

## Rostered Routine Testing: A Necessary Evil?

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We report our institution's experience of detecting a staff member who was infected with severe acute respiratory syndrome coronavirus 2 while he was asymptomatic, as part of a rostered routine testing program, and how the institution was able to undertake measures to curb the spread, hence reducing the impact on the daily operations of our institution.

**Keywords.** healthcare personnel; rostered routine testing; surveillance.

Rostered routine testing (RRT) is a surveillance testing program for identified groups who are more vulnerable or have higher risk of exposure to coronavirus disease 2019 (COVID-19). Active surveillance allows the early identification and isolation of individuals infected with severe acute respiratory coronavirus virus 2 (SARS-CoV-2), prompt tracing and quarantining close contacts, and prevention of further transmission. Simulation studies suggest that RRT for asymptomatic healthcare personnel (HCP) amid ongoing community transmission can substantially reduce the risk of COVID-19 outbreaks in hospitals [1].

Based on the real-world experience, it has been reported that in the situations in which there is a low prevalence of SARS-CoV-2 in asymptomatic HCP (0.1%–0.4%), coupled with good infection prevention and control practices, a universal mask policy, and a comprehensive staff sickness surveillance system, the benefits of RRT for asymptomatic HCP in hospitals remain questionable [2–8]. However, with the emergence of more highly transmissible SARS-CoV-2 variant strains and institutional outbreaks caused by them [9], Singapore's Ministry of

Health has implemented RRT for HCP working in acute-care hospitals.

Our institution is a 1000-bed tertiary, public hospital with a mixture of single occupancy rooms and open multibed cubicles. The surveillance testing in our institution involves scheduled repeat nasopharyngeal swab for polymerase chain reaction testing every 14 days for all staff with patient contact. Such swabs cause significant discomfort and requires close contact by trained personnel, massive laboratory testing capacity, a large supply of test kits, and personal protective equipment (PPE).

In this study, we report our institution's experience of managing a cluster of COVID-19 cases among our staff members, wherein the index case was determined from the ongoing RRT exercise while he was asymptomatic.

### METHODS

On June 23, 2021, a staff member working as a porter in Changi General Hospital was discovered to be infected with COVID-19. This was picked up on the surveillance swab. The staff member was asymptomatic at that point, and he had a negative surveillance swab 2 weeks prior on June 8, 2021. The staff member works on regular night shifts from Thursdays to Mondays, and he was last at work on June 22, 2021. His duties involve escorting patients in the hospital, and his work is not limited to any area within the hospital. He wears an N95 mask for his regular duties. On occasions when he is tasked to convey a deceased patient to the mortuary, he wears an N95 mask, face shield, gown, and gloves. He is trained to don and doff the appropriate PPE, and he adheres to the PPE recommendations at work. He completed his vaccination with the Pfizer-BioNTech vaccine on February 4, 2021.

Contact tracing was conducted promptly; 2 of his close contacts were diagnosed with COVID-19 on targeted swabbing by the next day. The contact tracing efforts were also aided by the TraceTogether digital system, which managed to place 2 of the cases in close proximity for a period of 30 minutes, even though the 2 staff members did not recall any interaction with each other. Eventually, a total of 7 staff members (6 porters and 1 healthcare attendant) were determined to be part of this cluster. It is postulated that the staff members may have socialized while dining during their break time, where masks were not worn. The staff belonging to this cluster had received at least 1 dose of Pfizer-BioNTech vaccine. Five of seven were fully vaccinated, and the median number of days between the diagnosis of COVID-19 and completion of the vaccination regimen was 77 days. All staff in the cluster were either asymptomatic or had mild symptoms.

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With the detection of this cluster, 17 other uninfected porters who were on permanent night shift were identified as close contacts, and they received a quarantine order. This group of staff shared an overlapping roster, and they often had common break times. Focused enhanced surveillance swabs were coordinated across all staff groups, with tailored regimens for staff assessed at different risk categories. All porters and housekeeping staff, who shared the same administrative and rest areas, had a total of 3 nasopharyngeal swabs done over a period of 2 weeks, as well as pre-shift antigen rapid testing. After contact tracing efforts, 20 more staff were placed on quarantine, and 99 others placed on phone surveillance. Sixty-six patients that were in contact with the infected cases of the cluster were placed under quarantine. The group of quarantined patients were swabbed regularly during their quarantine period. Figure 1 shows the epidemic curve of the cluster of staff members and the family members. The household attack rates varied from 14% to 100%.

Patients under quarantine that required inpatient care were stratified based on the time of contact with the infected staff. Those with high-risk contact were placed in single isolation rooms, whereas low-risk contacts were placed in cohort isolation wards. High-risk contacts were defined as those patients with prolonged contact of more than 15 minutes. The low-risk contacts were the patients that only had transient contact with the porters.

In the midst of the action, there was another staff member working as a nurse who was found to be infected. She was asymptomatic then. Extensive in-house contact tracing efforts did not establish any clear links with the cluster of infected staff, and hence she was classified as an unlinked case.

The ward where the nurse was stationed at was locked down, where no new admissions were allowed, and patients exposed during the infectious period who were fit for discharge from hospitals were sent to a quarantine facility. There were no

visitors allowed in the ward. Besides that, there was a step up in the recommended PPE to be used in the ward, to consist of an N95 mask, eye protection, gown, and gloves. Contact tracing was done, and it involved staff members, patients, as well as visitors to the wards, eventually leading to 89 individuals being issued a quarantine order and 133 individuals being placed on phone surveillance. High-risk contacts of the nurse were defined as (1) the patients that she provided direct care and (2) the staff that she had mask-down interactions with, for more than 15 minutes, and were less than 2 meters away. The low-risk contacts for the nurse were the other patients in the ward, and the staff that were working in the ward. None of the identified contacts of the nurse were diagnosed to have COVID-19.

Just like the staff members and patients identified to be at risk from the cluster of cases, the staff members and patients were being swabbed at regular intervals to enable early identification of any further cases. The patients requiring quarantine, as well as ongoing hospital care were transferred to the isolation wards after risk stratification, where the high risk contacts went to single isolation rooms, and low risk contacts to cohort isolation wards.

## RESULTS

As a result of the 8 cases among our staff, 3 wards had to be converted to isolation wards to house patients under quarantine, who still require ongoing medical care. Those that were admitted to single isolation rooms had a polymerase chain reaction (PCR) done on days 1, 4, 7, and 14 counting from the day of last exposure. The patients in the cohort isolation ward had PCRs done on days 1, 4, 7, 10, and 14 from the date of last exposure as well as antigen testing on days 2, 3, 5, and 6.

With this spate of cases, the hospital swung into action, with support from the Ministry of Health, to perform proactive

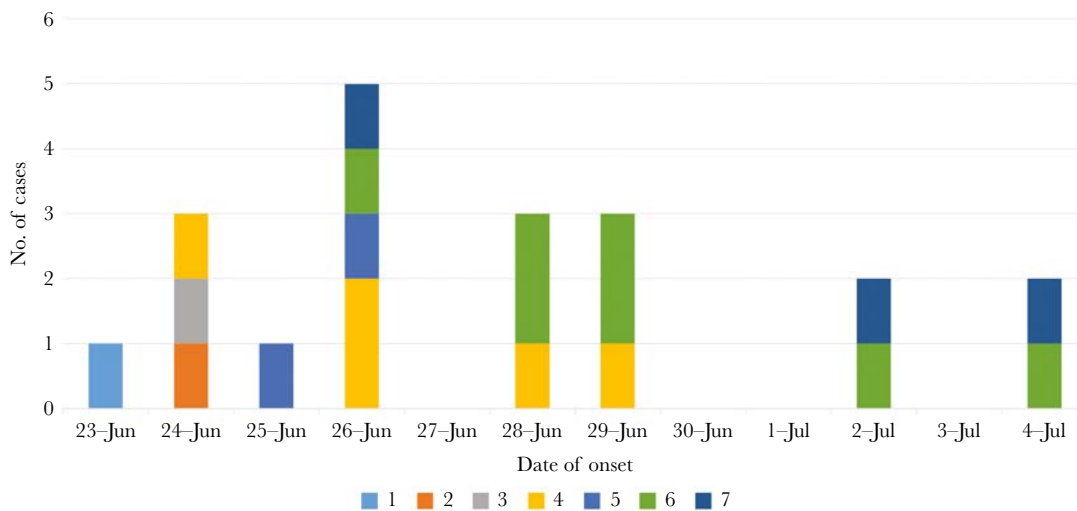


Figure 1. Epidemic curve of cases linked to the cluster. The numbers indicate the individual staff members and their infected household members.

swabbing, and personnel reviewed existing protocols governing conduct of high-risk activities, to limit the impact of the cluster of cases on the hospital, staff, and, more importantly, the patients. The hospital management also took the opportunity to reiterate the importance of adhering to safe management measures, especially during meal times, and also took measures to maintain the adherence after hours, by performing evening and night time walkabout and audits.

The overall strategy in surveillance swab testing lies in expanding the concentric circles of staff groups based on their degree of contact. This strategy enabled the swift testing of the close contacts in the innermost circle and then gradually expanding to the outer circles. The entire staff body of approximately 9000 with or without known exposure to this cluster was swabbed within 1 week. The broad concept of the hospital-wide surveillance in response to the cluster of infected staff are illustrated in Figure 2.

Subsequent surveillance swabs from the staff members and patients that were still admitted in hospital were all negative. The number of cases linked to the porters' cluster is 20, whereas the remaining 13 cases were community contacts of the infected staff. The nurse did not result in any transmission among her contacts.

## DISCUSSION

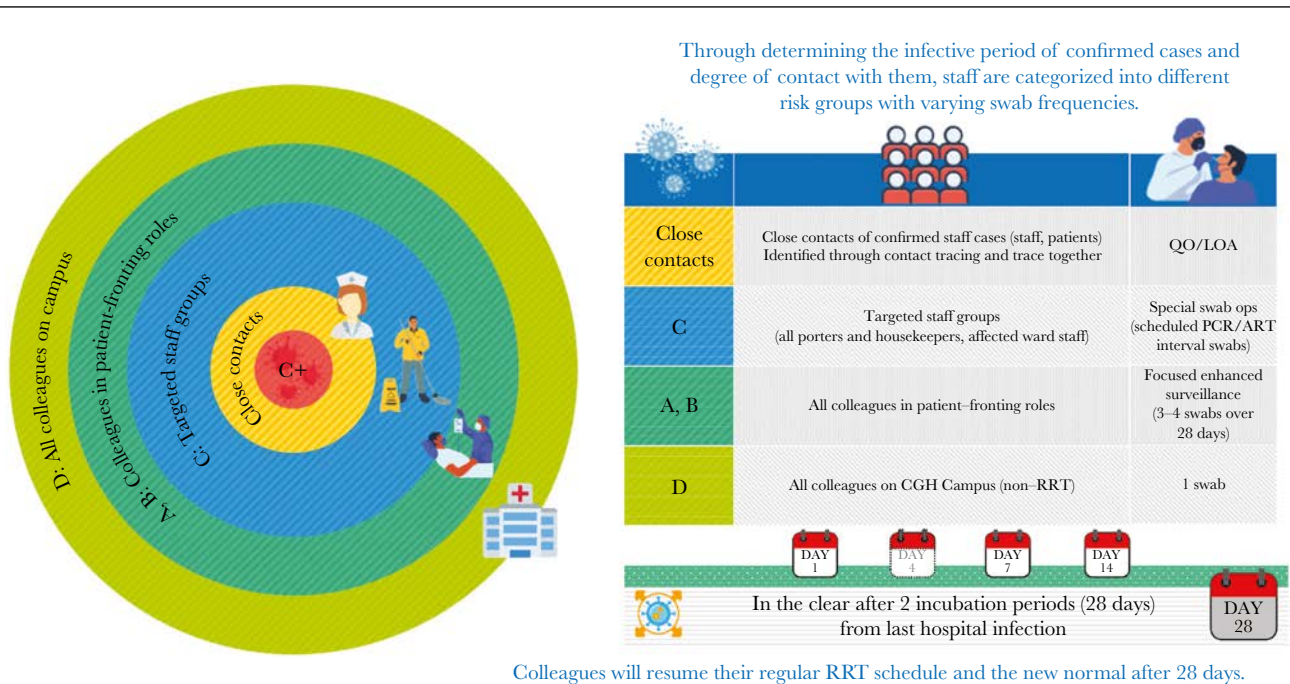
The porter who was found to be infected with COVID-19 on RRT eventually developed a fever 2 days after the day of the swab, so did the nurse who was also found to be infected after the RRT, and she also developed symptoms 2 days after her

swab. In this situation, we did benefit from the regular screening of asymptomatic healthcare workers, as outlined by Black et al [10]. In our case, the cluster would have grown to a bigger size because some of the infected staff were asymptomatic or they were working during the presymptomatic phase. We hypothesize that the delay could have triggered a wider cluster of cases, as well as resulted in a larger group of healthcare workers to be quarantined, due to the inadvertent contact with the infected staff and the number of patients who would have come into contact with the infected staff.

This had a significant impact on the hospital's operations and its ability to deliver care to patients admitted for both COVID-19 and non-COVID 19 medical conditions. Considering that the delta variant seems to be approximately 60% more transmissible than the already highly infectious alpha variant [11], with reduced vaccine effectiveness, one can imagine the potential repercussions despite having a fairly high level of vaccine coverage among the hospital staff. The cluster could have spread to a wide population of staff and patients.

Phylogenetic analysis eventually showed that the 7 staff members (6 porters, 1 healthcare attendant) as well as the node were infected with the delta variant belonging to the same node. This suggests that all 8 cases were linked.

Even as we acknowledge that the institution has experienced the benefit of RRT, we recognize the magnitude of efforts and resources required. Staff were drawn away from their regular duties to sustain the operations. Our staff have provided feedback that undergoing a nasopharyngeal swab was uncomfortable and sometimes painful, and a significant number of staff



**Figure 2.** Broad concept plan for hospital wide surveillance carried out in response to the cluster of staff cases.

have reported prolonged discomfort after undergoing the nasopharyngeal swabs. We feel that RRT should be continued but with a less invasive mode of testing.

## CONCLUSIONS

Testing asymptomatic HCP without known or suspected exposure to SARS-CoV-2 is most valuable when it is repeated frequently, especially if a test with lower sensitivity is used. In facilities with limited resources, it would be challenging to sustain this exercise. This process might also cause an increased demand for confirmatory testing because false positives will occur, particularly when testing people who are less likely to be infected, such as HCP with no known exposure [12].

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