

Outbreak Reports

An Outbreak of SARS-CoV-2 Omicron Subvariant BA.2.76 in an Outdoor Park — Chongqing Municipality, China, August 2022

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Summary

What is already known about this topic?

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) Omicron subvariant has a stronger transmission capacity and faster transmission speed than the previous strain.

What is added by this report?

The first coronavirus disease 2019 (COVID-19) case infected with the SARS-CoV-2 Omicron subvariant BA.2.76 who caused local transmission was reported in Chongqing Municipality on August 16, 2022. For 35 minutes, the Patient Zero jogged along a lake at a local park without wearing a mask. Among the 2,836 people potentially exposed at the time, 39 tested positive. Overall, 38 out of 39 cases did not wear a mask on the morning of August 16. All 39 cases lacked any previous exposure to the variant before testing positive on their nucleic acid test.

What are the implications for public health practice?

It is essential to maintain personal wellbeing by ensuring one maintains personal protection and follows regulated guidelines such as maintaining safe distances from others both indoors and outdoors.

The first coronavirus disease 2019 (COVID-19) case infected with the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) Omicron subvariant BA.2.76 causing local transmission was reported in Chongqing Municipality on August 16, 2022. For 35 minutes, Patient Zero jogged along a lake in a park without wearing a mask. Of the 2,836 people potentially exposed in the park, 39 tested SARS-CoV-2 positive. Gene analysis from the 39 cases showed highly homologous when compared to Patient Zero. Epidemiological investigations supported that Patient Zero transmitted to the following 33 visitors and 2 park cleaners and the 2 cleaners transmitted to 4 colleagues. This outbreak indicated that the Omicron subvariant BA.2.76 could be easily transmitted to

others outdoors if they are not equipped with effective protection equipment. The public should be encouraged to use good protection measures and retain safe distances amongst others both indoors and outdoors.

INVESTIGATION AND RESULTS

A 41-year-old male COVID-19 case (Patient Zero) was reported in Chongqing on August 16, 2022. He flew to Hohhot City on August 11 and flew back to Chongqing on flight CZ2752 on August 13, 2022. On August 12, this plane was from Chongqing to Hohhot (CZ2751), it housed 4 passengers from Tibet who tested positive for SARS-CoV-2 once they arrived at Hohhot. The flight arriving in Hohhot at 20:00 was not disinfected for the following day's departure for Chongqing (CZ2752) at 09:59 on August 13. Patient Zero took flight CZ2752 and his seat (33K) happened to be situated around the seats of the 3 positive passengers (34A, 34C, 34H) (CZ2751). Case interviewing found that Patient Zero has no epidemiological association with previous cases in Chongqing. All the 40 persons he contacted in Hohhot had negative testing results for SARS-CoV-2 nucleic acid.

The genome sequence analysis conducted by Chongqing CDC showed Patient Zero infected with Omicron BA.2.76, with the same 75 nucleotide mutations as strains from recent local cases in Tibet. The genetic sequences were highly homologous between Patient Zero and the 4 infected passengers in flight CZ2751, which suggested they might belong to a same transmission chain. Patient Zero was infected most likely because of the exposure to contaminated airline environments.

Patient Zero participated in screening for SARS-CoV-2 virus by using community PCR testing sites in Chongqing on August 9, 10, 11, 13, and 14 and results were negative. There was no screening test on August 12 when Patient Zero was in Hohhot. On

August 15, his throat swab specimen was taken at 21:39 and sent to a Medical Laboratory. The positive test result was available at 08:00 on August 16 with ORF lab/N gene: 29.19/31.86. At this time, he just came back home after jogging in the park. He was informed to stay at home and resampled at 09:45, and this result was positive with lower Ct value (ORF lab/N: 19.23/16.96) tested by local CDC.

Local CDC identified close contacts and at-risk populations by case interviewing, review of surveillance footage and action track positioning. Close contacts were persons who have a distance of less than 1 meter with Patient Zero and without effective prevention measures. At-risk populations were persons who had been to areas that Patient Zero visited while without close contact with Patient Zero. Close contacts were quarantined at hotels for 7 days and at-risk populations were quarantined at home for 3 days. Finally, 256 close contacts and 20,496 at-risk populations were identified. Health personnel took daily throat swab for SARS-CoV-2 nucleic acid PCR tests for them.

Among those close contacts and at-risk populations, 48 were infected. Overall, 9 of the 48 individuals were exposed to Patient Zero on August 15 or 16 before Patient Zero jogged, including Patient Zero's wife, 4 colleagues, 2 foot massage therapists, 1 breakfast server, and 1 person on the road. The other 39 cases all had the same exposure of being in the park where Patient Zero jogged on August 16, including 33 visitors and 6 park staff (4 cleaners, 1 lawn mower and 1 park officer). None of the 39 cases were exposed to other previous reported cases or traveled to regions with COVID-19 cases. The 39 cases had positive test throat swabs or developed symptoms between August 17 and 22. The epi curve indicated a point source exposure for 33 visitor cases and the first 2 park cleaner cases (Figure 1). Among the 39 cases, 29 had the exact same gene sequencing as Patient Zero; 5 cases had a mutation site added to Patient Zero's gene sequence; and the other 5 cases could not be sequenced because of unqualified specimens.

The investigation team highly suspected that Patient Zero was the source of this outbreak due to his maskless jogging in the park. Investigators focused on the activities in the park for both Patient Zero and the 39 cases. The park is a cultural park of 42.5 acres. On August 16, Patient Zero entered the park through the east gate at 6:54 am, jogged counterclockwise to the lake and circled the lake 4 times. He left the park along the same roads at the east gate at 07:29. The path

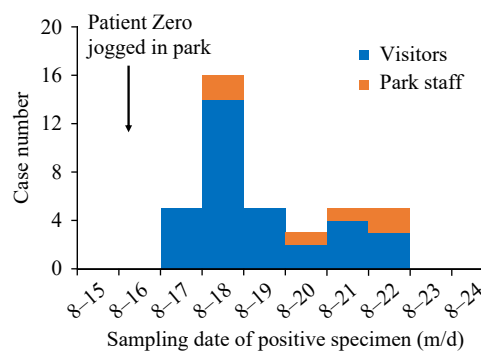


FIGURE 1. The distribution of sampling date for positive specimen in the outbreak of severe acute respiratory syndrome coronavirus 2 Omicron subvariant BA.2.76 in an outdoor park in Chongqing Municipality, China, August 2022.

Note: Two cases developed symptoms earlier than the positive specimen date, their onset dates were used in the epi curve.

width of jogging was about 4 meters. The wind speed was 0.5–3.0 m/s, the temperatures were 33.0°C–42°C and the air humidity was 44%–48% when Patient Zero was jogging. The east gate of the park is the main gate, with convenient transportation, and a good flow of people. During the jogging time, there were 104 close contacts who have a distance less than 1 meter with Patient Zero and without wearing masks.

Patient Zero felt fatigue on August 15 but had no symptoms of fever or cough. He did not wear a mask during his jogging in the park. He did not use any facilities and interact with others in the park. Among the 33 cases among visitors, 13 were close contacts who had faced with or passed by Patient Zero when they exercised by reviewing surveillance footage in the park, 20 were at risk due to exposure to Patient Zero. Among the 20 at-risk populations, 10 cases had both stayed for a while around the lake and entered the park through the same east gate as Patient Zero, 2 cases stayed around the lake, 1 case entered the park through east gate, the other 7 cases had neither stayed around the lake nor entered the park through east gate, but part of their walking routes in the park overlapped with the route Patient Zero had taken. The 33 visitor cases did not know each other, no COVID-19 cases in the communities where they dwelled and no time-space overlap with previous reported COVID-19 cases before they tested positive.

There were 24 staff in the park. From August 18 to 20, they worked in the park during the day and rested in two big meeting rooms at night until they were transferred to quarantine hotels. During the 3 days, they shared the same toilet. Two park cleaners who

worked in the area of the lake tested positive on August 18, then the other 4 park staff subsequently tested positive on August 20 (1 case), 21 (1 case), and 22 (2 cases). It was possible that the first 2 cleaner cases infected the other 4 staff during the 3 days.

DISCUSSION

This investigation reported a male infected with Omicron BA.2.76 subsequently infecting 33 visitors and 2 park cleaners while he jogged in a park. Neither Patient Zero nor the 33 visitors wore masks when they visited the park.

The risk of virus transmission in outdoor locations has been lower than in indoor spaces (1). Literature had reported several SARS-CoV-2 infections and outbreaks occurred outdoors (2–5). However, these reports do not exclude the possibility of direct contact to cases in indoor spaces. In this outbreak, the only possible exposure for the 33 visitor cases and 2 park cleaner cases were in the park at the same time as Patient Zero. Both epidemiological investigation and gene sequence analysis supported the findings of SARS-CoV-2 infections occurred in the park during Patient Zero jogged. This transmission occurred in the park without directly contacting others.

Literature showed that factors which could affect outdoor transmission of SARS-CoV-2 included duration of exposure, frequency of exposure, density of gathering, sunlight, temperature (6), air humidity (7), and use of masks, etc. The BA.2.76 and BA.2.75 strains of Omicron are growing rapidly in India, showing priority compared with other lineages (8). In this outbreak, the throat swab specimen of Patient Zero was positive for COVID-19 virus nucleic acid test on August 15. Patient Zero developed symptoms of fatigue the day before his jogging. When Patient Zero jogged, the transmission of the virus increased due to the excessive heavy breathing. A study applied a model and claimed that runners, who in their exercise state produce stronger inhalation and exhalation breaths, could be more prone to being infected with COVID-19 (9). The 33 visitor cases who had morning exercises in the park had higher opportunities to be infected. They could quickly encounter particles in the air that might contain the virus because of the stronger breath during exercises (10). In addition, turbulent airflow generated by intense physical exercise might be the cause of more dense transmission (11–12). In our report, Patient Zero jogged for 35 minutes, it is

reasonable to assume that he may have emitted an abundance of virus-laden respiratory particles and spread SARS-CoV-2.

There were limitations in this investigation. First, for some cases in visitors, we could not find the exact contact situation with Patient Zero because of limited surveillance footage in the park. The second is that 5 cases were not sequenced because of low-quality specimens.

Personal protection measures including maintaining social distance and wearing masks were the most effective ways to prevent transmission and infection (1). This investigation showed Patient Zero and the 35 subsequent infected individuals did not wear masks when they were in the park. Only the park officer case wore a mask when he worked. Thus, this led to the transmission of SARS-CoV-2. Although some scholars pointed out that wearing a mask during exercise will cause great resistance to breathing (13), given the stronger transmission capacity and faster transmission speed of Omicron subvariant, the public should be encouraged to use good personal protection measures during the COVID-19 epidemic even while outdoors.

In conclusion, this outbreak showed that a COVID-19 case infected with Omicron subvariant BA.2.76 transmitted to 33 visitor cases and 2 park working staff in an outdoor park when the first case jogged. It was highly possible SARS-CoV-2 transmission could easily occur outdoors if effective prevention was not taken. Therefore, physical distancing and correct use of masks should be emphasized as important strategies for mitigating transmission in congregate settings. In the current Dynamic COVID-Zero Policy in China, keeping good personal protection and maintaining safe distances should be strongly recommended not only indoors, but also outdoors.

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