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A SARS-CoV-2 omicron (B.1.1.529) variant outbreak in a primary school in Geneva, Switzerland

The role of primary-school children in community circulation of SARS-CoV-2 remains unclear,¹ and this is particularly true for the highly transmissible

omicron (B.1.1.529) variant, which has a high potential for immune escape, increasing the likelihood to infect or reinfect vaccinated family members.²

We investigated a SARS-CoV-2 outbreak in a primary school in Geneva, Switzerland, as part of a longitudinal, prospective, school class-based surveillance study (SEROCoV-Schools).³ Detailed methods are in the appendix (pp 1–2). Briefly, children (aged 3–7 years), teachers, and school staff from four classes in the primary school (classes A–D) were invited to participate in the surveillance study. When a participant tested positive, we prospectively investigated the transmission of SARS-CoV-2 in the school and in the household.

The first case (class C) of SARS-CoV-2 infection with the omicron variant was notified to our team on Jan 11, 2022, which was the day after the start of the school term after the winter vacation, referred to as day 0. Children and staff members were tested for SARS-CoV-2 infection via RT-PCR on oropharyngeal swabs twice by our team, on day 3 and day 7, regardless of symptoms (appendix p 3). Additional tests were done on a few participants who developed symptoms after day 7. Within 3 days of identification of the first case, we identified cases in all four classes being investigated. Cumulative infection incidence was four (33%) of 12 children in class A (which increased to five [42%] of 12 if including a probable case, as defined in the appendix [p 1]), two (15%) of 13 in class B, nine (56%) of 16 in class C, and 11 (61%) of 18 in class D. At the time of the study, only two children were vaccinated against COVID-19 with one dose; both tested positive for SARS-CoV-2 infection. Because this outbreak investigation is part of a surveillance study that began on Oct 5, 2021, we were able to determine that 19 (29%) of 66 children (four to six children in each class) had anti-spike SARS-CoV-2 IgG antibodies (unrelated to vaccination) or PCR-confirmed infection, or both,

before the beginning of the omicron outbreak in January, 2022. Among those, 17 were tested during the outbreak and five (29%) of 17 were infected. Among the children without indication of previous infection or vaccination who were tested, 20 (50%) of 40 were infected.

Five (50%) of ten teachers and one (20%) of five non-teaching staff members at the school tested positive during the omicron outbreak. Two (13%) of 15 staff members were not vaccinated against COVID-19, and both tested positive.

We also investigated the introduction of SARS-CoV-2 infections in 24 households of children who tested positive. 52 household members were tested once or twice within the week after their child or sibling tested positive (appendix p 3). Infections with the SARS-CoV-2 omicron variant were found in 15 (63%) of 24 households and 25 (48%) of 52 investigated household members (which increased to 27 [50%] of 54 if including probably cases), a household cumulative infection incidence that was similar to the findings of another report from South Korea.⁴ 42 (91%) of 46 parents included were vaccinated, of whom 32 (76%) had received a booster. After excluding those who tested positive just before the outbreak and those who were not tested, the cumulative incidence of infection among those who had received a booster vaccination was 13 (43%) of 30, among those who had received one or two doses of vaccine was two (33%) of six, and among those who were unvaccinated was two (67%) of three, supporting the idea that this variant is highly transmissible even among fully vaccinated people.⁵

Most infections were symptomatic, with 25 (81%) of 31 children and siblings and 19 (86%) of 22 adults (parents, teachers, and non-teaching staff members combined) reporting symptoms. Four (100%) of four adults who were unvaccinated, three (75%) of four adults who were vaccinated

See Online for appendix



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with one or two doses, and 12 (92%) of 13 who were vaccinated with two or three doses reported symptoms. No hospitalisations were reported.

Several factors probably led to this large outbreak, including close contacts between children at school, several separate introductions (as suggested by contact tracing) after the winter vacation in a context of high weekly incidence (3101 of 100 000 inhabitants in Geneva at the end of week 2 of 2022 were infected, of which >96% were caused by the omicron variant), reinfections with the omicron variant,⁶ and isolation periods shortened to 5 days from Jan 13, 2022, by the health authorities, which led to potentially infectious participants being sent back to school.

In summary, this prospective, school class-based study provides evidence of higher transmission of infections in school settings with the omicron variant than was reported with previous variants.³ Children appear to be an important source of extra-household infections and have a key role in community transmission.

This study was approved by the ethics committee of the Canton of Geneva (Project ID 2020-02957). All parents and teachers were informed about the study and gave written informed consent, while children gave verbal assent to participate. The SEROCov-Schools study was supported by the Federal Office of Public Health, the Private Foundation of the Geneva University Hospitals, the Fondation des Grangettes, the Center for Emerging Viral Diseases, and a SNF NRP (National Research Program) 78 COVID-19 Grant 198412 (to SJM and IE). We declare no competing interests. SEROCov-Schools Study Group members are listed in the appendix (p 5).

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