Infection Control & Hospital Epidemiology (2024), **45**, 377–379
doi:10.1017/ice.2023.230

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Concise Communication

Initial and 5-day positivity rate of severe acute respiratory coronavirus virus 2 (SARS-CoV-2) polymerase chain reaction (PCR) in exposed inpatients within shared rooms during the omicron-variant dominant period

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Abstract

In this observational study conducted in 2022, 12.3% of patients who shared a room with a patient positive for severe acute respiratory coronavirus virus 2 (SARS-CoV-2) also had a positive polymerase chain reaction (PCR) test, either at initial screening or during a 5-day quarantine. Therefore, screening and quarantine are still necessary within hospitals for close-contact inpatients during the SARS-CoV-2 omicron-variant dominant period.

(Received 23 June 2023; accepted 16 September 2023; electronically published 23 October 2023)

The highly contagious severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was first identified in December 2019, and it has since caused the coronavirus disease 2019 (COVID-19) pandemic.[1] Because SARS-CoV-2 can be transmitted even in the absence of symptoms, it can be difficult to prevent its transmission within healthcare facilities.[2] In an effort to prevent nosocomial spread, extensive contact tracing, testing, and quarantine of exposed patients, caregivers, and visitors have been performed when an inpatient has been confirmed to have COVID-19. However, these measures have been gradually lifted with the emergence of the SARS-CoV-2 omicron variant, due to its high infectivity and relatively low mortality. The mean incubation period of SARS-CoV-2 is 6.57 days, but the omicron variant has a comparatively shorter incubation period of 3.42 days.[3] In South Korea, after a massive omicron-dominant community outbreak, monitoring and quarantine of close contacts are no longer mandated in the community setting.[4] However, concerns remain regarding the discontinuation of monitoring and quarantine within hospitals. We investigated the positivity rates of SARS-CoV-2 polymerase chain reaction (PCR) at initial screening and during a 5-day follow-up among exposed inpatients in shared hospital rooms. We sought to determine whether initial screening tests and quarantine are still necessary for in-hospital close contact patients in the omicron-dominant period.

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Cite this article: Park S, Lee SH, Jung HJ, *et al.* Initial and 5-day positivity rate of severe acute respiratory coronavirus virus 2 (SARS-CoV-2) polymerase chain reaction (PCR) in exposed inpatients within shared rooms during the omicron-variant dominant period. *Infect Control Hosp Epidemiol* 2024. 45: 377–379, doi: 10.1017/ice.2023.230

Methods

This retrospective, observational study was performed at a tertiary-care hospital in South Korea, comprising mostly multibed rooms with 4–5 beds each. After universal screening at admission, we performed additional testing when patients developed new symptoms, had COVID-19 exposure, or were scheduled to undergo general anesthesia within 48 hours. When a patient was diagnosed with COVID-19, testing and tracing were performed for patients hospitalized in the same room, and the exposed patients were quarantined for 5 days after the last exposure. Real-time reverse-transcriptase PCR (RT-PCR) was performed on days 1 and 4 of quarantine using a PowerChekTM 2019-nCoV Real-time PCR Kit (Kogenebiotech, Seoul, Korea) or an Allplex 2019-nCoV assay (Seegene, Seoul, Korea). If relevant symptoms developed during quarantine, testing was promptly performed, regardless of the established schedule. If a secondary attack occurred during cohort quarantine, testing and quarantine dates were reset from that time.

We used SPSS version 27.0 software (IBM, Armonk, NY) for statistical analyses. We used a χ^2 test of linear-by-linear association to assess the trends in infection rates over time (in months). This study was approved by the Institutional Review Board (IRB) of Soonchunhyang University Bucheon Hospital (IRB No. 2023-01-002). The need for informed consent was waived by the IRB because no intervention was involved and no identifiable information was included.

Table 1. The Rate of Positive SARS-CoV-2 PCR Tests in Exposed In-Hospital Patients at Initial Screening and During 5-Day Quarantine

Variable	Total	Period						*P* Value
		Jun 15–Jul 2022	Aug 2022	Sep 2022	Oct 2022	Nov 2022	Dec 1–29 2022	
No. of events	179	12	54	6	26	33	48	
No. of exposed inpatients	705	50	216	36	103	103	120	
Patients with a positive test at initial screening, no. (%)	56 (7.9)	2 (4.0)	28 (13.0)	0	8 (7.8)	6 (5.0)	12 (6.7)	.095
Patients with positive conversion during quarantine, no. (%)	31 (4.8)	1 (2.1)	10 (5.3)	0	4 (4.2)	11 (9.6)	5 (3.0)	.104

Note. SARS-CoV-2, severe acute respiratory syndrome coronavirus 2; PCR, polymerase chain reaction.

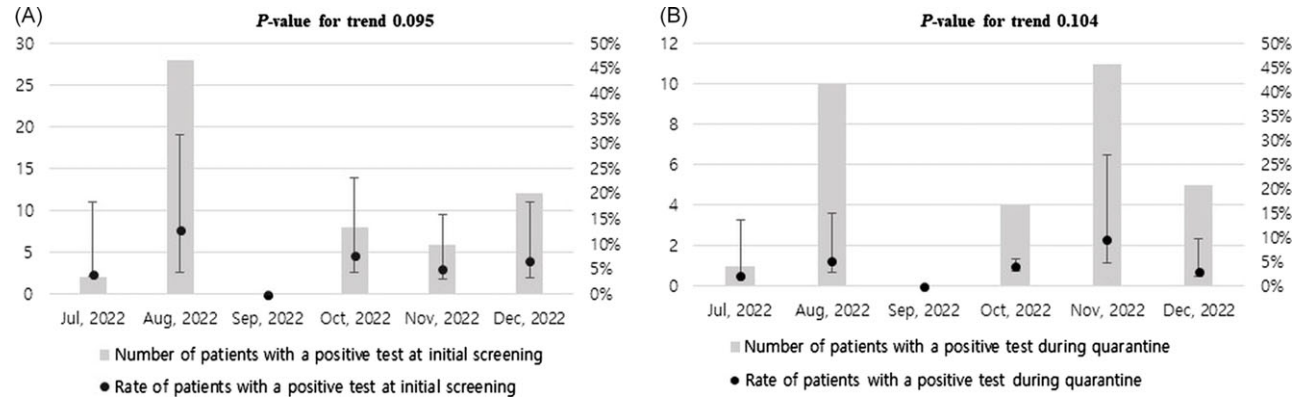

Figure 1. The number and rate of positive SARS-CoV-2 PCR tests in exposed in-hospital patients at initial screening and during a 5-day quarantine period. The number and rate of positive SARS-CoV-2 PCR tests in exposed in-hospital patients at initial screening (A) and during a 5-day quarantine (B) for each month.

Results

Between June 15, 2022, and December 29, 2022, there were 179 COVID-19 cases within the hospital. However, 18 exposed patients were excluded from this study because they were discharged during quarantine, and 705 patients were included in the final analysis. The median number of days from admission to positive SARS-CoV-2 PCR in the index patients was 9 days (interquartile range [IQR], 4–17). The median number of exposed inpatients for each event was 4 patients (IQR, 2–5 patients). Overall, 56 exposed patients (7.9%; 95% confidence interval [95% CI], 6.0%–10.3%) had positive initial screening tests (Table 1). Among those with an initially negative test, positive conversion was identified in 31 patients (4.8%; 95% CI, 3.2%–6.8%) during quarantine. In correlation with the number of confirmed COVID-19 cases in South Korea at that time,[5] the number of in-hospital events and exposed patients peaked in August 2022. However, positive test rates at initial testing or during quarantine did not differ significantly according to the month ($P = 0.095$ and $P = 0.104$, respectively) (Fig. 1).

Discussion

In our study, 12.3% of exposed patients within shared rooms had a positive PCR test, either at initial screening or during quarantine. Previous studies on nosocomial transmission of SARS-CoV-2 have shown variable attack rates, from no transmission to as high as 64% in a nursing home in the United States.[2] In a study performed between July 2020 and May 2021, the secondary attack rate in shared patient rooms was similar to that of household exposures, at 21.6%, with the median time to positive conversion of 5 days.[6] Another study undertaken between September 2020 and April 2021 showed that 12 (39%) of 31 exposed roommates tested positive for SARS-CoV-2 within 14 days.[7] The secondary infection rate in cancer patients within semiprivate rooms was 18.9% in a study conducted from March 2020 to February 2021.[8] Transmission rates may have differed from this study due to changes in the dominant variant and community prevalence of COVID-19 as well as discrepancies between hospitals concerning infection control measures and personal protective equipment protocols. Additionally, vaccination began in February 2021, and 96.5% of people aged >18 years in South Korea had received at least 2 doses of the COVID-19 vaccine by June 2022.[9] The significant increase in immunity due to vaccination and previous infection may also have contributed to the relatively low transmission rate compared to earlier studies. Notably, significant transmission occurred in our study despite patient beds being closed off with curtains and face masks being mandatory in open areas, suggesting airborne transmission via droplets.

This study had several limitations. Index patient identification and symptom investigation were challenging. Because we were not able to perform precise epidemiological investigations due to lack of manpower, the first patient in each room to be diagnosed was presumed to be the "index patient," although it is possible that one of the patients identified as an "exposed patient" may have been the actual index patient. Because surveillance testing was only performed until day 4, a significant number of patients who developed infections after this time may have gone undetected; thus, the transmission rate may have been underestimated. However, because previous studies were mostly performed during earlier stages of the pandemic, this study has yielded valuable data on the nosocomial transmission risk of SARS-CoV-2 during the current omicron-variant dominant phase.

https://doi.org/10.1017/ice.2023.230 Published online by Cambridge University Press

In conclusion, our findings suggest that screening and quarantine are still necessary for close-contact inpatients in the omicron period. Testing intervals and the duration of quarantine may need adjustment considering the current shortage of isolation rooms, testing capacity, and healthcare personnel.

Acknowledgments.

Financial support. This work was supported by the Soonchunhyang University Research Fund.

Competing interests. All authors report no conflicts of interest relevant to this article.

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