 outbreak, I was tasked to run the Pharmacy at NCID Screening Centre.



We served suspect COVID-19 patients while working together with other healthcare professionals to provide the best treatment outcome for our patients. Setting up the Screening Centre proved to be tedious and tested our resilience. When I was deployed back to the NCID Outpatient Pharmacy, we had to implement a new medication delivery service to assist patients who had their appointments rescheduled during the circuit breaker period. Despite the stressful and challenging time, our pharmacy staff stood by each other and volunteered to be deployed to the newly activated NCID Screening Centre. Time and again, individuals and organisations have demonstrated that the worst situations tend to bring out the best in people. I am lucky to have the unconditional support from senior management, peers and colleagues from other disciplines and departments. This experience is without a doubt the most memorable for me in 2020.

**Han Yiyao, Pharmacy Technician,  
NCID Outpatient Pharmacy**



Together with my colleagues from the Operations team, we sprang into action to equip NCID Screening Centre to receive suspect COVID-19 cases in late January 2020. I was given the opportunity to take the lead and ensure that processes were smooth. This

involved taking on a preceptor role and managing augmented staff throughout the outbreak. I had to troubleshoot ground issues to keep up with the ever changing criteria and workflows. Through this stint, I gained valuable experience and it was a pleasure working with colleagues from various departments. It brings me immense joy that I have played a part to curb the spread of COVID-19.

**Siti Nasuhah D/O Abdul Naseer, Executive  
Assistant, Executive Director's Office**



**A BIG THANK YOU  
TO OUR HEALTHCARE HEROES**



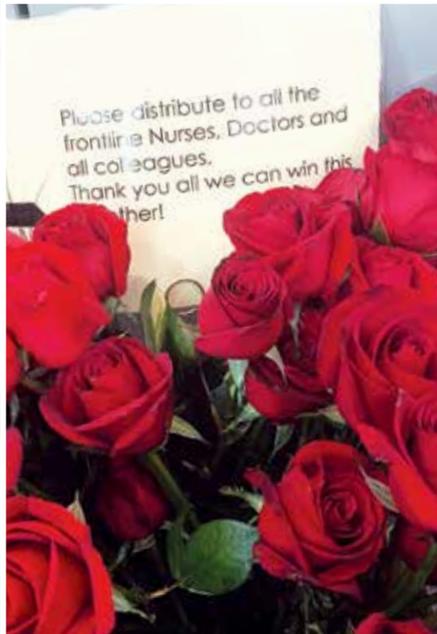
## WELL WISHES FROM THE PUBLIC

Since the start of the COVID-19 pandemic in Singapore, staff in NCID have been working tirelessly and often for long hours, going beyond the call of duty and with unflinching determination to fight the virus and care for patients. All staff stepped up in the battle against COVID-19 in a strong display of unity and teamwork.

We are very grateful for the well wishes from recovered patients and their families, organisations and the community who sent thank you notes and cards, flowers, crafts, food and other items to cheer us on and encourage us in 2020. We are touched by their expressions of gratitude and their kindness.

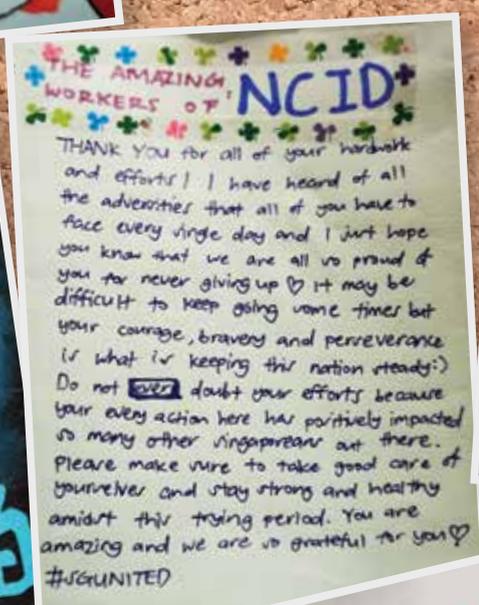
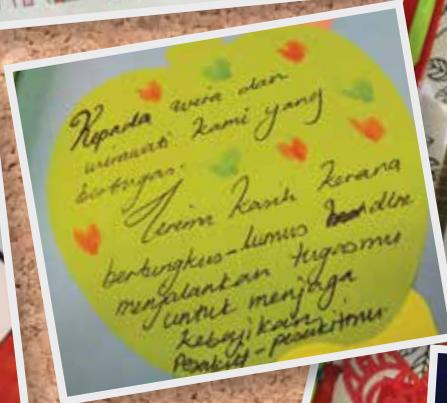
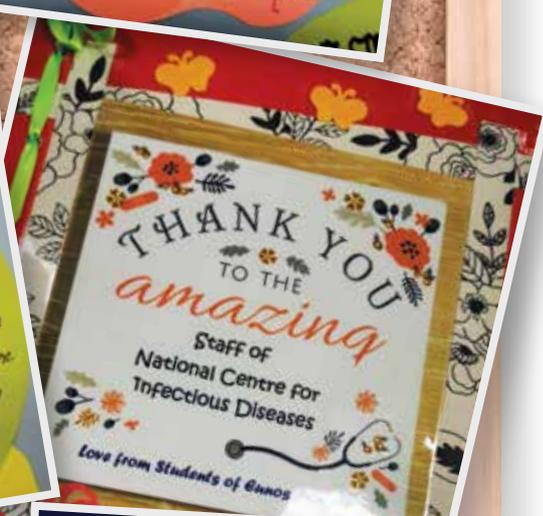
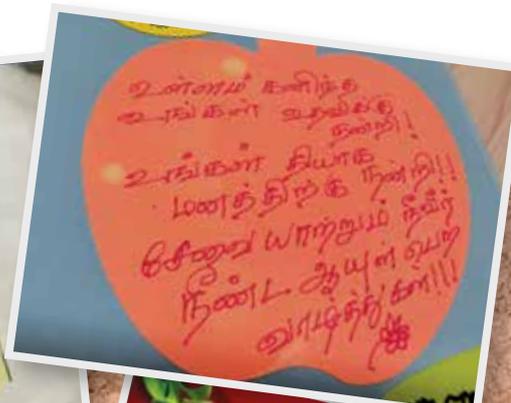


\* Photos taken before the implementation of safe distancing measures and mask mandate.



\* Photos taken before the implementation of safe distancing measures and mask mandate.





# WELL WISHES FROM THE PUBLIC



Our appreciation to Henry Lim and Trudy Zhang from Tan Tock Seng Hospital Communications, Pearl Gan, Ore Huiying, and staff of NCID who contributed photos to this book.

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ISBN: 978-981-18-1456-3

