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COMMENTARY

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Dramatic decrease of laboratory-confirmed influenza A after school closure in response to COVID-19

Andres Perez-Lopez MD, PhD[1,2] | **Mohammad Hasan PhD[1,2]** | **Muhammad Iqbal MSc[1]** | **Mohammed Janahi MD[2,3]** | **Diane Roscoe MD[1]** | **Patrick Tang MD, PhD[1,2]**

[1]Department of Pathology and Laboratory Medicine, Division of Microbiology, Sidra Medicine, Qatar Foundation, Doha, Qatar

[2]Weill Cornell Medical College, Doha, Qatar

[3]Division of Paediatric Infectious Diseases, Sidra Medicine, Qatar Foundation, Doha, Qatar

Correspondence
Andres Perez-Lopez, MD, PhD, Department of Pathology and Laboratory Medicine, Division of Microbiology, Sidra Medicine, Level 2 M, Office H2M-24093, PO BOX 26999, Doha, Qatar.
Email: aperezlopez@sidra.org

The novelty of the coronavirus disease 2019 (COVID-19) has led some researchers to use influenza models and changes in influenza activity to infer the impact of social distancing measures to mitigate the transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).[1,2] However, it has been argued that the effectiveness of school closure to reduce influenza transmission is not transferrable to the COVID-19 pandemic given the alleged lower attack rate in children compared with adults and the greater basic reproductive number of SARS-CoV-2 as opposed to influenza.[3]

Sidra Medicine is the main referral center for the pediatric population of Qatar with 76 694 pediatric emergency department (PED) visits in 2019. A proactive school closure was the first social distancing measure implemented by the State of Qatar on 10 March. Table 1 shows a comparison of the molecular detection of respiratory viruses other than SARS-CoV-2 on nasopharyngeal swabs from our PED per 1000 emergency visits before school closure, between 13 February and 14 March, assuming a maximum incubation period for influenza of 4 days, and after school closure, between 15 March and 11 April. Notably, whereas the rate of laboratory-confirmed influenza A infections decreased more than 30-fold after school closure, rates of total respiratory pathogen tests and positive tests for other viruses, except for adenovirus, varied slightly. In fact, influenza A has not been detected by our laboratory since 30 March. This dramatic decrease is unlikely to be related to seasonal variations as rates of laboratory-confirmed influenza A were similar during the same weeks in 2019 (relative risk, 1.3; 95% CI, 0.4-3.8, $P = .7$), which was consistent with the typical transmission pattern in the north-eastern coast of the Arabian Peninsula where influenza A circulates throughout the year with secondary peaks occurring usually in March.[4] Although the rates of common human coronaviruses (common HCoVs), including types 229E, HKU1, NL63, and OC43, did not change significantly before and after school closure (Table 1), it should be kept in mind that the annual antigenic drift and periodic antigenic shifts of influenza A give this virus access to substantial pools of individuals without a pre-existing immunity, similar to SARS-CoV-2 which is circulating in a completely naïve population. In contrast, other seasonal respiratory viruses like common HCoVs typically undergo less annual antigenic variations allowing maintenance of some degree of immunity within the community that may explain their dissimilar epidemiology to influenza A.[5]

The study of transmission dynamics of SARS-CoV-2 among children has been limited by the suppression of contacts in kindergarten and primary school classrooms, the highest-risk setting for transmission of respiratory pathogens among school-age children, after early implementation of school closure in the majority of countries worldwide. In fact, the notion that children with SARS-CoV-2 infection are less infectious than adults should be considered cautiously in light of emerging evidence. For instance, a large study carried out in Shenzhen, China, involving 391 PCR-confirmed cases and tracing of 1286 contacts observed a similar household secondary attack rate among children younger than 10 years compared with that in the general population (7.4% vs 6.6%).[6] A German study with a small number of children and adolescents reported similar mean viral loads in respiratory tract specimens among school-age children and adults, although the maximum range of viral loads was higher in age groups older than 20 years.[7] Putting these findings together with the fact that a great proportion of children are asymptomatic or mildly symptomatic,[8] it could be speculated that age-school children may represent a significant source of transmission to age groups at greater risk for a serious infection.

As of yet, there have been no controlled studies addressing transmission of SARS-CoV-2 in schools. In fact, some countries,

TABLE 1 Trends in molecular testing for respiratory viruses in pediatric emergency department nasopharyngeal swabs before and after school closure

	Rate, no. of positive tests per 1000 emergency visits (95% CI)			
	Before school closure (13 Feb-14 Mar)	After school closure (15 Mar-11 Apr)	RR (95% CI)	*P*
Total tests[a]	75.1 (69.1-81.6)	64.1 (60.3-77.6)	0.9 (0.7-1)	.03
Influenza A	8.7 (6.7-11.1)	0.3 (0.07-1.5)	0.03 (0.004-0.2)	<.001
Influenza B	3.3 (2.2-4.9)	2.3 (1.1-4.7)	0.7 (0.3-1.5)	.3
RSV	0.9 (0.4-1.9)	1 (0.3-2.8)	**1.1 (0.3-3.7)**	.9
Rhino/entero	12.1 (9.7-14.8)	12.3 (9.7-17.4)	1 (0.7-1.4)	.9
hMPV	3.6 (2.4-5.2)	3.3 (1.9-6.1)	0.9 (0.5-1.8)	.8
Common HCoVs	3.1 (2-4.6)	2.3 (1.1-4.7)	0.7 (0.3-1.6)	.5
Adenovirus	2.3 (1.3-3.7)	7.2 (5.1-11.1)	3.2 (1.7-5.8)	<.001
Parainfluenza	3.1 (2-4.6)	3.6 (2.1-6.4)	1.2 (0.6-2.3)	.7

Abbreviations: CI, confidence interval; Common HCoVs, common human coronaviruses (229E, HKU1, NL63, and OC43); hMPV, human metapneumovirus; Parainfluenza, parainfluenza viruses 1-4; Rhino/entero, rhinovirus/enterovirus; RR, relative risk; RSV: respiratory syncytial virus.
aNasopharyngeal swabs were tested for respiratory pathogens using the Xpert Xpress Flu/RSV assay (Cepheid, Sunnyvale, CA) and BioFire FilmArray Respiratory Panel 2 plus (bioMerieux, Marcy l'Etoile, France).

including Israel, South Korea, and France, have had to immediately close schools after re-opening because of COVID-19 transmission.[9-11] Although future research may prove otherwise, at this moment, it may be reasonable to use influenza A as a surrogate marker to estimate the contribution of school closure in combination with other social distancing measures to curb COVID-19 spread, until the risk of acquisition of SARS-CoV-2 from children is fully elucidated and more conclusive data on the impact of nonpharmaceutical interventions during this pandemic is available.

ORCID

Andres Perez-Lopez http://orcid.org/0000-0002-2301-470X

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