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Surgical Response to COVID-19 Pandemic: A Singapore Perspective

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And there are no more surgeons, urologists, orthopaedic surgeons; we are only doctors who suddenly become part of a single team to face this tsunami that has overwhelmed us.

Dr Daniele Macchini,
Bergamo, Italy March 7, 2020

The COVID-19 pandemic continues to spread rapidly and overwhelm health systems around the world. Tan Tock Seng Hospital was the epicenter in the coordination and management of the severe acute respiratory syndrome outbreak in 2003. Now, together with the National Centre for Infectious Diseases, Tan Tock Seng Hospital is taking the lead in Singapore's efforts to navigate this pandemic. In dealing with COVID-19, given the scale of the pandemic, surgeons and surgical teams all around the world face unique challenges to daily operations, having to fulfill alternate nonsurgical roles while reducing attrition. We hope to share our experience from the perspective of the Division of Surgery, Tan Tock Seng Hospital, on our actions in responding to this challenge, in the hope that it may benefit others during this global crisis.

On January 23, 2020, Singapore became one of the first countries outside China to report a case of COVID-19.¹ In early February, the World Health Organization reported that Singapore had the most cases of COVID-19 outside China.² This, however, was not the first time Singapore faced such a grave pandemic. In 2003, the severe acute respiratory syndrome (SARS) epidemic spread to 28 countries, and Singapore was severely affected. Tan Tock Seng Hospital (TTSH) was at the epicenter of the fight against SARS in Singapore. Being one of the largest acute care hospitals in Singapore, providing multispecialty care with high volumes of emergency department (ED) visits and trauma cases, daily operations at

TTSH were severely disrupted during SARS. Born out of the need to bolster Singapore's response to pandemics, the National Centre for Infectious Diseases (NCID) was built and recently inaugurated in 2019. NCID is a 330-bed, purpose-built facility designed to augment Singapore's capabilities in infectious disease management and prevention. It houses a screening center (SC), isolation and cohort wards, ICU wards, independent laboratories, radiology imaging facilities, endoscopy capabilities, and operating theaters (OTs). NCID is closely annexed to TTSH, and relies upon TTSH as a multispecialty general hospital for a full range of clinical and logistic services. In peacetime, many of the NCID resources are in standby mode. In the COVID-19 pandemic, since February 2020, NCID has been resourced for outbreak response by reducing TTSH business-as-usual work proportionately. To enhance NCID capabilities to respond to COVID-19, TTSH staff were deployed to NCID in various capacities. Division of Medicine staff were primarily engaged to cover the expanding number of isolation wards; the Division of Surgery staff were primarily engaged in providing screening services in clinical suspects at the NCID SC. As countries around the world, especially in Europe, struggle to control the pandemic, we would like to share the experience of the surgical division of TTSH in the hope that it might benefit other healthcare institutions during this challenging period.

PREPAREDNESS

Singapore's Ministry of Health, NCID, and TTSH have been developing preparedness crisis plans for a long time, and in fact, the institutions were due to conduct an Emerging Infectious Disease (EID) joint exercise in the first quarter of 2020, so the majority of the national and hospital level crisis plans for EID have been in place. At the outset of the COVID-19 pandemic, the crisis plans for the Surgical Division were to prioritize the manning of the NCID SC while still preserving emergency surgical capabilities, level 1 trauma center capability, contribution of anesthetists to the ICU, and phased reduction in elective procedures and clinic consultations.

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Abbreviations and Acronyms

ED	= emergency department
NCID	= National Centre for Infectious Diseases
OT	= operating theater
SARS	= severe acute respiratory syndrome
SC	= screening center
TTSH	= Tan Tock Seng Hospital

RESOURCES**Elective surgery and endoscopy lists**

Many surgical professional groups have recently issued guidance to curtail elective surgical procedures. At TTSH, the elective lists were reduced by 30% in early February 2020 to 50% in March 2020. Life-saving or limb-saving procedures, such as oncology and limb revascularization operations, were prioritized. There are many considerations, both medical and logistical, when deciding to cancel or postpone surgical procedures. They include:

1. Reducing the manpower (surgeons, anesthesiologists, scrub nurses, allied health workers) requirements in the OT to balance the manpower assigned to NCID while maintaining urgent surgery capabilities;
2. Reducing chance of undiagnosed COVID-19 patients entering the “clean” OT, risking disease transmission and compromising provider safety;
3. Freeing up ICU resources and manpower in TTSH in case of a surge of COVID-19 patients requiring advanced life support;
4. Analyzing medical risk-benefit by weighing acuity of elective surgery and risks of postponement of surgery with input from the primary surgeons and heads of services; and
5. Need for postoperative inpatient care in general ward, high-dependency units and ICU.

Clinic resources

Clinic resources have also been drastically reduced to minimize unnecessary traffic in the hospital. Clinic visits are reviewed by doctors 1 week before the scheduled visit. Patients with time-sensitive results, needing emergent surgery, or those who are symptomatic are booked into clinic slots; those on follow-up for chronic conditions or with nonurgent results have their appointments postponed. Where possible, such as discussing nonurgent results, consultations are done by telephone, and this helps to allay the anxiety in patients. Provisions are made for patients to refill chronic medication without clinic consultation, with an option for courier delivery service. New referrals

are also screened by consultants and appointments deferred, depending on presenting complaint.

Personal protective equipment

Early in the outbreak, a hospital level personal protective equipment (PPE) use policy for different clinical areas was firmly established with the following principles:

1. Prioritize adequate provision of appropriate PPE to all staff, depending on their roles and clinical areas in which they function to provide staff the confidence to do their work.
2. Early institution of wearing surgical masks by staff in all clinical areas to provide baseline PPE for all staff to defend against inadvertent exposure to patients with uncertain COVID-19 status.
3. Enforce the PPE requirement to Tier 2 PPE (N95 mask, full sleeve gown, gloves, shower cap, eye protection) for all aerosol-generating procedures, including intubation, regardless of the COVID-19 status.
4. Stepped up PPE requirements to Tier 2 PPE for endoscopic procedures with a high risk of aerosolization (eg gastroscopy, nasoendoscopy, etc) regardless of the COVID-19 status.
5. Hospital and national level continuous monitoring of supplies and consumption rate. Supply and consumption rate informs clinical leads whether to modify practice, PPE policy, and use of alternatives.

PEOPLE

The COVID-19 outbreak could not have come at a worse time. Although news of the outbreak emerged from Wuhan, China in December 2019, it was not until January 23, 2020 that COVID-19 reached Singapore's shores, coinciding with the Chinese New Year period (January 25 to 27, 2020).¹ This is one of Singapore's major holidays, celebrated by the most of the population and involving family gatherings, visiting of friends, and hosting of dinners, all of which risked disease transmission. Moreover, a number of staff had gone back to their home countries for the celebration. To safeguard the rest of the workforce, staff returning from affected countries were placed on 14-day paid leave of absence, and this had a significant impact on our deployable workforce.

Surgical staffing in alternate roles

Doctors and nurses from the Division of Surgery were engaged to assist in the NCID screening center. The doctors' main roles included history taking and physical examination of suspected COVID-19 patients, with management plans and disposition decided with guidance

from ED physicians. These were our considerations when fulfilling these roles:

1. Preservation of emergency surgical response takes top priority. Critical services such as trauma, vascular surgery, neurosurgery, and thoracic surgery must continue to be operational when designing rosters for the NCID SC.
2. Just-in-time training for surgical staff, including use of ED electronic medical records, and on-the-ground walkabout to ensure familiarity with NCID processes.
3. Adequate supervision by ED physicians, who decide on management, and disposition plans to reduce the cognitive load and risk of error faced by surgeons in an unfamiliar environment.
4. Adequate work-rest cycle for manpower sustainability. NCID SC staffing works on a shift system similar to that in the ED.

Protecting staff

The response from the management in protecting the staff had to be swift and decisive, to show unequivocally that the hospital prioritizes the health of its staff. This is important to maintain morale of staff, their confidence in the hospital leadership, and to reduce “presenteeism,” which is prevalent among healthcare workers.³ Staff surveillance of temperature and sickness was instituted via an online portal for all hospital staff. All staff who were unwell were encouraged to report to the hospital’s occupational health clinic or NCID SC, depending on their exposure risk. All staff working in TTSH had N95 mask fitting done at the time of their recruitment; however, to close any gaps, additional mask fitting sessions were organized with collaboration from the Infection Control department on very short notice. Each staff was fitted with at least 2 different models of N95 so that the staff could continue to work safely even if 1 model became unavailable due to supply issues. For relevant staff, just-in-time training was conducted on the use of the powered air purifying respirator (PAPR) and donning of personal protective equipment, with videos made available via several hospital e-learning platforms. All staff pantries’ seating arrangements were redesigned, including in OT, to allow for adequate social distancing and with staggered mealtimes to reduce crowding.

Segregation of teams

To maintain full emergency surgical capability, it was important to ensure that team segregation within each subspecialty was practiced. This ensures that if 1 team within the subspecialty has to be quarantined due to unexpected exposure to COVID-19 patients, the other team

within the subspecialty could continue care with minimal disruption to essential emergency surgical services. In essential meetings, such as tumor boards, where more than 10 persons are present, all are to wear surgical masks and practice hand hygiene.

PSYCHOLOGICAL WELFARE AND MORALE

COVID-19 has caused panic among the general public manifesting as irrational behavior of avoiding healthcare workers on public transportation and hoarding food items and groceries. The pandemic has brought back tragic memories of SARS, which affected 238 patients, causing 33 deaths, including TTSH healthcare workers.⁴ There has been more widespread proliferation of mobile usage and social media usage now compared with the SARS period. While facilitating ease of information dissemination, inaccurate and false reporting has also been repeated and perpetuated through these digital media, causing further panic and anxiety. To counter this, timely, accurate, coordinated, honest, and responsible reporting from hospital leadership is necessary to allay the concerns among healthcare workers in a time of uncertainty. Messages of support and gratitude from hospital leadership and community are important to bolster the resolve and morale of the healthcare workers. Leave policies initially called for cancellation of all leave for all staff; however, given the likely protracted nature of the pandemic, to sustain morale over the longer-term, this was relaxed to allow for local leave, with the caveat that staff must be contactable at all times to return to the hospital if necessary.

Communication

Various digital media were used for transmission of essential information. Information sharing on critical issues, such as hospital-wide policy changes, were disseminated via staff bulletin emails and intranet. Instant messaging (IM), via TigerConnect, which is the hospital’s official instant messaging application, is used to transmit time-sensitive messages. Senior leadership are also engaged in the instant messaging application, enabling smooth 2-way transfer of information, rapid problem-solving of issues on the ground, and “flattening the hierarchy.” Leaders also ensured that every batch of staff that were about to embark upon the “COVID-19 tour of duty” in NCID were briefed, and alignment with the hospital mission made clear. Regular engagement with the staff by leadership, either in person or via teleconferencing, was also important for communicating information and updates on strategic direction. Nonessential overseas leave was also suspended to reduce the risk of overseas importation of COVID-19; this included pre-planned holidays,

workshops, and conferences. Staff who had to travel overseas required approval from senior hospital leadership and were placed on a 14-day leave of absence on return to mitigate any risk of importation of COVID-19.

Leading by example

Senior members of the surgical department, such as heads of department, heads of service, senior consultants, nursing officers, and managers rotated alongside junior members to the NCID SC, serving in equal capacity at the frontline, despite the heavier administrative burden on the senior staff and already stretched manpower situation. However, leading by example helped to boost morale and instill confidence among the juniors during this challenging time, and is another example of “flattening the hierarchy.”⁵

Welfare and support

Although there was stigmatization of HCWs by the public in the initial stages of the outbreak, there has been an even bigger movement to show support to the HCWs. This has included free drinks and meals at popular establishments, goodie bags consisting of multivitamins and snacks, and personally written cards from schoolchildren, coordinated by the Human Resource Department. These small gestures from corporates, who themselves are seeing a challenging economic environment, and members of the public, serve to boost morale of the HCWs and strengthen the society’s resolve to weather the crisis together. Within TTSH and NCID, the widespread use of murals of appreciation and corporate social media (Facebook, Workplace from Facebook) have allowed the sharing of personal stories and expression of appreciation by colleagues.

CONCLUSIONS

The COVID-19 situation continues to evolve rapidly. Surgical staff form an essential pillar of any hospital, but during this unprecedented time, must step out of their comfort zones to fill gaps. Leadership must remain nimble to make policy changes quickly in response to changing situations and yet remain receptive to feedback and sensing from the ground to keep up morale and resolve of staff during this challenging period. We hope sharing our experience helps other surgical units navigate this crisis successfully.

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Invited commentary

Being a Surgeon in the Pandemic Era



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The end of 2019 saw the first cases of pneumonia of unidentified origin being reported by the Chinese government in Wuhan, China,¹ with confirmed human-to-human transmission to healthcare workers on January 12, 2020.² This was met with a swift response by public health and scientific communities, uncovering its etiology to be a novel RNA beta-coronavirus.³ Its genome has since been sequenced, with Zhu and colleagues⁴ reporting a 75% to 80% similarity to the 2003 Severe Acute Respiratory Syndrome coronavirus. The coronavirus disease (COVID-19) outbreak has since caused a global pandemic, with 896,450 confirmed cases and an unprecedented death toll of 45,526 people.⁵

With the pervasive spread of COVID-19, surgeons will invariably be intertwined and profoundly affected in many areas. Potential exposure to COVID-19 may arise from reviewing patients with surgical complaints in the emergency department, some of whom may have incidental suspicious chest x-ray findings and awaiting COVID-19 swab confirmation, encountering patients with recent travel history in the specialist outpatient clinics, and being exposed to blood or aerosol in the operating theater that may be contaminated with the virus. As such, it is timely for us to reflect on what it takes to be a surgeon in the pandemic era.

Wisdom in rationalizing resources

This article, by Ahmed and coauthors,⁶ is highly relevant and topical and summarizes their surgical department’s