



COVID-19 and Transmission in New Hampshire Schools

Introduction

Everyone agrees that having schools in session is critical for the emotional and mental health of children of New Hampshire. Disagreement occurs on how best to reduce risk in schools to acceptable levels, within the context of balancing economic goals and public health. Recently, disputes over school reopening and vaccine administration have erupted in New Hampshire and across the country. The Governor of New Hampshire has claimed that teachers don't need vaccines for schools to open because transmission is not occurring in schools. "Some schools and classrooms are at full capacity without any vaccine. They've been there since September; they're doing great. So, it's been proven that you don't need a vaccine," he said.¹ The Governor removed teachers from Phase 1B of the state's vaccination program¹, even though placing teachers in Phase 1B is a Centers for Disease Control (CDC) recommendation. He accused teachers' unions of politicizing CDC vaccination recommendations.²

However, in New Hampshire, widespread testing of children in schools who do not show symptoms is not conducted. Therefore, the true disease prevalence in the schools is unknown, and assertions about lack of transmission in schools are not supported with current data reports or by known science regarding viral load in children.³

Recently, school officials in the town of Weare, New Hampshire are worried that the push to keep schools open might have led to COVID-19 transmission in schools.⁴

Decisions to reopen schools should be made based on real time COVID transmission rates and other CDC metrics within the community. The CDC has issued "indicators and thresholds" for the risk of introduction and transmission of COVID-19 in schools⁵ based on several factors, including community case rates (see Figure 1), hospitalization rates, and mitigation factors. The New Hampshire Department of Health and Human Services (DHHS) has indicated that hospitalization rates are not reliably reported. Measures of mitigation strategies in schools are not widely reported; however, case numbers per town are available on the DHHS website.⁶

Methods

Case rates per 100,000 of the population over the prior 14 days per town reported by DHHS during the period between January 25 and January 30th, 2021 were compared with CDC thresholds for risk and transmission.

¹ Gov. Sununu accuses teachers union of politicizing vaccination process <https://www.wmur.com/article/gov-sununu-accuses-teachers-union-of-politicizing-vaccination-process/35283193>

² 'You Don't Need a Vaccine' to Reopen Schools, Says Sununu <https://www.nhpr.org/post/you-dont-need-vaccine-reopen-schools-says-sununu>

³ <https://jamanetwork.com/journals/jamapediatrics/fullarticle/2768952>

⁴ School officials worried push to stay open might have led to COVID-19 transmission <https://www.wmur.com/article/school-officials-worried-push-to-stay-open-might-have-led-to-covid-19-transmission/35355973>

⁵ "CDC indicators and thresholds for risk of introduction and transmission of COVID-19 in schools" <https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/indicators.html#thresholds>.

⁶ <https://www.nh.gov/covid19/dashboard/map.htm>



DHHS does not calculate case rates for towns with less than four cases in the last 14 days due to privacy concerns. For towns where DHHS did not report 14-day case rates, upper and lower estimates of case rates were calculated using population estimates taken from the U.S. Census Bureau (2010) for 1 and 4 cases per town. For towns where case rates are not provided by DHHS, the median of the case rates calculated using 1 and 4 cases per town are calculated and are used for assessment within each SAU. The maximum CDC threshold for each of the SAUs was calculated as an assessment of the overall risk in the district.

Results

Of the 234 New Hampshire towns, and according to CDC metrics, 129 towns are at the highest risk of transmission in schools, 82 are at higher risk of transmission, and four towns are at moderate risk (Table 1). Nineteen towns indicate a low risk for transmission in schools based on CDC risk thresholds. If schools are reopened or remain open, 94 of the 100 SAUs are at risk of spreading higher rates of COVID-19 to lower case rate towns.

Additionally, high schools in cities and large towns represent an issue with the transmission in these communities since the students are typically drawn from many towns, have higher student numbers, and lack testing. Also, high school students may be more likely to spread COVID than younger children since they are active in communities through work and social activities.

The 14-day COVID-19 case trends are increasing an average of 62 cases per 100,000 in 30 towns and have remained the same in 64 towns over the last four days. The 14-day case rates have decreased over the last four days by approximately 41 cases per 100,000 in 61 towns.

As discussed above, school officials in Weare are concerned that the push to keep schools open may be resulting in higher COVID-19 cases. Over the time period examined in our analysis, 14-day case rates per 100,000 in Weare have increased and have maintained at the highest risk level when compared with CDC thresholds for risk. SAU 24 also includes the town of Henniker, where the risk of transmission is “moderate” based on the CDC thresholds. Keeping schools open may also likely result in higher case rates in the town of Henniker.

Discussion

In 2020, as in the 1918 pandemic, closing schools had been one of the most effective NPIs to slow community transmission of COVID 19. Schools are sources of spread in the community once cases get over a certain rate. At high community transmission rates, opening schools can initiate a vicious circle of keeping community rates high.

While severe cases in children are currently rare, approximately 12-15% of school-age children are experiencing symptoms of long COVID-19 (for five weeks or more). The long-term effects of COVID-19 on children are unknown, and decisions made now could impact our children through adulthood. With this uncertainty, taking a precautionary approach is prudent.



While there are published studies that are cited in the media that schools “are not sources of spread” or “few outbreaks occur in schools”, these studies have weaknesses in their design, which has been noted by the CDC. Children are typically only “counted” in a study if their parent is identified as an index case, and the child is subsequently tested, but children are never “counted” if they silently and asymptotically are infecting others in a school setting or at home. Also, many studies have used different decision-making criteria to define a “case” or counted cases during periods of time schools were not open (summer). Finally, biology and experience with other diseases (flu, tuberculosis, chickenpox, measles, and the common cold) indicate clearly that children contribute towards transmission of disease; there’s no biological reason to support that SARS-COV-2 would be an exception and children aren’t vectors, though children do seem to be less susceptible to severe outcomes.

An additional factor to consider is the newer variants that have been recently detected in the United States. Studies in England, where the UK variant likely predominates, have shown in recent weeks that children have the highest positivity rate, and in general, there is no difference in percent testing positive when broken out by age.⁷

A global study in 226 countries looking at every kind of NPI (nonpharmaceutical interventions), like lockdowns, travel bans, etc.) put school closures as the second most effective NPI that reduced COVID.⁸

In March 2020, almost every US state instituted some kind of school closure in the United States. The beneficial impact was greater in states that started with lower incidence rates. A study concluded the timing of school closure was associated with a significant decline in the incidence of COVID-19 (adjusted relative change per week, -62% [95% CI, -71% to -49%]) and mortality (adjusted relative change per week, -58% [95% CI, -68% to -46%]).⁹ During periods of high community transmission, which is occurring in many parts of New Hampshire, school closure is the most effective NPI.

Conclusions

While children may be less susceptible (meaning they are less likely to have a fatal or serious short-term outcome or even symptoms), this fact does not mean children don’t get COVID or contribute to transmission. There is some evidence that variants recently detected in the United States and Brazil may be more transmissible. In addition, long term damage to organs from COVID-19 or known variants in children is unknown and may be possible even in asymptomatic cases.

Because it’s important for kids to be in school if the following risk reduction measures are in place, and community transmission is low risk to moderate risk, then in-person classes are recommended (see Figure 1). Only five SAUs, 66, 76, 78, 101, and 102, currently meet these criteria (Table 1).

Layers of swiss cheese can be used as an analogy for understanding risk reduction in schools. Risk reduction is not achieved with one layer (as one layer has holes) but from implementing multiple layers (each layer upon each other acts to block other holes in the cheese). All the layers have to be in place

7

<https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/coronaviruscovid19infectionsurveypilot/24december2020#age-analysis-of-the-number-of-people-in-england-who-had-covid-19>

⁸ <https://www.nature.com/articles/s41562-020-01009-0>

⁹ <https://jamanetwork.com/journals/jama/fullarticle/2769034>



for maximum risk reduction. All six risk reduction recommendations will reduce exposure to the maximum extent possible.

1. Masking: COVID-19 is airborne the virus floats on air through a room like smoke and builds up in indoor settings. The primary intervention to prevent emissions from sources of virus (asymptomatic children/people) or recipients (other children or teachers/staff) is wearing a 3-ply surgical mask or a 3-layer cloth mask with a filter insert. Fit is crucial, snug over the nose and smooth fit to the face. If necessary, to improve fit, using a snug cloth mask over a surgical mask can improve protection to the wearer. Other options for better masking include ENVO masks (made in Hudson, New Hampshire), N95's, and KF94 masks from South Korea, available online at Amazon.
2. Ventilation: The air changes per hour in classrooms should be five air changes per hour (ACH) or above. This can be achieved by increasing outdoor/fresh air into the classroom (by opening windows or changing heating, ventilation, and air conditioning (HVAC) system settings to increase the fraction of outside air).
3. Filtration: HVAC systems should have the highest-number MERV filters the system can handle, ideally MERV 13. MERV 11 is recommended if the system cannot handle MERV 13. If 5 ACH cannot be achieved by fresh air, then high efficiency particulate air (HEPA) portable air cleaners should be installed in classrooms to get to 5 ACH. Various online calculators are available to match the unit to the room size to determine the ACH. More HEPA cleaners can add ACH to the room.
4. In-person attendance: reduce the number of students in the classroom – alternating remote, hybrid, and in-person as strategies. The more space between students, the better; however, 6 feet of physical distance is not a magic number, as the virus floats in the air. The time spent in a room, the number of students, masking, and ventilation are more important.
5. Class length: should be kept at 50 minutes, with a 10-minute open door/open window air flush between classes.
6. Since the transmission is likely ongoing in schools and teachers are likely to be more vulnerable to impacts from COVID-19, teachers should be vaccinated as part of Phase 1B.

Figure 1 CDC Risk Thresholds for School Reopening

Indicators	Lowest risk of transmission in schools	Lower risk of transmission in schools	Moderate risk of transmission in schools	Higher risk of transmission in schools	Highest risk of transmission in schools
Core Indicators					
Number of new cases per 100,000 persons within the last 14 days*	<5	5 to <20	20 to <50	50 to ≤ 200	>200

Taken from: <https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/indicators.html#thresholds>.

Table 1 Summary of 14-day COVID-19 Case Rates by New Hampshire City/Town

SAU	Maximum Case Rate In District	Risk Level	SAU	Maximum Case Rate In District	Risk Level	SAU	Maximum Case Rate In District	Risk Level	SAU	Maximum Case Rate In District	Risk Level
1	679	Highest Risk	29	588	Highest Risk	57	828	Highest Risk	84	675	Highest Risk
2	574	Highest Risk	30	520	Highest Risk	58	501	Highest Risk	85	81	Higher Risk
3	899	Highest Risk	31	428	Highest Risk	59	86	Higher Risk	86	962	Highest Risk
4	205	Highest Risk	32	124	Higher Risk	60	591	Highest Risk	87	713	Highest Risk
5	578	Highest Risk	33	567	Highest Risk	61	627	Highest Risk	88	239	Highest Risk
6	1901	Highest Risk	34	1092	Highest Risk	62	184	Higher Risk	89	174	Higher Risk
7	235	Highest Risk	35	472	Highest Risk	63	151	Higher Risk	91	337	Highest Risk
8	523	Highest Risk	36	1354	Highest Risk	64	62	Higher Risk	92	64	Higher Risk
9	695	Highest Risk	37	713	Highest Risk	65	300	Highest Risk	93	311	Highest Risk
10	585	Highest Risk	39	370	Highest Risk	66	44	Moderate Ri	94	1193	Highest Risk
11	666	Highest Risk	40	795	Highest Risk	67	447	Highest Risk	95	734	Highest Risk
12	570	Highest Risk	41	594	Highest Risk	68	1333	Highest Risk	96	314	Highest Risk
13	185	Higher Risk	42	837	Highest Risk	69	137	Higher Risk	97	787	Highest Risk
14	569	Highest Risk	43	897	Highest Risk	70	246	Highest Risk	99	330	Highest Risk
15	1024	Highest Risk	44	677	Highest Risk	71	270	Highest Risk	100	65	Higher Risk
16	543	Highest Risk	45	61	Higher Risk	72	966	Highest Risk	101	49	Moderate Ri
17	682	Highest Risk	46	197	Higher Risk	73	516	Highest Risk	102	0	Low Risk
18	500	Highest Risk	47	1021	Highest Risk	74	396	Highest Risk	103	272	Highest Risk
19	805	Highest Risk	48	1344	Highest Risk	75	87	Higher Risk	104	99	Higher Risk
20	883	Highest Risk	49	459	Highest Risk	76	0	Low Risk			
21	616	Highest Risk	50	518	Highest Risk	77	265	Highest Risk			
23	674	Highest Risk	51	61	Higher Risk	78	0	Low Risk			
24	500	Highest Risk	52	615	Highest Risk	79	105	Higher Risk			
25	672	Highest Risk	53	569	Highest Risk	80	660	Highest Risk			
26	634	Highest Risk	54	836	Highest Risk	81	872	Highest Risk			
27	736	Highest Risk	55	22727	Highest Risk	82	674	Highest Risk			
28	873	Highest Risk	56	731	Highest Risk	83	317	Highest Risk			

Notes:

1. Case rates and risk levels in New Hampshire towns/cities were compared with CDC risk thresholds for transmission in schools <https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/indicators.html#thresholds>.
2. Case rates obtained from: <https://www.NewHampshire.gov/covid19/dashboard/map.htm>.
3. For towns where DHHS does not report case rates due to privacy concerns, case rates per 100,000 were calculated assuming 4 cases per town to compare with CDC thresholds for risk of transmission.