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Rostered routine testing for healthcare workers and universal inpatient screening: the role of expanded hospital surveillance during an outbreak of COVID-19 in the surrounding community

Authors:
Liang En, Wee;¹ Edwin Philip Conceicao;² May Kyawt Aung;² Aung Myat Oo;² Yang Yong;² Indumathi Venkatachalam;¹,² Jean Xiang-Ying Sim¹,²

Affiliations
¹Department of Infectious Diseases, Singapore General Hospital, Singapore
²Department of Infection Prevention and Epidemiology, Singapore General Hospital, Singapore

Corresponding Author: Dr Wee Liang En Ian, SingHealth Infectious Diseases Residency, Singapore, Email: ian.wee@mohh.com.sg, Telephone Number: +65 96777651, ORCID: 0001-6428-9999

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To the Editor,

We read with interest the article by Chow et al. describing the outcomes of rostered-routine-testing (RRT) of healthcare workers (HCWs) in a tertiary hospital with robust infection-prevention measures during an ongoing hospital outbreak of coronavirus disease 2019 (COVID-19) infections.\(^1\) Despite the presence of a large hospital cluster, extensive RRT of asymptomatic HCWs did not detect covert infection.\(^1\) Given the low risk of healthcare-associated transmission on the background of robust infection-prevention, and low incidence of asymptomatic SARS-CoV-2 infection amongst HCWs,\(^2\) routine surveillance of asymptomatic HCWs is not recommended as a primary infection prevention strategy.\(^3\) Similarly, the value of systematic screening of all asymptomatic inpatients for SARS-CoV-2 has been questioned, given low detection rates.\(^4\) However, there may still be potential for spillover of infections into the healthcare system during ongoing community outbreaks of COVID-19. We describe our institution’s experience with RRT of HCWs and systematic screening of all inpatients for SARS-CoV-2 during a large COVID-19 outbreak in the immediately adjacent community.

In Singapore, a Southeast Asian city-state, healthcare-associated transmission of COVID-19 was initially limited due to comprehensive infection-prevention measures instituted early in the pandemic.\(^5\)\(^-\)\(^7\) At our institution, the largest hospital campus in Singapore, with close to 13,000 HCWs, to-date COVID-19 rates amongst HCWs have been kept low (0.13%, 17/13066) and have reflected community acquisition rather than nosocomial spread.\(^8\) Over a 6-month period from Jan-Jun 2020, while \(\geq 1500\) cases of COVID-19 were managed in our institution, <5% of cases were initially detected outside of the isolation ward, mitigating potential nosocomial transmission.\(^8\)\(^,\)\(^9\) However, with the emergence of more highly transmissible variant strains, a large hospital cluster attributed to the B.1.617.2 variant strain was reported in end-April 2021; providing the impetus for Singapore’s Ministry of Health to institute RRT for all HCWs in acute-care hospitals.\(^1\) Previously, SARS-CoV-2 testing was made available at our institution’s staff clinic to all symptomatic HCWs and high risk asymptomatic healthcare contacts. RRT via polymerase-chain-reaction (PCR) testing of respiratory samples was conducted fortnightly for vaccinated staff and weekly for non-vaccinated staff. No additional covert infections were detected at our institution during the first round of RRT; COVID-19 vaccination uptake at our institution was high, with 89.6% of staff having received 2 doses by end-April 2021.
On 10th June 2021, an epidemiologically unlinked case of COVID-19 infection at a wet market <1km from our hospital campus was first detected via community-based surveillance. This turned out to be the index case of a large community cluster linked to ongoing transmission in the Bukit Merah housing estate, surrounding our hospital campus. Over a 6-week period from 10th June 2021-23rd July 2021, a total of 132 cases in 5 community clusters were detected from community surveillance conducted in the Bukit Merah housing estate (Figure 1a,1b). Given the close proximity of this community outbreak to our hospital campus, spillover of undetected infection was an immediate concern. A significant proportion of staff (10.3%, 1350/13066) stayed within a 1.5km radius of the cluster epicenter (Figure 1a) and the community clusters fell within our hospital’s catchment area, meaning that patients in these neighborhoods with heightened community transmission would be conveyed to our hospital if they required acute medical care. In addition to staff RRT, from 19th June 2021 onwards, universal screening of all inpatients was instituted, with patients tested for SARS-CoV-2 via PCR testing of respiratory samples, on admission and every 7 days subsequently.

During the 6-week outbreak period, a total of 7 HCWs and 20 inpatients at our institution tested positive for COVID-19. The majority (51.8%, 14/27) were linked epidemiologically to the Bukit Merah community clusters, and attributed to the B.1.617.2 variant. The majority of cases identified on hospital surveillance (4/7 HCWs, 11/20 inpatients) stayed within 1.5km of the cluster epicenter; 4/7 (57%) of HCWs and 5/20 (25%) of inpatient cases were asymptomatic at time of diagnosis. Contact tracing for the HCW cases (N=7) identified 37 additional staff as having significant unprotected contact requiring quarantine; none tested positive subsequently. In comparison, prior to RRT, 14 cases of COVID-19 were detected amongst HCWs at our institution over a 4-month period (Jan-Apr 2020); a total of 76 staff were identified as having significant unprotected contact, with a COVID-19 cluster subsequently detected in HCWs sharing a common office space. Before institution of universal patient surveillance, patients detected outside of the isolation ward over a six-month period (Jan-Jun 2020) spent an average of 16.5 hours (N=32, S.D=9.76) in the general ward prior to isolation, with 68 inpatient close-contacts identified; one inpatient close-contact subsequently tested positive within the incubation period. During the universal surveillance period, asymptomatic inpatients spent an average of 2 hours (N=5, S.D=1.87) prior
to isolation, a difference that was statistically significant (-14.6, 95%CI=-23.5 to -5.6, p=0.002). A total of 26 inpatient close-contacts were identified and placed under quarantine; none tested positive.

In conclusion, institution of RRT for all HCWs as well as universal screening for COVID-19 in all inpatients during a 6-week period of increased transmission in the surrounding community detected additional asymptomatic cases amongst HCWs and inpatients. While the yield of testing was not high, earlier detection of asymptomatic inpatient cases allowed for faster isolation, limiting potential exposure. No clusters of COVID-19 infections were seeded amongst staff or patients during a period of heightened risk. Although RRT and universal screening for all inpatients is resource-intensive (Figure 1c), there may be a role for such measures during increased community transmission, given that healthcare institutions are inextricably intertwined with their neighboring communities.

Conflict of interest

The authors report no conflicts of interest.
References


Figure 1a: Map of community clusters in proximity to the hospital campus of a large Singaporean tertiary hospital

N= no. of COVID-19 cases detected
Figure 1b: Timeline of COVID-19 outbreak in neighbouring community, and detection of COVID-19 cases amongst staff and patients through hospital surveillance
Figure 1c: Volume of SARS-CoV-2 testing (PCR) for staff and patients at a large Singaporean tertiary hospital

Mean no. of daily samples tested for SARS-CoV2 on staff surveillance post-RRT vs. pre-RRT:
1107.1 samples/day (S.D=724.0) vs. 46.7 samples/day (S.D=74.8), difference=1060.4, 95%CI=933.8-1187.05, p<0.001

Mean no. of daily samples tested for SARS-CoV2 on inpatient surveillance post-universal surveillance vs. pre-universal surveillance:
429.2 samples/day (S.D=161.2) vs. 191.8 samples/day(S.D=133.1), difference=237.5, 95%CI=186.8-288.1, p<0.001