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Coronavirus disease 2019 (COVID-19) transmission events in school staff in a Brazilian prospective cohort

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To the Editor—Since the emergence of the severe acute respiratory coronavirus virus 2 (SARS-CoV-2) and global pandemic declaration, the recommendation to embrace nonpharmaceutical public health measures has been established, including nonessential business and school closures. Despite some uncertainty, studies have temporally associated school closure with decreased coronavirus disease 2019 (COVID-19) incidence and mortality.^{1,2} However, recent research has revealed lower attack rates for children, and they might be less susceptible to SARS-CoV-2 infection.^{3,4} The balance between the risks of SARS-CoV-2 infection to children and the adverse events of isolation and social distance to their educational and socioemotional skill development is still a matter of debate.⁵ Transmission between staff is more common than transmission between students and staff or among students.⁶

Methods

We studied a cohort of school staff from 3 institutions in Rio Grande do Sul, Brazil's southernmost state, from October 1, 2020, to December 31, 2020. In-person learning was closed from March to September 2020. In total, ~768 students attended onsite classes during the study period. The 3 schools followed a hybrid model in which students attended classes on alternate days. According to the state law, each classroom could support 50% of students, with 1.5 m between students.

The schools' preparedness included the availability of alcohol-based hand rub, disinfectants for environment cleaning, and staff education. Classrooms were organized to maintain a distance of at

least 1.5 m between students. Toys or shared materials were accessed for cleaning, and unnecessary materials were taken out of classrooms. Natural ventilation with doors and windows open was simulated at all times. The cafeteria and dining halls were closed. Students and staff had to wear masks while in school, except those aged <6 years.⁷ Face shields were also recommended for staff, especially educators. Students from kindergarten through grade 12 were separated into "packs" to facilitate case tracking. Packs with infected students or staff were evaluated for a distance-learning mode. Daily symptom screening was performed to monitor staff members and students. Those who presented any symptoms were not allowed to enter the school and were evaluated and monitored by an infectious disease physician. An infection control specialist was available for school leaders by phone 5 days a week. We present a descriptive analysis of this cohort. Statistical comparisons were made using the Fisher exact test.

Results

We received 3,229 answers to daily queries from 315 staff members working onsite during the study period; among them, 55 professionals (17.5%) reported being symptomatic. The most common initial symptoms were sore throat (56.4%); fatigue (41.8%); nausea, vomiting, or diarrhea (38.2%); headache (36.4%); muscle or body aches (34.5%); cough (30.9%); fever (21.8%); shortness of breath (16.4%); and loss of taste or smell (12.7%) (Table 1). Among symptomatic professionals, 7 tested positive for SARS-CoV-2 (12.7%), 38 tested negative (69.1%), and 10 were not tested (18.2%). The presence of fever ($P = .05$), fatigue ($P < .01$), and >5 symptoms at initial presentation ($P < .01$) were associated with a SARS-CoV-2-positive RT-PCR test.

During the study period, 1 classroom of 6-year-old students had to be closed because of a cluster of 3 students who tested positive. All students from this class remained on distance learning for 14 days, and no other cases were reported thereafter.

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Table 1. The Most Common Initial Symptoms Presented by School Staff

Symptoms	Total, No. (%)	RT-PCR Positive, No. (%)	RT-PCR Negative, No. (%)	P Value
Sore throat	31 (56.4)	3 (42.9)	23 (60.5)	.43
Fatigue	23 (41.8)	7 (100.0)	15 (39.5)	<.01
Nausea, vomiting, diarrhea	21 (38.2)	2 (28.6)	14 (36.8)	1.0
Headache	20 (36.4)	4 (57.1)	14 (36.8)	.41
Muscle or body aches	19 (34.5)	5 (71.4)	12 (31.6)	.09
Cough	17 (30.9)	4 (57.1)	12 (31.6)	.22
Fever	12 (21.8)	4 (57.1)	7 (18.4)	.05
Shortness of breath	9 (16.4)	2 (28.6)	7 (18.4)	.61
Loss of taste or smell	7 (12.7)	3 (42.9)	4 (10.5)	.06
≥5 symptoms	17 (30.9)	6 (85.7)	11 (28.9)	<.01
Total	55 (100.0)	7 (12.7)	38 (69.1)	

Note. RT-PCR, real-time polymerase chain reaction.

Overall, 49 symptomatic professionals (89.1%) reported working for 48 hours before symptom onset (presymptomatic period), and 25 (45.5%) had worked with symptoms (72.0% for 1 day; 24.0% for 2 days; 4% for 3 days). Also, 4 cases (57.1%) were associated with community-related transmission, and in 3 cases, neither community- nor labor-related transmission was identified. Furthermore, 10 workers were followed for reported contact with a positive colleague during the transmission period. Just 1 of these workers developed symptoms (ie, fever, cough, body aches, shortness of breath, and/or diarrhea) 8 days later but tested negative for SARS-CoV-2 by real-time PCR.

Discussion

Among school staff the positivity rate for SARS-CoV-2 was low, 2.2%. Most infections were community acquired. There were no transmission events in our staff cohort during the 2020 school year in Brazil. A study performed in England also demonstrated the low risk of SARS-CoV-2 infection among school staff and students.⁶ However, the community risk for SARS-CoV-2 disease highlights the importance of the school team being vigilant outside school settings.

Asymptomatic spread is one of the reasons for the high transmissibility of SARS-CoV-2. Although asymptomatic transmission is lower than in symptomatic patients, the attack rate can be as high as 30%.⁸ Most symptomatic and SARS-CoV-2-positive cases worked 48 hours before illness onset in our cohort. The low level

of transmission among school staff might suggest that the strategies we adopted mitigated the spread of COVID-19 among school staff, even with increasing numbers of infections during November and December 2020. The incidence of cases more than doubled during this period in the state.⁹

Moreover, due to daily screening of minimally symptomatic people, those who worked with symptoms had often done so for <1 day. The advice of and tracing by infection disease physicians were crucial, giving the school leaders and staff the support they needed to establish a safe environment.

Pandemic education of school workers, adherence to public health measures, initial symptom screening, and sick-leave policies adopted by schools, as implemented by healthcare institutions,¹⁰ are essential to blocking transmission events. Although ours was a small study with a short follow-up period, our findings reinforce the low impact of well-organized schools in COVID-19 transmission.

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