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An Otorhinolaryngology Perspective Into a Hospital COVID-19 Cluster

Jian Li Tan[1,2,3], Ming Yann Lim[1,2,3], Augustine Yui Ler Chai[1], and Seng Beng Yeo[1,2,3]

Abstract

In this commentary, we share our experience of a COVID-19 cluster which developed within a frontline healthcare facility designated for treating COVID-19 patients. We provide an Otorhinolaryngology perspective into the key challenges, analyses and responses. We discuss how we identified and isolated infected patients and staff, uncovered the responsible COVID-19 variant strain B1.617.2 and instituted various measures to overcome this cluster. The measures include ceasing non-essential services, limiting transfers of patients, a heightened stance of personal protective equipment, ring-fencing of staff and enhanced COVID-19 testing. With rapid hospital wide efforts, there were no new non-isolated cases from our hospital cluster 3 days after the wards were locked down. The cluster which developed on 28-April-2021 was closed on 6-Jun-2021, with 48 cases, ten of whom were healthcare workers. Some of these lessons may be useful for consideration should another healthcare institution face a similar crisis in the future.

Keywords

COVID-19, hospital cluster, outbreak, B1.617.2 variant

Introduction

Since diagnosing its first case of Coronavirus disease 2019 (COVID-19) on 23 January 2020, Singapore's fight against COVID-19 has been an unpredictable roller-coaster ride. The fight was initially dominated by the outbreak in foreign workers' dormitories in 2020, and later focused on the continuous flow of imported cases coming through our borders. At the outset, Singapore's healthcare system was severely tested as the dormitory cases were relentless, but as the majority of dormitory residents were healthy with mild clinical disease, quarantining them was the main logistical challenge.[1] Eventually, the dormitory outbreak was brought under control with the help of Rostered Routine Testing (RRT) and strict isolation measures to prevent the spread of dormitory infections into the community.[2] As a result, Singapore continued to see low levels of community infections, and this allowed cautious reopening from a 2-month circuit-breaker in June 2020, albeit maintaining safety measures like mask wearing and monitoring of personal movement.[3]

Following a year of gradual relaxation of COVID-19 restrictions, COVID-19 struck a blow to the nation once again when the first COVID-19 hospital cluster in Singapore developed in Tan Tock Seng Hospital (TTSH) on 28 April 2021.[4] TTSH is a major Public Healthcare Institution (PHI) of Singapore, and supports the National Centre of Infectious Diseases (NCID), the designated frontline healthcare facility for treating COVID-19 patients in Singapore. By that point in time, the Department of Otorhinolaryngology (ENT) of TTSH had already adapted to the initial challenges posed by COVID-19, and resumed business-as-usual services by making necessary changes in clinical practice and enhanced safety precautions.[5,6] However, this first healthcare cluster in Singapore, resulting from a more infectious variant of COVID-19, brought about new challenges, requiring rapid analyses and response. Describing both hospital/institution responses and speciality-specific responses, the authors would like to share their experience in battling the new and unique problems.

[1]Department of Otorhinolaryngology, Tan Tock Seng Hospital, Singapore
[2]Yong Loo Lin School of Medicine, National University of Singapore, Singapore
[3]Lee Kong Chian School of Medicine, National Technological University-Imperial College, Singapore

Corresponding Author:
Jian Li Tan, Department of Otorhinolaryngology, Tan Tock Seng Hospital, 11 Jln Tan Tock Seng, Singapore 308433, Singapore.
Email: Jian_Li_TAN@ttsh.com.sg

'Strategic' Differences in 2021 COVID-19 Situation for Tan Tock Seng Hospital

It is important to describe two key differences in the COVID-19 challenges faced by the department in 2021.

First, the enemy was now within us.

Previously in 2020, the source of COVID-19 infection was either out in the community or in the dormitories, and the ENT department's role was to provide medical services to the community, while at the same time putting in place protocols which would prevent ourselves from getting infected by the patients we treat.

But in 2021, when the COVID-19 cluster outbreak in TTSH occurred, it resulted in an unexpected reversal of roles. The ENT department, and in fact any staff member of TTSH, was suddenly a possible source of COVID-19. Therefore, the new problem in 2021 was how to ensure the continued provision of ENT services to the community, while minimising the risk of unwittingly spreading COVID-19 to our patients at the same time. The TTSH outbreak inevitably resulted in:

(1) A disquieting threat to the safety of both healthcare workers and patients of TTSH.
(2) Disruption of our normal business-as-usual in providing tertiary medical care.
(3) Undermined public confidence in a major PHI of Singapore.
(4) Paralysis of TTSH's ability to support NCID.

Second, this present enemy was not a return of the same enemy which we had previously encountered.

In 2021, we found ourselves dealing with a much more dangerous enemy; a variant strain known as the B1.617.2 strain which was first detected in India. This strain has been labelled a Variant of Concern by World Health Organisation (WHO) as it is more transmissible and animal models suggested that it brings about more severe illness. Emerging data also suggests that this strain may potentially become airborne, and vaccination effectiveness against it has also not been well verified.[7-10] This meant that traditional measures of social distancing, contact tracing and ring-fencing, which had proven effective against the original strain, now had to be done more aggressively to be effective against the new variant.

Response to a Possible COVID-19 Source Within Tan Tock Seng Hospital: Hospital Wide Measures

To address the new challenge, the involved wards of the hospital went into lockdown mode expeditiously on the day the cluster was discovered. This necessitated the identification of 'hot' wards where the COVID-19 positive cases had been admitted, and also 'cold' wards which had no COVID-19 cases.

Heightened protection. Level 2 PPE (Fitted N95 mask, eye protection, disposable gloves, gown and surgical cap) was required by all healthcare personnel entering hot wards, and even in cold wards it was necessary to use N95 masks and eye protection at least. Not only was this crucial to protect staff and patients, this also helped to prevent healthcare workers from being spreaders themselves because of the potential for asymptomatic carriers.[11]

Reduced patient contact. Until we could confirm that the virus was definitely contained within the hot wards, and had not spread wider, other precautionary measures were implemented to reduce exposure of additional people to the hospital environment. Crucial measures such as ambulance diversions and postponement of non-essential clinic appointments and elective surgeries were put in place. Visitation by relatives, and discharges of our inpatients were also not allowed temporarily. Where possible, outpatient in-person appointments were replaced by teleconferencing consults.

Ring-fencing of staff. A total of about 1000 staff, including 350 doctors were placed on quarantine, which reduced TTSH's available doctor manpower by about 20%. To compound matters, the reduction affected a greater proportion of junior doctors as they predominantly work in the inpatient wards. As for the ENT department, we did not have any inpatients in the hot wards. Our exposure to the virus occurred when some of the inpatients reviewed at our specialist clinic was later found to have COVID-19. This resulted in two out of three ENT registrars requiring quarantine, which paralysed the department's mid-tier manpower.

Enhanced testing followed by RRT of staff for COVID-19. Healthcare workers who had been to the Ward Block which houses the inpatient wards underwent enhanced weekly nasal swab PCR tests, followed by RRT. RRT was also later mandated by the Ministry of Health for all healthcare personnel. This ensured that the hospital could rapidly identify and isolate any staff members that harboured the virus. Thankfully, this revealed very few cases of infection amongst the hospital staff.

Segregation from family members. TTSH healthcare workers (HCW) who were not required to quarantine, but had household or family members working in other healthcare institutions were also instructed to segregate from these other HCW in their household for a period of time. If it was not possible to segregate at home, alternative accommodation was provided for such staff. This was to ensure that the cluster was contained within TTSH, and not risk directly compromising other healthcare institutions through household contacts. At that time, other PHIs in Singapore were already experiencing heavier workload because of the diversion of patients away from TTSH, and a simultaneous COVID-19 outbreak in a second PHI in Singapore may tip the overall healthcare situation in Singapore into an untenable one.[12]

Stratification of TTSH staff by COVID-19 exposure risk. TTSH staff at an early stage were stratified into four different levels of exposure risk, based on proximity to and duration of time spent in the hot wards. These categories helped guide prioritisation for nasal swab tests, as it would require almost a week to swab all 10,000 staff. It was also used to determine which staff required a period of Leave of Absence (LOA). Notwithstanding, all staff were also directed to isolate themselves from the Singapore public when not at work, that is, staff were only allowed to travel between home and work, and carry out essential activities such as buying groceries, or picking children from school. Essentially, this was the implementation of the spirit of a 'circuit-breaker' for TTSH staff alone. This occurred 3 weeks earlier than the announcement of nationwide Phase 2 (heightened alert) measures from 16 May to 13 June 2021. Throughout this period, staff wellness and psychological support were also enhanced.[13]

Table 1. Summary of challenges and measures implemented.

Key challenges when dealing with a hospital cluster	Measures implemented
1 Infected patients and healthcare workers within the hospital	Patient-related measures
	Ward and hospital lockdown
	No admissions or discharges
	Ambulance diversion
	Ward segregation into hot and cold zones
	Inter-ward transfers banned
	Serial COVID-19 testing
	Special discharge and transfer team set up No non-essential outpatient visits or elective surgeries
	Telemedicine encouraged
	Cessation of evaluation of Otolaryngology inpatients at our outpatient clinic
	Healthcare worker–related measures
	Quarantine of exposed staff
	Team segregation
	Enhanced testing followed by RRT for COVID-19
	Alternate accommodation to prevent cross-institution spread
	Restriction on staff movement outside work
	Escalating PPE precautions
	Use of disposable scopes
	Teleconferencing for meetings
	Enhanced staff support
2 B16172 COVID-19 variant	Adjustment of close contact definition
	Adjustment of quarantine duration
	Stricter PPE precautions

Dealing With a New Variant B1.617.2 Strain of COVID-19: Hospital and Speciality-Specific Measures

The measures mentioned above would undoubtedly have worked well a year ago against the original strain of COVID-19.

But for this 2021 outbreak, the fact that COVID-19 had managed to break through TTSH's usual safety protocols, and infect fully vaccinated frontline staff, made it uncertain whether these measures would be sufficient. This uncertainty increased tension and affected morale, and despite all the sacrifices made, no one could see any light at the end of the tunnel.

The presence of the variant was not confirmed until gene sequencing was completed 10 days after the outbreak. But even before that, our NCID colleagues had a high index of suspicion that we were dealing with a variant of concern based on detailed epidemiological investigations, and awareness of the local and global COVID-19 situation. So it was probably appropriate, in an abundance of caution, that the following additional measures were taken.

In light of this B1.617.2 variant, the MOH definition of COVID-19 close contact was changed to be more stringent. The previous definition used was less than 1 metre and more than 30 minutes. That was then changed to less than 2 metres and less than 15 minutes because of evidence that the variant was more transmissible.[7,8]

The duration of quarantine for this outbreak was also extended from 14 to 21 days for many TTSH staff as there were concerns regarding the longer duration of incubation, and infectivity during incubation for this variant strain. The extended quarantine period worsened the medical and nursing manpower situation on the ground, which was only partially alleviated by the diversion of patients away from TTSH over that same period of time. For the ENT department, our mid-tier staffing was decimated for a longer period than expected.

Acknowledging the enemy within, potential increased virulence of this new strain, coupled with the increased community prevalence, the ENT department made adjustments to our workflow. The following were the measures we instituted, the first few points being speciality-specific:

(1) Escalated our PPE for aerosolizing nasoendoscopy in clinic back to N95 and goggles, compared to surgical mask previously.[14]
(2) Temporary discontinuation of our usual practice of bringing inpatient Otolaryngology patients down to clinic for evaluation, to avoid mixing of inpatients and outpatients leading to cross contamination. In particular, we immediately ceased bringing inpatients down to the outpatient clinic to be scoped.
(3) Employed the use of disposable nasoendoscopes to mitigate risks of spread in COVID-19 positive patients, and in patients who were known contacts of COVID-19 patients. The use of these nasoendoscopes by our department meant that staff were better protected as this eliminated for a medical staff to manually clean a contaminated scope. In addition, the judicious use of portable video monitors that complimented the disposable scopes allowed the Otolaryngologist to maintain an obligatory safe distance from the high-risk delta variant patient.
(4) Our department also rapidly identified patients that were suitable for telemedicine consults and this was instituted with the creation of three department zoom accounts to allow teleconferencing consults for appropriate patients. These included patients with stable conditions like thyroid nodules, long term postoperative patients, chronic well-controlled conditions like tinnitus, giddiness and sinusitis.

(5) Over the course of the outbreak, segregated our teams into inpatient and outpatient teams, and further segregated our inpatient team into two teams (hot and cold), to prevent potential spread to the whole department.
(6) In line with hospital response, we also reduced outpatient care to essential visits, cancelled non-urgent electives, temporarily ceased the use of visiting specialists from outside our institution, and conversely, momentarily stopped sending our specialists to other PHIs.
(7) Instituted a temporary halt to the posting of medical students to our department.

Conclusion

Because of the above challenges, and the measures taken (Table 1), there were no new non-isolated or non-quarantined cases from our hospital cluster as of 1 May 2021, 3 days after the ward was locked down. At the point of writing, there were a total of 48 cases in our hospital cluster, of which ten were healthcare workers. One patient had passed on due to COVID-19–related complications in this cluster.[15] About 2 weeks after the start of the outbreak, the hospital completed six rounds of testing for all inpatients and two rounds of testing for all staff. The hospital resumed operations progressively from 18 May, about 3 weeks after the first reported case. With the rise in community cases in Singapore, TTSH and our ENT department having implemented these enhanced measures, will now be in a good position to continue our support to NCID in the fight against COVID-19.

With this publication, we hope to share the challenges faced by our department during Singapore's first COVID-19 hospital cluster. Challenges which differed from the previous year when the bulk of cases we dealt with were from workers' dormitories or imported. Some of the measures taken may be useful for consideration should another institution face similar issues in the future.

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Tan Jian Li and Lim Ming Yann was involved in the conception and design, drafting and revision of manuscript. Augustine Chai was involved in revision of manuscript, formatting of content and submission. Yeo Seng Beng was involved im revision of manuscript for intellectual content. All authors approved the final version of the manuscript.

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ORCID iD

Augustine Yui Ler Chai https://orcid.org/0000-0002-0358-3753

References

1. Ganti S, Shanker S and Pek JH. COVID-19 among foreign workers in dormitories—how one emergency department responded. *Ann Acad Med Singap* 2020; 49: 1034–1038.
2. Ngiam JN, Chew N, Tham SM, et al. Demographic shift in COVID-19 patients in Singapore from an aged, at-risk population to young migrant workers with reduced risk of severe disease. *Int J Infect Dis* 2021; 103: 329–335.
3. Chua AQ, Tan MMJ, Verma M, et al. Health system resilience in managing the COVID-19 pandemic: lessons from Singapore. *BMJ Glob Health* 2020; 5(9): e003317.
4. Ministry of Health. *Singapore. 3 new cases of locally transmitted covid-19 infection*, https://www.moh.gov.sg/news-highlights/details/3-new-cases-of-locally-transmitted-covid-19-infection-28apr2021-update (2021, accessed 18 May 2021).
5. Tan JL, Lim MY, Lee SYC, et al. Impact of COVID-19 on a tertiary otolaryngology practice in Singapore. *Ann Acad Med Singap* 2020; 49: 897–901.
6. Tan JL, Lim MY, Lee CSY, et al. Resuming otolaryngology services following a COVID-19 lockdown in Singapore. *Ann Acad Med Singap* 2021; 50: 99–102.
7. Lewis D. Mounting evidence suggests coronavirus is airborne—but health advice has not caught up. *Nature* 2020; 583: 510–513.
8. Morawska L and Milton DK. It is time to address airborne transmission of coronavirus disease 2019 (COVID-19). *Clin Infect Dis* 2020; 71: 2311–2313.
9. Vaidyanathan G. Coronavirus variants are spreading in India—what scientists know so far. *Nature* 2021; 593: 321–322.
10. European Centre for Disease Prevention and Control. *Stockholm. Emergence of SARS-CoV-2 B.1.617 Variants in India and Situation in the EU/EEA*. https://www.ecdc.europa.eu/en/publications-data/threat-assessment-emergence-sars-cov-2-b1617-variants (2021, accessed 18 May 2021).
11. Seto WH, Tsang D, Yung RW, et al. Effectiveness of precautions against droplets and contact in prevention of nosocomial transmission of severe acute respiratory syndrome (SARS). *Lancet* 2003; 361: 1519–1520.
12. Sun D. *Surge at A&Es as TTSH Limits Intake; Sengkang Wards Full*. https://www.straitstimes.com/singapore/sgh-and-skh-report-many-patients-at-ae-skh-wards-operating-at-full-capacity (2021, accessed 18 May 2021).
13. Chew NWS, Lee GKH, Tan BYQ, et al. A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak. *Brain Behav Immun* 2020; 88: 559–565.
14. Tan JL, Tay VS, Li H, et al. Otolaryngology surgery in time of COVID-19—what PPE to use when? *Ann Acad Med Singap* 2020; 49: 387–392.
15. Abu Baker J. *A Timeline of the Tan Tock Seng Hospital COVID-19 Cluster*. https://www.channelnewsasia.com/news/singapore/timeline-tan-tock-seng-hospital-covid-19-cluster-moh-14741614 (2021, accessed 18 May 2021).