

Analysis of the time from exposure to the diagnosis of Omicron infection to establish the ideal duration of quarantine for traced contacts

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Abstract

The Omicron variant was designated as a variant of concern (VOC) by World Health Organization (WHO) on November 27, 2021. Immediately, the Republic of Korea (ROK) began monitoring the incidence of infections caused by the Omicron variant around the world, as well as the importation and incidence of the variant in the ROK. In the ROK, the first Omicron case was confirmed in Incheon at the end of November. It spread to the community through the patient's acquaintances, family, and church. There was also a patient arrived in Honam with confirmed disease who spread the virus throughout the community through the daycare center in Jeonbuk, the daycare center in Jeonnam, and family gatherings. The authorities promptly began contact tracing in response. The government established an "Emerging variant response taskforce" to facilitate countermeasures. Such act was conducted in other to prevent the importation of the Omicron variant and community spread in the country.

Fifty-six patients, including family members, acquaintances, and church members, were traced to the index imported case in Incheon on November 24, 2021. Fifty-one patients contracted the virus from the Honam arrival, through the daycare center in Jeonbuk, the daycare center in Jeonnam, and family gatherings. The date of final exposure has been confirmed and analyzed. General characteristics of patients were analyzed, and the time from final exposure to a close contact diagnosis with the infection were calculated.

The mean time from final exposure to diagnosis was 3.7 days, with a median of 3 days and a quartile range of 2-5 days. Among 107 subjects, 50% were definitively diagnosed 3 days after final exposure, and 70% were confirmed as being infected by day 5. The current mandatory quarantine period is of 14 days. The analysis shows that 106 (99.1%) cases could have been identified even within a 10-day quarantine.

These results present scientific evidence to alter the current duration of quarantine (surveillance) for contacts exposed to the Omicron variant. The findings may be supportive in updating guidelines and devising policies for preventing the spread of the Omicron variant.

Keywords: Coronavirus disease-19 (COVID-19), Omicron variant

Introduction

The Omicron variant of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was first detected in South Africa on November 9, 2021. It was designated as a variant of concern (VOC) by World Health Organization (WHO) on November 27, 2021. Accordingly, the Republic of Korea (ROK) began monitoring its global incidence, as well as its importation and incidence in the country [1]. In the ROK, three of the Omicron-suspected cases were tested with whole-genome sequencing (WGS). All three cases were confirmed as Omicron infections on November 30, 2021. Omicron variant testing of all arrivals into the country led to the diagnosis of two additional cases on December 1, 2021. The government promptly began contact tracing and established an “Emerging variant response taskforce” to prevent the importation of the Omicron variant and its spread throughout the country [2].

In the ROK, a massive outbreak of the Omicron variant was sparked by an individual who arrived on November 24 to Incheon; spread occurred through the patient’s acquaintances, family, and church. Additionally, an individual who arrived in Honam on December 25 spread the Omicron variant through the daycare center in Jeonbuk, the daycare center in Jeonnam, and family gatherings. Since then, community-acquired cases have been sporadically confirmed. Epidemiological surveys have been conducted promptly to trace contacts and prevent transmission. Since December 2, 2021, Omicron-infected individuals have been mandated to isolate for 14 days regardless of their vaccination status per stricter governmental measures for the control of the Omicron VOC. The close contacts were also subjected to quarantine and diagnostic testing on day 1, 9, and 13, regardless of the presence or absence of symptoms [3].

We aimed to analyze the follow-up results of the contacts

of patients confirmed with Omicron infection to garner clearer evidence pertaining to the Omicron variant and alter the duration of quarantine (surveillance) as necessary for those in contact with positive patients.

Methods

1) Subjects

We analyzed 56 patients (family, acquaintance, church member) confirmed with Omicron infection in relation to Incheon-related imported case on November 24, 2021, and 51 confirmed patients (from the daycare center in Jeonbuk, the daycare center in Jeonnam, and family gatherings) linked to the Honam-related imported case on November 25, 2021, whose date of final exposure to the virus was known.

Results

1) General characteristics

Among 107 subjects, 56 (52.3%) were female and 51 (47.7%) were male. The country of nationality was ROK (n=54, 50.5%) or a foreign country (n=53, 49.5%), including Russia (n=21), Uzbekistan (n=16), Kazakhstan (n=10), Kyrgyzstan (n=5), and China (n=1). The predominant age group was 20–59 years (n=64, 59.8%), followed by < 20 years (n=37, 34.6%) and ≥ 60 years (n=6, 5.6%). All patients had mild symptoms, and there were no severe cases or deaths. The region in which the cases were reported was mostly Incheon (n=46, 43.0%), followed by Jeonbuk (n=30, 28.0%) and Jeonnam (n=19, 17.8%). With the exception of one individual whose vaccination history could not be determined due to an inaccurate resident registration number, 58 out of

106 (54.7%) were unvaccinated, while 42 (39.6%) were fully vaccinated with second doses. Six (5.7%) completed the first dose of vaccine, and none of the subjects had a third dose (Table 1).

2) The time from close contact exposure to diagnosis

The time from final exposure to a close contact to diagnosis was calculated for 56 patients related to Incheon case and 51 patients related to Honam case (29 from a daycare center in Jeonbuk, 6 from family gatherings, and 16 from a daycare center in Jeonnam).

The mean time from final exposure to diagnosis was 3.7 days, with a median of 3 days and a quartile range of 2–5 days.

The epidemic curve from final exposure to the date of diagnosis showed that 50% were diagnosed by day 3 and 70% by day 5 (Figure 1). One patient (unvaccinated child) was diagnosed by day 14. The child tested negative on day 7 of quarantine and, subsequently, tested positive on day 13 of quarantine.

Among individuals under the age of 20 years, 50% were diagnosed by day 3, and 70% by day 5. Among individuals aged 20 years and over, 50% were diagnosed by day 3, and 70% by day 4 (Figure 2). Regarding vaccination status, 50% were

Table 1. General characteristics and the time from exposure to diagnosis among contacts of Omicron-infected patients

Characteristics	Number of patients (%)	The time from exposure to diagnosis (day)			
		Average	SD	Median	Quartile range
	107 (100.0)	3.7	2.6	3	2–5
Sex					
Male	51 (47.7)	4.0	2.8	3	2–5
Female	56 (52.3)	3.5	2.5	3	1.25–5
Nationality					
Korean	54 (50.5)	3.1	2.4	3	1–5
Foreigner	53 (49.5)	4.4	2.8	4	2–6
Age					
<20	37 (34.6)	4.4	3.0	4	3–6
20–59	64 (59.8)	3.3	2.5	3	1–5
≥60	6 (5.6)	3.7	2.0	4	1.75–5.25
Region					
Seoul	10 (9.3)	3.4	1.8	3	2–5
Incheon	46 (43.0)	4.5	2.9	4	2–6
Gyeonggi	2 (1.9)	4.0	2.8	4	–
Jeonbuk	30 (28.0)	2.9	3.0	1.5	0–5.25
Jeonnam	19 (17.8)	3.4	1.2	3	3–3
Symptoms at diagnosis					
Symptomatic	85 (79.4)	3.3	2.1	3	2–5
Asymptomatic	22 (20.6)	5.2	3.8	5	2–9
Vaccination^a					
Unvaccinated	58 (54.7)	4.0	2.7	3	2–5
Vaccinated with first doses	6 (5.7)	3.0	2.1	2.5	1–5.25
Fully vaccinated with second doses	42 (39.6)	3.4	2.7	3	1–5

^a Excluding one individual who can not identify vaccination history

diagnosed by day 3, and 70% by day 5 in both the unvaccinated and fully vaccinated groups (Figure 3).

Among symptomatic individuals, 50% were diagnosed

by day 3, and 70% by day 5. In contrast, among asymptomatic individuals, 50% were diagnosed by day 5, and 70% by day 8 (Figure 4).

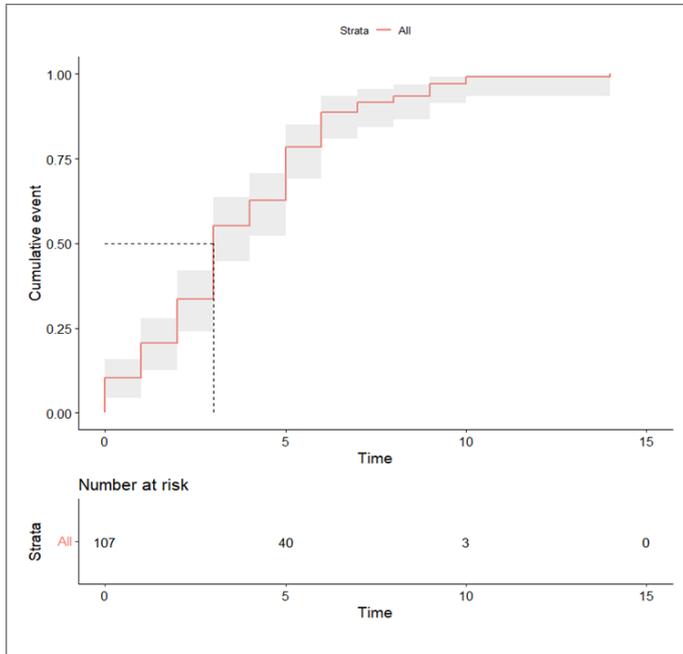


Figure 1. Epidemic curve from final exposure to the date of diagnosis

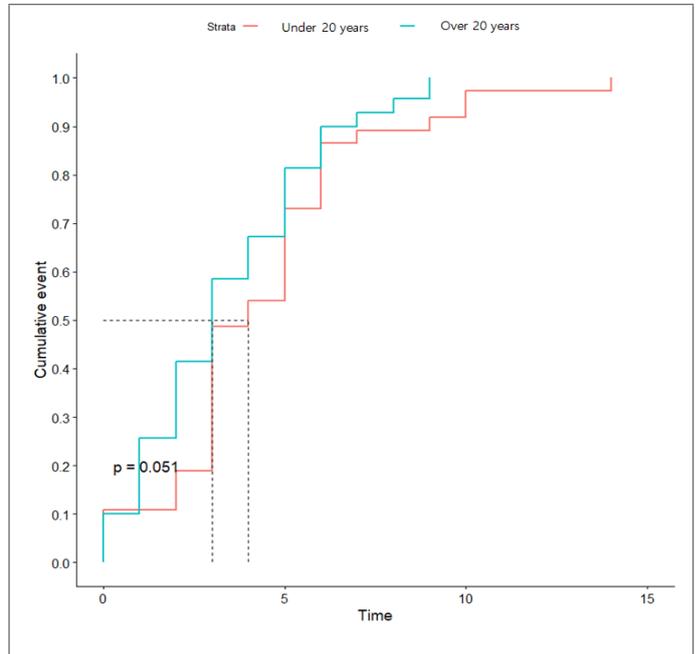


Figure 2. Epidemic curve from final exposure to the date of diagnosis (age, < 20 years vs ≥ 20 years)

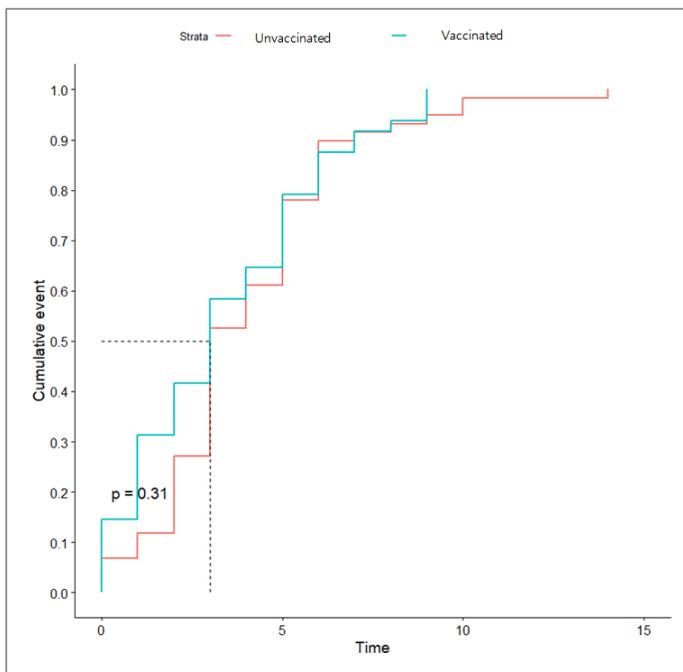


Figure 3. Epidemic curve from final exposure to the date of diagnosis (vaccination status, unvaccinated vs vaccinated)

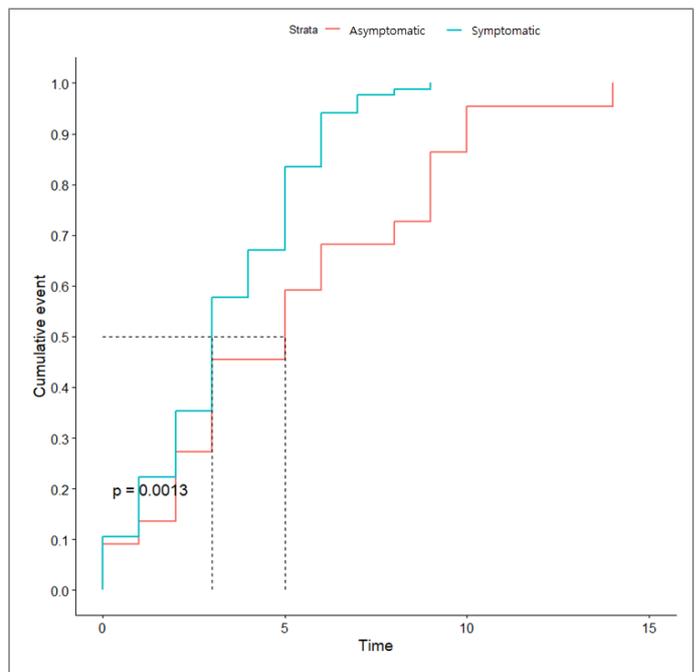


Figure 4. Epidemic curve from final exposure to the date of diagnosis (symptoms, asymptomatic vs symptomatic)

Conclusion

Currently, individuals with confirmed infection with the Omicron variant and contacts of patients confirmed with Omicron infection are subject to a longer 14-day isolation period than the 10-day isolation period required for individuals infected with other variants of COVID-19 in the ROK. In our follow-up of the close contacts of patients confirmed with infection with the Omicron variant, 106 (99.1%) were able to be diagnosed by the day 10 of isolation.

We conducted a viral culture test to detect infectious viral loads of the Omicron VOC. A total of 171 samples (from 72 patients infected with the Omicron variant) were analyzed to measure viral shedding at different time points since infection. Infectious viral shedding occurred only up to 10 days following the onset of symptoms. This was similar to the viral shedding associated with the non-mutated virus and the Alpha and Delta variants [4].

As the number of Omicron cases continues to increase in the ROK, close monitoring and additional analysis of confirmed cases are required. Hence, we plan to continue our survey.

Based on the scientific evidence presented in this study, the duration of isolation (surveillance) for contacts of Omicron-infected patients can be reduced. The findings may be useful for updating guidelines and devising policies to prevent the transmission of the Omicron VOC.

① What was previously known?

Patients confirmed with the Omicron variant of the SARS-CoV-2 are subject to mandatory 14-day isolation, and close contacts of these patients are subject to quarantine regardless of their vaccination history or symptoms, along with diagnostic testing on day 1, 9, and 13.

② What new information is available?

The mean time from final exposure to diagnosis was 3.7 days, with a median of 3 days and a quartile range of 2–5 days. The epidemic curve from final exposure to the date of diagnosis shows that 50% were diagnosed by day 3 and 70% by day 5.

③ What are the implications?

Based on the diagnostic test results, the infection was detected by day 10 of isolation in 106 (99.1%) patients. This result supports the change in the duration of quarantine of Omicron-exposed contacts. The findings may be useful for updating guidelines and devising policies to prevent the transmission of the Omicron VOC.

Acknowledgement

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Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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