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**Responding to the COVID-19 pandemic at a primary care centre in Singapore**

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## INTRODUCTION

A pneumonia of unknown aetiology that was first detected in Wuhan, China, was reported to the World Health Organization (WHO) on 31 December 2019.<sup>(1)</sup> Within days, the virus responsible was identified as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), originating from the coronavirus family,<sup>(2)</sup> and the disease was later termed coronavirus disease 2019 (COVID-19).<sup>(3)</sup> On 11 March 2020, the WHO declared the COVID-19 outbreak to be a pandemic.<sup>(4)</sup> As of 15 July 2020, more than 13 million cases of COVID-19 were reported worldwide, leading to over 574,000 deaths.<sup>(5)</sup> Singapore has been one of the worst affected countries in Southeast Asia, with over 46,000 confirmed cases, the majority of whom were foreign workers from dormitories.<sup>(6)</sup>

In Singapore, polyclinics are the public primary care institutions that, together with private primary care clinics, form the foundation of Singapore's healthcare system. During the ongoing pandemic, they play an important role in screening and transferring patients with higher risk of COVID-19 to tertiary institutes for further management. To strengthen active case finding and narrow the list of differentials, polyclinics and Public Health Preparedness Clinics (run by private general practitioners)<sup>(7)</sup> have conducted swab tests for suspect cases and surveillance since 18 February 2020.<sup>(8)</sup> Acute upper respiratory tract infection (URTI) is the initial presentation in most COVID-19 patients in Singapore<sup>(9)</sup> and one of the top four conditions of polyclinic attendance in 2019, according to Ministry of Health (MOH) statistical data.<sup>(10)</sup> SingHealth Polyclinics (SHP)-Bukit Merah, one of the 20 polyclinics in Singapore, had an annual attendance of 27,591 for URTI in 2019, out of a total attendance of 210,436 at our polyclinic.

SHP-Bukit Merah has been operational since 1980 and offers comprehensive healthcare services to a wide spectrum of age groups. In addition to doctors' consultations, health education

and preventative health services, the polyclinic has a clinical laboratory and a diagnostic radiology service. In 2017, the polyclinic underwent renovation, expanding the premises to include a new wing separated by a common passageway (Fig. 1). To equip the facility to tackle potential infectious diseases, a negative pressure isolation room with gowning and de-gowning rooms were installed.

Local case definitions for suspect cases of viral pneumonia of unknown cause (later termed COVID-19) in Wuhan, China, were established in Singapore since 2 January 2020.<sup>(11)</sup> As one of the SingHealth Polyclinics, our clinic adopted SHP's risk-stratification strategies with guidance from health advisories issued by the MOH. The plan was to risk-stratify patients depending on their likelihood of having the disease and ensuring appropriate use of personal protective equipment (PPE) depending on the risk of exposure.<sup>(12)</sup> This was done while also ensuring minimal disruption of essential services to patients with non-COVID-19 related diseases at our polyclinic. These strategies were constantly updated to adapt to the evolving global and local situation. With the COVID-19 pandemic threatening to overwhelm healthcare systems worldwide, we would like to share our experience of responding to the pandemic while maintaining the functional capacity to serve our patients with essential medical care as usual.

## **RISK-STRATIFICATION STRATEGY AND PERSONAL PROTECTIVE EQUIPMENT USE**

The risk-stratification strategy and PPE use at SHP-Bukit Merah corresponds to the Disease Outbreak Response System Condition (DORSCON) status in Singapore. DORSCON, an indicator of the level of Singapore's response to any outbreak, is based on lessons learnt during the severe acute respiratory syndrome (SARS) and H1N1 outbreaks.<sup>(13)</sup> It is divided into four levels of

incremental severity (green, yellow, orange and red) and takes into account both disease severity and spread to predict the impact on the community.<sup>(13,14)</sup> Since the MOH revised the risk assessment from DORSCON yellow to orange on 7 February 2020,<sup>(15)</sup> SHP-Bukit Merah has further strengthened its protocols and PPE use with the MOH guidance.<sup>(12)</sup> We herein describe the latest risk-stratification strategy at SHP-Bukit Merah as of the time of writing.

Risk-stratification of patients begins at the clinic entrance, where there is a triage station equipped with a thermal scanning camera. Staff at the triage station wear N95 masks and identify patients with symptoms such as fever, cough, running nose and sore throat; contacts who tested positive; travel history; and residence in congregated settings such as dormitories where there were reports of a COVID-19 outbreak. Patients with fever or respiratory symptoms but without other risk factors, such as positive contacts or travel, are designated as Yellow Zone patients, while those with a high likelihood of having the disease – symptomatic patients who have positive contacts, have travel history or stay in congregated settings such as dormitories – are designated as Red Zone patients (Box 1). Patients without any respiratory symptoms or risk factors are designated as Green Zone patients. Patients are given green, yellow or red stickers to enable easy identification and directed to the appropriate areas in the clinic (Fig. 1) depending on their triage status. Triage staff ensure that patients designated as Yellow Zone or Red Zone have donned surgical masks prior to directing them to the respective areas for consultation.

**Box 1. Risk stratification of patients:****Red Zone**

Highly suspect cases, i.e. symptomatic patients with positive contacts or travel or residing in congregated settings such as dormitories

- Patients are promptly directed to the negative pressure isolation room.
- Staff don full personal protective equipment (PPE) to attend to these patients.

- Patients who are eventually discharged or transferred wait at a segregated holding area.

**Yellow Zone**

Symptomatic patients without positive contacts/travel or stay in congregated settings

- Patients are directed to the ‘fever area’, which also includes a room designated to conduct swabs for SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2).
- Physicians don N95 masks and face shields while attending to patients.
- Personnel conducting swabs, deemed to be a high-risk, aerosol-generating procedure, don full PPE.

**Green Zone**

Low-risk patients who are asymptomatic

- The other parts of the clinic are designated as the Green Zone and patients have access to all clinic services.
- Staff, including nurses and allied health staff, don at least surgical masks in these areas.

As we have a negative pressure room, Red Zone patients are directed there and the designated physician on duty is subsequently informed. The physician dons full PPE for the consult, comprising goggles/face shield, N95 mask, gown, gloves, caps and shoe covers, and conducts the consultation in the isolation room, subsequently proceeding to de-gown in the de-gowning room. The isolation room is equipped with oxygen cylinders should patients require supplemental oxygen. After the assessment, patients who are deemed fit for discharge are directed to a segregated holding area, where the pharmacist hands them their medications. Patients who are clinically stable but require ambulance transfer to a tertiary centre are also directed to the holding area. The cleaner then thoroughly disinfects the isolation room after each consultation.

Yellow Zone patients are registered at triage and directed to the ‘fever area’ to await consultation. ‘Fever area’ doctors don N95 masks and face shields during consultation. Following the consult, if a swab to test for SARS-CoV-2 is deemed necessary, patients are directed to a

designated room where a nurse donning full PPE conducts a nasopharyngeal swab according to guidance issued by the MOH for the Swab and Send Home programme.<sup>(16)</sup>

Green Zone patients are seen in the other parts of the polyclinic and have access to all clinic services such as the diagnostic laboratory service, radiology service and dressing service. Staff members, including nurses and allied health staff, don at least a surgical mask in these areas. Occasionally, symptomatic patients slip through despite the best efforts of our staff. They are re-assigned yellow stickers at the point of identification and redirected to the ‘fever area’ for consultation, or to the Yellow Zone pharmacy area to await medication dispensing.

With these measures, our clinic has segregated suspect cases from low-risk patients during the ongoing pandemic. These measures may be implemented in primary care centres with adequate floor space to risk-stratify and segregate patients. Appropriate use of PPE is critical during the ongoing pandemic to ensure that frontline staff are adequately protected.

## **ENSURING CONTINUATION OF ESSENTIAL CARE SERVICES**

In general, the fight against the COVID-19 pandemic focuses on managing affected patients and protecting others from infections. Ensuring continuity of care services for patients presenting with conditions unrelated to COVID-19 during this pandemic poses a challenge for the worldwide healthcare system.<sup>(17)</sup> In 2019, there were 21,385 deaths due to a variety of causes in Singapore, of which the top two causes were diseases of the circulatory systems (heart and hypertensive diseases, and cerebrovascular disease; 6,500 deaths) and neoplasms (6,226 deaths).<sup>(18)</sup> Therefore, it is crucial to maintain continuity of care services to non-COVID-19 patients in the primary care setting.

During this pandemic, while our polyclinic’s functional capacity has been preserved by the risk-stratification strategy and appropriate PPE use, essential services such as acute care,

suboptimal chronic illness management, children's development assessment and vaccination, have remained available for patients attending the polyclinic. SHP-Bukit Merah has continued to provide holistic care to patients, including the disadvantaged and marginalised who were affected by the cessation of some community care services provided by community partners. These include daycare services, medical escort services and home personal care (medication packaging, medication supervision and monitoring of chronic conditions). We actively identified this group of patients who have intensive needs and no family support and liaised with the community partners to ensure that patients' socioeconomic needs are met despite the 'circuit breaker' measures that were in place from 7 April 2020.<sup>(19)</sup> To encourage patients to stay home as much as possible in order to limit exposure to potentially infectious cases, we offered medication delivery service to those with stable chronic medical conditions who called in for medication refills during the circuit breaker period. These patients' medical records were subsequently reviewed by assigned physicians and their suitability for medication top-up assessed. This reduced the clinic's patient load and helped to conserve medical and nursing manpower should there be a need for staff deployment elsewhere to help in COVID-19 community isolation facilities. Non-essential services such as physiotherapy, financial counselling and elective minor procedures were deferred during the circuit breaker period, further limiting patient attendance to the polyclinic for non-urgent services.

## **CONCLUSION**

Singapore was able to contain SARS in 2003 and learnt from the experience. Over the past decade, Singapore's healthcare institutions have enhanced our facilities to manage infectious diseases. The COVID-19 pandemic has presented new challenges to healthcare workers worldwide and also

significantly changed the way clinical practice is carried out in Singapore.<sup>(20)</sup> As a primary care centre, we needed to rapidly respond to these emerging challenges and escalate strategies in response to the evolving global and local situations. Our strategy focused on risk-stratification to identify and segregate patients with high risk of having the disease and attending to patients in appropriate PPE. Similar measures may be implemented in primary care centres with adequate floor space. Potential pitfalls include patients' failure to declare symptoms at triage. However, these risk-stratification strategies also help in ensuring continuity of services for low-risk patients who require monitoring of chronic conditions or present for acute care.

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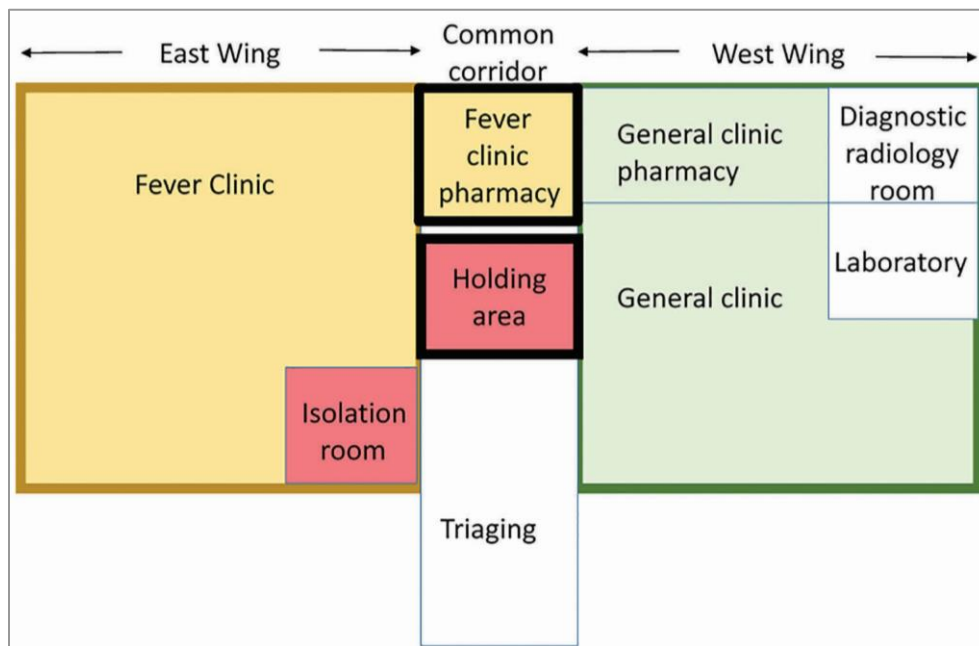
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**FIGURE**



**Fig. 1** Diagram shows the clinic layout.