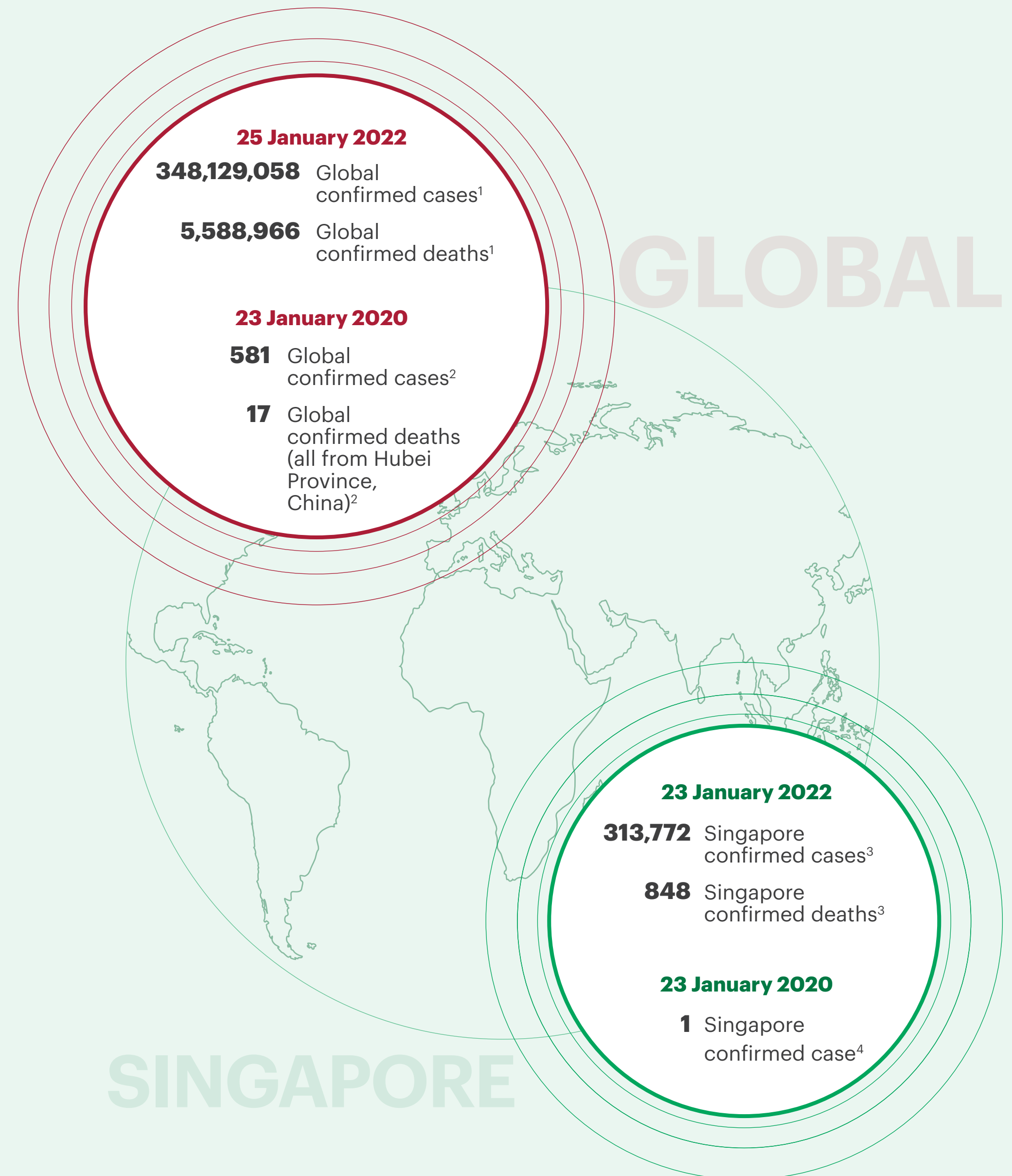
CHAPTER 5

Fighting For Every Breath

COVID-19 CASES AT A GLANCE



[1] World Health Organisation weekly operational update on COVID-19 on 25 January 2022.
[2] World Health Organisation Novel Coronavirus (2019-nCoV) Situation Report on 23 January 2020.
[3] The Straits Times.
[4] Ministry of Health, Singapore.

The ringing phone interrupted the silence of the night. I was the chest therapist covering ward 68. The medical officer (MO) on duty was going to transfer another deteriorating case of the new infection to the Intensive Care Unit (ICU). When I arrived, the patient was huffing and puffing away, supported via a facemask blowing 50% oxygen.

The experience from overseas had identified elderly persons with co-morbidities as a group that fared worst. Like a few others already in our ICU, this one was elderly, but not frail or debilitated. They were community-ambulant, independent individuals who had reasonably well-controlled conditions like diabetes or hypertension. They were in many ways good for their age and often enjoying their role as grandparents. These were not patients whom we would routinely expect to fall critically ill and we were not willing to give up on them. Not without a fight anyway.

The patient was clearly running into deep trouble – the pulse oximeter's oxygen reading was falling precipitously. The young doctor was giving a slew of instructions on what to prepare and whom to activate.

Infection prevention rules were as strict in the ICU as anywhere else. In those uncertain times, anyone going into an isolation ICU room had to wear a Powered Air-Purifying Respirator (PAPR)[5]. This was on top of all the regular personal protective equipment (PPE) including cap, goggles, N95 mask, gown and gloves. Entering and leaving the room was minimised, not least because of the laborious process of donning and doffing the protective gear. Such minimisation of movement meant that all the necessary equipment had to be anticipated and prepared in advance. ICU procedures required long lists of equipment and even longer lists for contingencies. As there was limited opportunity to step out of the room if something had been missed out, a whole pile of equipment was assembled. Specifically, two trolleys were prepared: one for intubation of the patient's windpipe and the other in case there were difficulties getting the tube in.

Anticipating contingencies also extended to alerting the necessary personnel. The anaesthesia airway team had to be informed in advance that a positive case was to be intubated. They obliged by turning up and were already waiting right outside the patient's room. To perform the procedure, the intensivist[6], medical officer, ICU nurse and I all entered in protective gear. Another nurse stood at the doorway of the anteroom to act as a runner, in case messages needed to be relayed or additional equipment was required. Multiple drugs were also stashed in the anteroom in anticipation of emergencies: drugs to sedate the patient, to reverse sedation, to support the blood pressure, to correct an abnormal cardiac rhythm.

It was impossible to hear yourself in the PAPR, let alone relay instructions. All communication was through hand signals or shouting. Before entering the room, we had a quick huddle, going through every step of the procedure. Hopefully things would run like clockwork. The patient was obviously terrified. He had only hours before being informed of the unwelcome diagnosis and now was struggling to breathe. Being able to communicate while decked from head to toe in PPE was not something I had learnt in training. And we were literally shouting above the sound of the PAPR. A combination of patience, exaggerated gestures and smiling with your eyes, perhaps. The family had already received the dreaded late-night call from the young doctor explaining the patient's deterioration and the need for life support. One could imagine the disorientation among the family members – being interrogated by Ministry officials, seeing one another go into quarantine, trying to make arrangements to survive a strict Stay at Home order, and now this.

Thankfully the intubation was smooth. With a video laryngoscope, we could confirm the passage of the tube through the vocal cords. Not that it was my first time seeing it, but this time, it was the very street where SARS-CoV-2 lived. Surreal? No, just real. We connected the tube directly to a ventilator. No manual bagging, a usual peacetime practice. We could not allow aerosol spread of the virus. I did not listen to the chest – had not heard anything with my stethoscope while wearing the PAPR. I squinted through the shield for the reassuring misting[7] of the tube – well, yes, maybe it was there.

RESPIRATORY THERAPIST
COVID-19 ICU team

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[5] A Powered Air-Purifying Respirator (PAPR) is a hooded device that forces air through purifiers before allowing it into the hood, supplying the wearer with purified air.

[6] Intensivists are doctors who provide sub-speciality care for critically ill patients, usually in the ICU.

[7] Condensation on the inner surface of the endotracheal tube is an indicator that the tube has been inserted correctly.

Bracing for the surge

As cases began to emerge outside China, nurse Patricia Yong[8] knew that once a case appeared in Singapore, ICU beds would be needed, and in good numbers. Chest physician Phua Ghee Chee[9] remembered that modelling had predicted that the peak would occur in April 2020. Indeed, the Ministry of Health (MOH) had told them to prepare for a 400% surge.

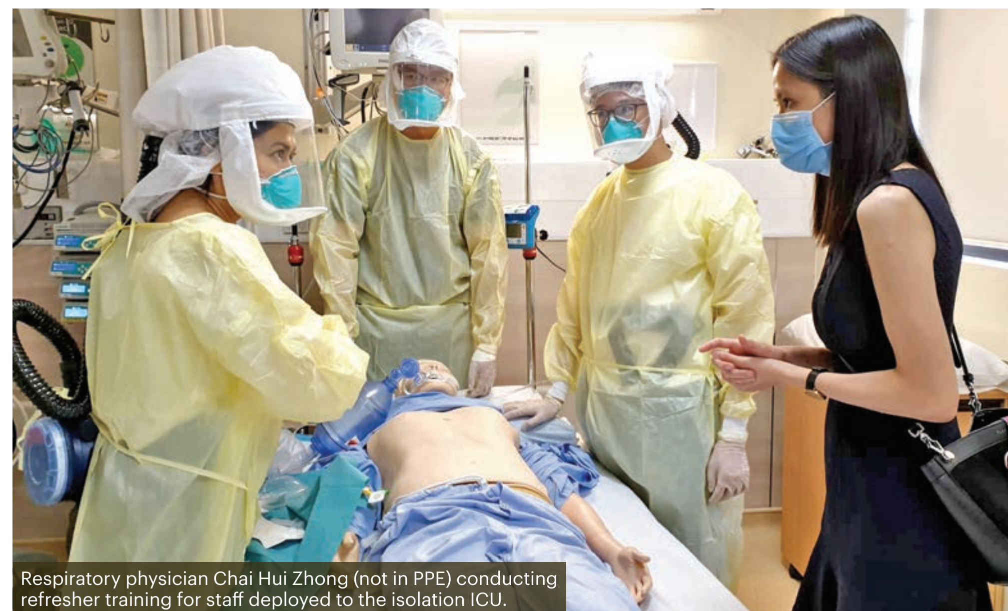
To avoid infection prevention lapses in the high stakes environment of an isolation ICU, Patricia instinctively wanted a buddy system, even though this would mean more manpower. "ICU nurses have ego, built on the high standards required of their specialisation, so a buddy system is important. It is very crucial to have eyes looking at you when you enter the room."

THE INTENSIVE CARE UNIT (ICU)

The ICU is a critical facility for managing patients whose lungs are injured to the extent that they cannot perform their usual function of exchanging oxygen and carbon dioxide. Such patients need ventilator support, via a machine that delivers oxygen into their lungs. The severe form of the novel infection was, ultimately, a pneumonia. The first paper from Wuhan, published in The Lancet on 24 January 2020, indicated that 29% of 41 people who caught the virus ended up being unable to breathe on their own, requiring ICU care. Today, with the large worldwide experience, we know that a much smaller percentage end up in the ICU. The figure is even smaller for the vaccinated who suffer a breakthrough infection.

Upskilling for ICU nursing would require much more than a theoretical refresher. Along with nurse Irene Too[10], Patricia created and ran a hands-on ICU course, training six nurses at a time.

[8] Patricia Yong, Deputy Director Nursing, oversees nursing in the ICUs and the Emergency Department.
[9] Dr Phua Ghee Chee, Head and Senior Consultant, Department of Respiratory and Critical Care Medicine. He is also co-chair of the SGH Campus ICU Committee.
[10] Dr Irene Too Ai Ling, Advance Practice Nurse, Speciality Nursing.



Respiratory physician Chai Hui Zhong (not in PPE) conducting refresher training for staff deployed to the isolation ICU.

If there were a surge of critically ill patients, ICU-trained doctors would also be in short supply. Ghee Chee planned to conscript manpower to the ICU – every doctor who had had some ICU training in the past was a potential recruit. Of course, they needed refresher training. A plan was soon hatched for them to work in an isolation ICU with a trained intensivist as a supervisor, should the need arise. If stockpiled mobile ventilators had to be mobilised, there would clearly be no familiarity with them. A series of voice-annotated PowerPoint presentations and video demonstrations was created for an online ICU refresher course by respiratory therapist Constance Teo[11], chest physicians Sewa Duu Wen[12], Ken Goh[13], Chai Hui Zhong[14] and nurse Ng Lit Soo[15]. The videos were completed within two weeks with help from

[11] Constance Teo, Principal Respiratory Therapist, leads the team of Respiratory Therapists in SGH.
[12] Dr Sewa Duu Wen, Senior Consultant, Department of Respiratory and Critical Care Medicine. He is also Director of the Medical ICU.
[13] Dr Ken Goh, Consultant, Department of Respiratory and Critical Care Medicine.
[14] Dr Chai Hui Zhong, Consultant, Department of Respiratory and Critical Care Medicine.
[15] Ng Lit Soo, Advance Practice Nurse, Nurse Clinician, Specialty Nursing.

Jayakumar Selvam[16] of SingHealth Academy. Posted on the internet and social media, the videos received more than 30,000 views and garnered an international following. Our national role in ICU pandemic training was sealed when these videos became compulsory viewing at several other hospitals in Singapore.

AIRWAY MANAGEMENT IN THE CRITICALLY ILL PATIENT - YOUTUBE

These videos became compulsory viewing for trainees in other hospitals too.

In addition, there were also concerns about the stocks of sedation drugs available. Ventilator management of the acute respiratory distress syndrome[17] would be impossible without them. Discussions were made about having substitutes in the event supplies ran low. A chest physician wondered. "Were we really going to use sublingual lorazepam and fentanyl patches if we ran short of intravenous morphine and fentanyl? Would we really prescribe rectal paracetamol suppositories when oral and intravenous formulations were depleted?"

There were no good answers. The operating theatres, which also used the same sedatives, worked hard to revise their processes, and switched to substitutes[18]. The ICU team ensured that every single item was procured for stockpile or a substitute identified. Even the amount of oxygen available to the hospital was checked.

[16] Jayakumar Selvam, Associate Executive, Academia Education Facilities Management, Office of SingHealth Academy.

[17] Acute respiratory distress syndrome (ARDS) is a form of lung injury that is associated with high mortality. Mechanical ventilation is key to treatment.

[18] For more details about the use of substitutes, see Chapter 7.

Care team prepares trolleys of equipment outside the anteroom as colleagues in PAPR get ready to enter an isolation room.

Surprisingly, it was the cheap and mundane items that were at risk of disappearing. Syringes and 50ml saline bottles were running out fast because of just-in-time supply algorithms. The team embarked on a conservation strategy. But first they had to work with the Infection Prevention and Epidemiology (IPE) team to consider which items could be kept for per patient use. One of the items they decided to conserve was the ventilator tubing. Working with the Infection Prevention Nurses (IPNs), they checked every manufacturer's recommendations closely, and used every tubing to its limit, rather than change them every 48 hours, as was the norm.

Intensivist Anantham Devanand[19] recalled. "There were initial fears over shortages of masks and PPE. But those supplies were managed such that we never felt unprotected. We had been reassured that no one would be put in harm's way and no one was."

[19] Dr Anantham Devanand, Senior Consultant, Department of Respiratory and Critical Care Medicine.

TEAMWORK BETWEEN INTENSIVISTS AND INFECTIOUS DISEASES (ID) PHYSICIANS

ID physicians have always been close allies of intensivists. This bond was further strengthened during the pandemic. One of the isolation rooms was converted into a huddle room, where we held daily case discussions with the ID team. Each patient was discussed at length. The ID doctors helped the ICU team with therapeutic strategies.

Initially when there was no known therapy, we repurposed existing drugs such as lopinavir-ritonavir, based on biological plausibility.

At that time, we had concerns about steroids because of the frequency of secondary infections, and the experience in SARS had been negative. Eventually, data came through and therapeutic options expanded: remdesivir, dexamethasone, convalescent plasma and tocilizumab.

Some patients' family members did internet searches and advocated innovative therapies supported by limited data. It was understandable that they felt the need to do something for a loved one who was dying. Acknowledging that sense of helplessness in the family and respectfully educating them on the value of a data-driven approach in the desperately ill was no easy task.

ANANTHAM DEVANAND
Senior Consultant,
Department of Respiratory and
Critical Care Medicine

Care through the final days

In the first year of the pandemic, Singapore had very few ICU deaths, an impressive statistic. The remarkably small number of deaths belies the work that fell on the ICU teams. The majority of the patients in the isolation ICU did not have confirmed COVID-19. They had critical illnesses, usually non-COVID pneumonia or some other condition causing respiratory failure. But obviously such patients would have cough or breathlessness or fever. SGH considered it imperative that COVID-19 be excluded in these patients before allowing them to be nursed in a non-isolation ICU. This meant that even patients who did not have COVID-19 were separated from family during the initial stages of critical illness.

Yet, one death is one too many. Palliative care physician Jamie Zhou[20] and medical social worker (MSW) Andy Sim[21] recollected how nurses, generally not used to grief and loss conversations, had to take over the role of the MSWs, who were not allowed to enter individual patient rooms

A doctor in PPE inside the anteroom shows the patient's ECG to fellow doctors outside.

[20] Dr Jamie Zhou, Consultant, Division of Supportive and Palliative Care, National Cancer Centre Singapore.
[21] Andy Sim, Principal Medical Social Worker, Department of Medical Social Services.

in the isolation ICU. "MSWs are trained to provide grief counselling and are usually there when doctors inform relatives of a death, especially sudden deaths. In the isolation ICU, we are normally the ones to assist with the last call. During COVID-19, the task fell on the nurses. The MSWs felt handicapped and the nurses felt burdened, having to deal with the emotional part of grief and loss. It took a lot from them, and was quite traumatic for some."

Although isolation patients were not allowed visitors, those on the dangerously ill list (DIL) were permitted a limited number. The visitors, however, had to stand outside the anteroom[22] of ICU patients.

A last reunion

The team had to find innovative ways to work around the restrictions. They quickly drew up a protocol for virtual family conferences. As MSWs were not allowed to enter the patient's room, they trained the nurses. They purchased a mobile phone, which nurses could bring into the ICU room (it had to be cleaned rigorously before it could be brought out).

The family conference usually allowed the ICU doctors to connect with the family, building trust and sometimes breaking bad news to them. Using the video call function, the nurse enabled the family to see the patient. Patients who were conscious would be able to see and hear their family members.

[22] A proper isolation room always has an adjoining anteroom. Here healthcare staff take off their PPE. The anteroom also allows for sophisticated air engineering, preventing air from reaching the rest of the ward beyond it.

THE CALL OF DUTY

It was tough to listen in on their parting words. I was fully gowned up – there was no way for me to wipe my tears. I tried to distract myself with the tasks in the room. To hear but not to listen.

The patient was struggling to stay alive, the numbers on the monitors were blinking red, and the loved ones could only view through glass doors. There was a phrase, I thought – ah, "so near yet so far". What should have been a final loving touch was reduced to an intercom encouragement, "stay strong, fight on".

I was told to do three video calls for my patient, one with each of his children. I had to be in the room, listening to their conversations. As the nurse, I had to do it. The call of duty. Each conversation was supposed to last 15 minutes. I had to do it three times.

And then the ECG flatlined. What do you tell the children?

But somehow they knew.

The patient's wife arrived at the ward to see him. A scene that burned into my heart. A pair of love birds separated by the anteroom. She pleaded to let her enter the room, to at least be inside the anteroom. We declined. I explained why, but those words – those were stabbing words.

It felt morally wrong to let an elder beg to see her love for the very last time, to exchange a final touch. But the stakes were too high. We had an obligation to the nation. It was for a greater good, but at the expense of their grief. Protecting our People took precedence over their grief. An obligation we had to uphold, whether it was morally right or not.

All I could do was apologise. The word "sorry" could never describe the guilt I felt and could never fill the void in their grieving hearts. With the MSW nodding his assent, I offered a final video call, to bridge this physical gap between the two doors. Maybe the family could have closure. The patient's wife finally broke down and acknowledged his death, while I stood in the patient's room, holding the phone as close to his face as possible. Guilt ate into me but it had to be done this way. Do no harm. Beneficence to our People. This was the call of duty.

LEE SHU ZHEN
Senior Staff Nurse,
Urology Centre

She was one of those who took up the challenge of the crash course to serve in the isolation ICU. She had not bargained for the insights she would acquire.

It was a tremendously difficult time for the family. The daughter went on social media, fought hard for novel therapies for her father. There was the fear of the unknown disease, fear of losing a loved one, and exasperation because they couldn't figure out how he contracted it. It was an emotional roller coaster ride as his condition waxed and waned. I remember standing with the family outside the door to the patient's room. When a nurse extended an arm to one of them, she turned and said, "Why are you touching me? Are you not afraid that I am dirty?"

Lee Guozhang, Consultant, Department of Internal Medicine

He was part of the team providing palliative care for the first COVID-19 patient who passed away in SGH.

Despite the gloom, every now and then, shafts of light shone through. MSW Andy recalled a special moment. "One day, we noticed that a patient who had been deteriorating actually had consecutive negative viral swabs, meaning he was no longer infectious. Now the family could be by his side in his last moments. After letting them into the room, I had this feeling that they wanted to take a final photo with their father. Taking photos and videos is not allowed in the ICU, but how could I deny them? So I said nothing and left the room.

But a few moments later, the son sought me out. I quickly consulted Sister Z[23] and the other nursing sisters on duty – they all had no problems with the request.

The son said, 'Thank you for taking our last family photo.'"

Hope in the midst of heartbreak

Not all cases ended in defeat. There were wins too. Lots of them. Some of the sickest patients eventually walked out of SGH. The journey for some of them was long-drawn, with a difficult ICU course followed by prolonged rehabilitation, but they made it. So many dedicated healthcare professionals working intensively for the patients – this must have played some part in the surprisingly low mortality of COVID-19 in Singapore, in 2020. Every success kept the team going.

Video calls to his family in Bangladesh supported Mr Islam Mujahidul (bottom right) through the critical stages of his illness in the ICU. MSW Andy Sim and colleague are seen on the left.

[23] Ziyadah binte Zainuddin, Senior Nurse Manager, Ward 68 (Isolation).

Islam Mujahidul[24], a Bangladeshi worker, was admitted to SGH on 23 May 2020 for headache and respiratory symptoms. He was diagnosed with a brain bleed as well as COVID-19. Andy continued. "We worked very hard to connect with and support his family (wife, two young children, numerous siblings and in-laws) in Bangladesh through multiple video phone calls. His condition was grave and he needed brain surgery. We were preparing the family for the worst. Amazingly, he made a miraculous recovery and managed to leave the ICU. He was moved to the isolation general ward where he received targeted rehabilitation."

Take a deep breath

> The pool of respiratory therapists (RT) is very small. Unlike the other professions, there are no RTs outside the ICU who can reinforce us. I have learnt to take the time spent waiting in the anteroom for the doors to close or open as a time to centre myself, unplug from any messages, calls or emails and focus on the patient in front of me. I am one of the privileged few who have engaged with COVID-19 patients and listened to their stories, their hopes and their fears.

Constance Teo, Principal Respiratory Therapist
who heads the RT team in SGH

[24] Mr Islam Mujahidul gave consent to share his details and photograph. He has returned to Bangladesh. Medical social worker Andy Sim helped to link his family with a non-governmental organisation there for financial assistance.

PASSING THE BATON

In the early days of the outbreak, the worry was how infectious these patients were to healthcare workers. We had been burnt by SARS and for the older clinicians who experienced SARS and lost colleagues, this was always on our minds. But COVID-19 is much tougher that SARS. SARS was quick, brutal and then it was over. The fear and adrenaline carried us through the crisis. We have never faced a prolonged and seemingly never-ending pandemic like COVID-19. The challenge this time includes how to overcome pandemic fatigue, how to protect the mental health and wellness of our staff, how to re-energise our people and organisation.

Having a generation of healthcare workers who are veterans of previous pandemics is critical. It is not just useful from a standpoint of knowing what needs to be done and what to expect. More important, it provided reassurance and confidence to the younger staff members who were experiencing this for the first time. Even when the COVID-19 pandemic eventually passes, we can continue passing down these experiences to the next generation, in preparation for the next pandemic.

As a leader, it wasn't easy sending young colleagues into hot zones such as isolation ward, isolation ICU and even sending our ECMO team to work with the ICU team at the National Centre for Infectious Diseases. There was always the worry that I was sending them into harm's way. But I was grateful and inspired by how positive they were. We were never short of volunteers for the isolation wards. It was heartening that the newer generation of clinicians were as dedicated, committed and courageous as their seniors were. I am really proud of the new generation of healthcare workers. The future shines bright.

PHUA GHEE CHEE
Head and Senior Consultant,
Department of Respiratory and
Critical Care Medicine

Ghee Chee himself is a SARS veteran.

The good in an invisible war

There are no gunshots
No shrapnel on the streets
No bodies strewn in debris
They said, "you could never be too prepared"

Could anyone prepare for an invisible war?
Like dominos we tumble
A first, a second, then hundred and five
Hang on, is it a couple of thousand now?
The evening news is a daily guessing game

One did not plan for this
When he opened his restaurant chain last year
Or the marriage plans they had saved up for
Yet one rises to the occasion
Because there is no other way
Out of nowhere
A little girl writes a card
Her whole class follows suit

A struggling stallholder
Drops off hundred packets of food at the hospital door
Thousands of other nameless acts
Kindness has a domino effect

This too shall pass
And when the lion city roars itself to life again
Pavements will be walked on
A carnival of colours
Compassion will tide us through

SHUBASHRI JEYARATNAM
Medical Officer

She was doing her posting at the Plastic, Reconstructive and Aesthetic Surgery Department when the outbreak started. She was subsequently deployed to the Department of Emergency Medicine and then to the Community Isolation Facility @ Expo (see Chapter 9).