

SARS-CoV-2 and Schools

David Goldfarb

Land Acknowledgement

- Fortunate to give this presentation from the the uncaded territories of the x^wməθk^wəyəm (Musqueam), Sk̓wx̓wú7mesh (Squamish), and Sel̓ílwitulh (Tsleil-Waututh) Nations

- Relationships with commercial interests:
 - Nothing to disclose
- Research funding from the Public Health Agency of Canada, CIHR, Grand Challenges Canada, CDC Foundation, IDRC, ArcticNet, GenePOC, Meridian and investigator initiated grants from bioMerieux
- **(some slides provided by Dr. Alexandra Choi)**

Outline

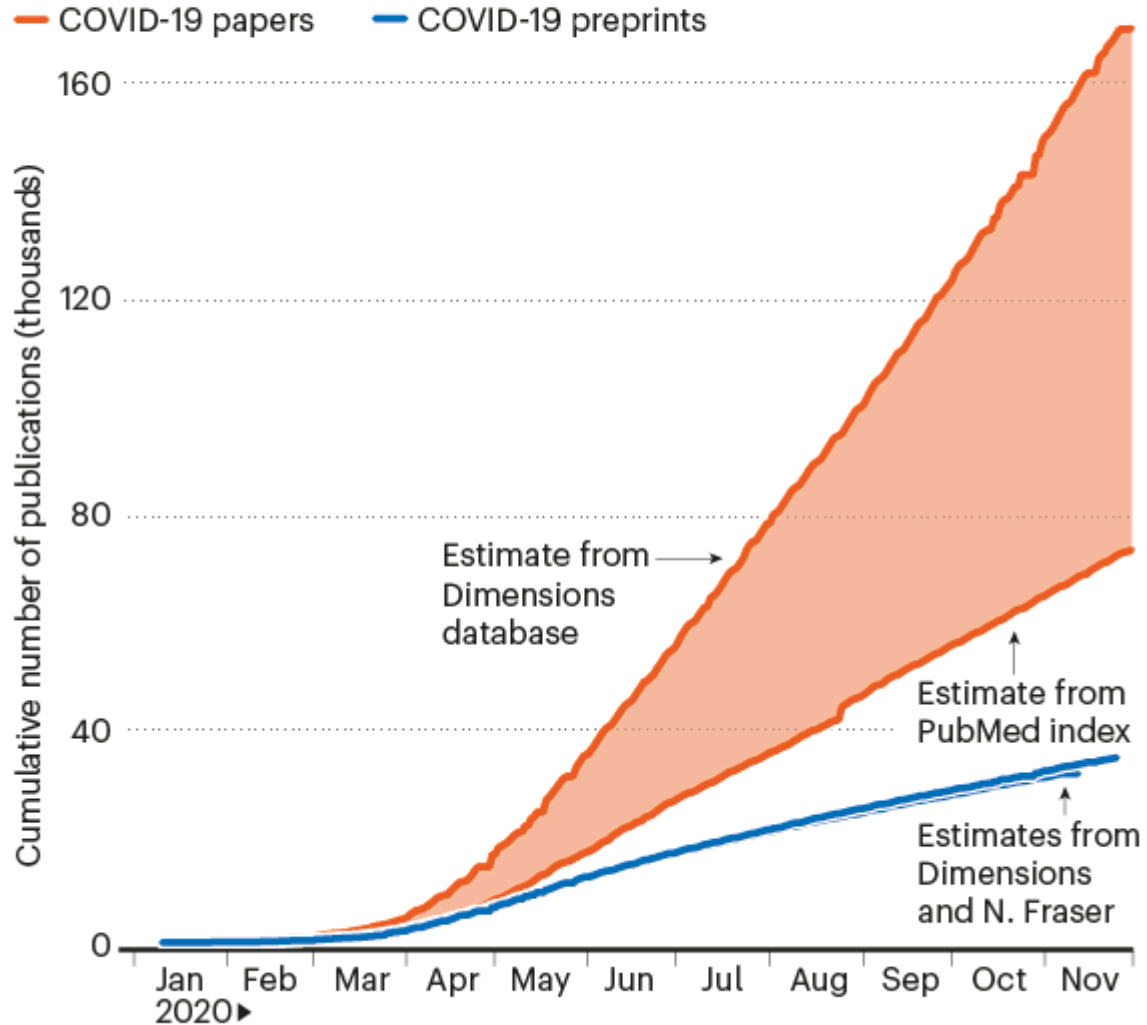
- Kids and COVID-19 in general
- COVID-19 and schools
- Situation in BC
- Q & A

Keeping up with COVID-19 literature



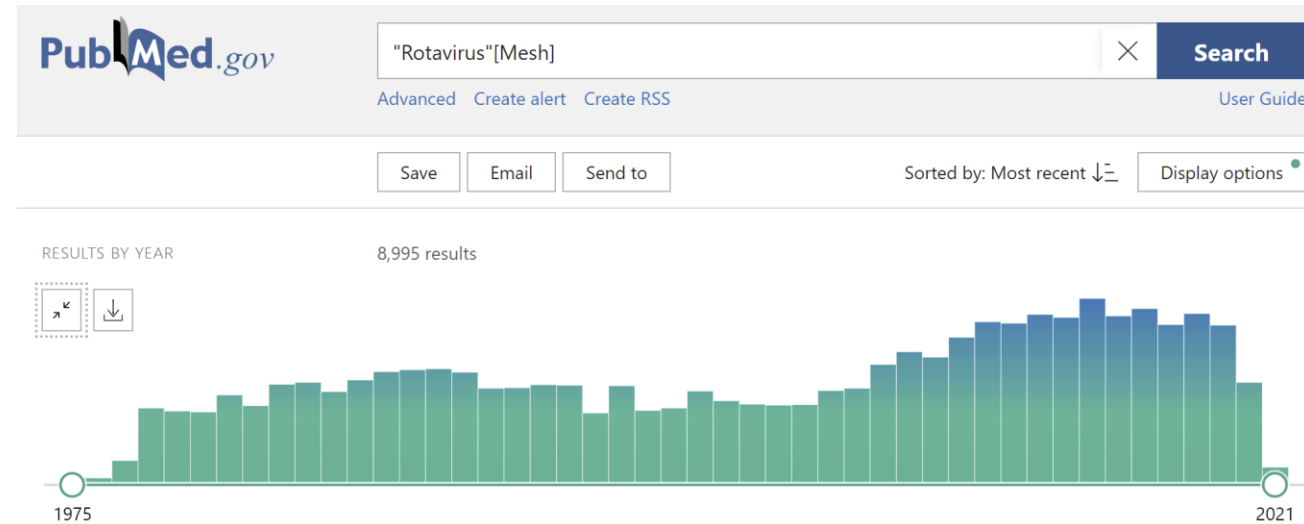
CORONAVIRUS CASCADE

One estimate suggests that more than 200,000 coronavirus-related journal articles and preprints had been published by early December.



*Estimates differ depending on search terms, database coverage, and definitions of what counts as a scientific article; some preprints were posted on multiple sites online.

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Outline

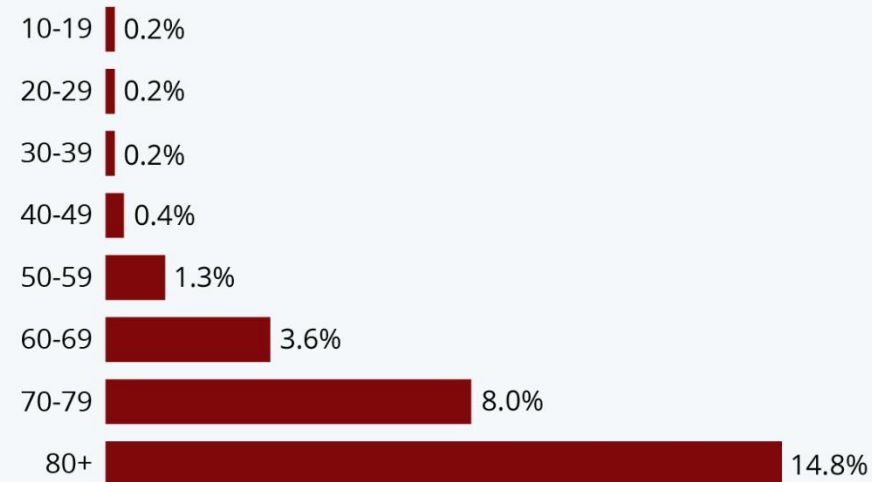
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Children (in general) do well with
the acute infection

First Data – Feb 2020

Study: Elderly Most At Risk From The Coronavirus

COVID-19 fatality rate by age (as of February 11, 2020)



n=44,672 confirmed COVID-19 cases in Mainland China
Source: Chinese Centre for Disease Control and Prevention



statista

Appendix Table 6B: Child Mortality Data Available on 4/22/21*

COVID-19-Associated Deaths and Children

Location	Age range	Cumulative child deaths	Cumulative total deaths (all ages)	Percent children of total deaths	Percent of child cases resulting in death^
Mississippi	0-17	3	7,173	0.04%	0.01%
Missouri	0-17	4	8,691	0.05%	0.01%
Nebraska	0-19	4	2,232	0.18%	0.01%
Nevada	0-19	5	5,388	0.10%	0.01%
New Hampshire	0-19	0	1,273	0.00%	0.00%
New Jersey	0-17	7	22,660	0.03%	0.01%
North Carolina	0-17	3	12,480	0.02%	0.00%
North Dakota	0-19	1	1,484	0.07%	0.01%
NYC	0-17	23	27,130	0.08%	0.03%
Ohio [~]	0-19	7	19,033	0.04%	0.00%
Oklahoma	0-17	2	6,716	0.03%	0.00%
Oregon	0-19	2	2,466	0.08%	0.01%
Pennsylvania	0-19	9	25,827	0.03%	0.01%
Puerto Rico	0-19	3	2,238	0.13%	0.02%
South Dakota	0-19	0	1,954	0.00%	0.00%
Tennessee	0-20	12	12,111	0.10%	0.01%
Texas [#]	0-19	51	48,508	0.11%	--
Vermont	0-19	0	243	0.00%	0.00%
Virginia [□]	0-19	4	10,653	0.04%	0.00%
Washington	0-19	7	5,422	0.13%	0.01%
Wisconsin	0-19	3	7,430	0.04%	0.00%
Wyoming	0-18	0	705	0.00%	0.00%

New “variants” data

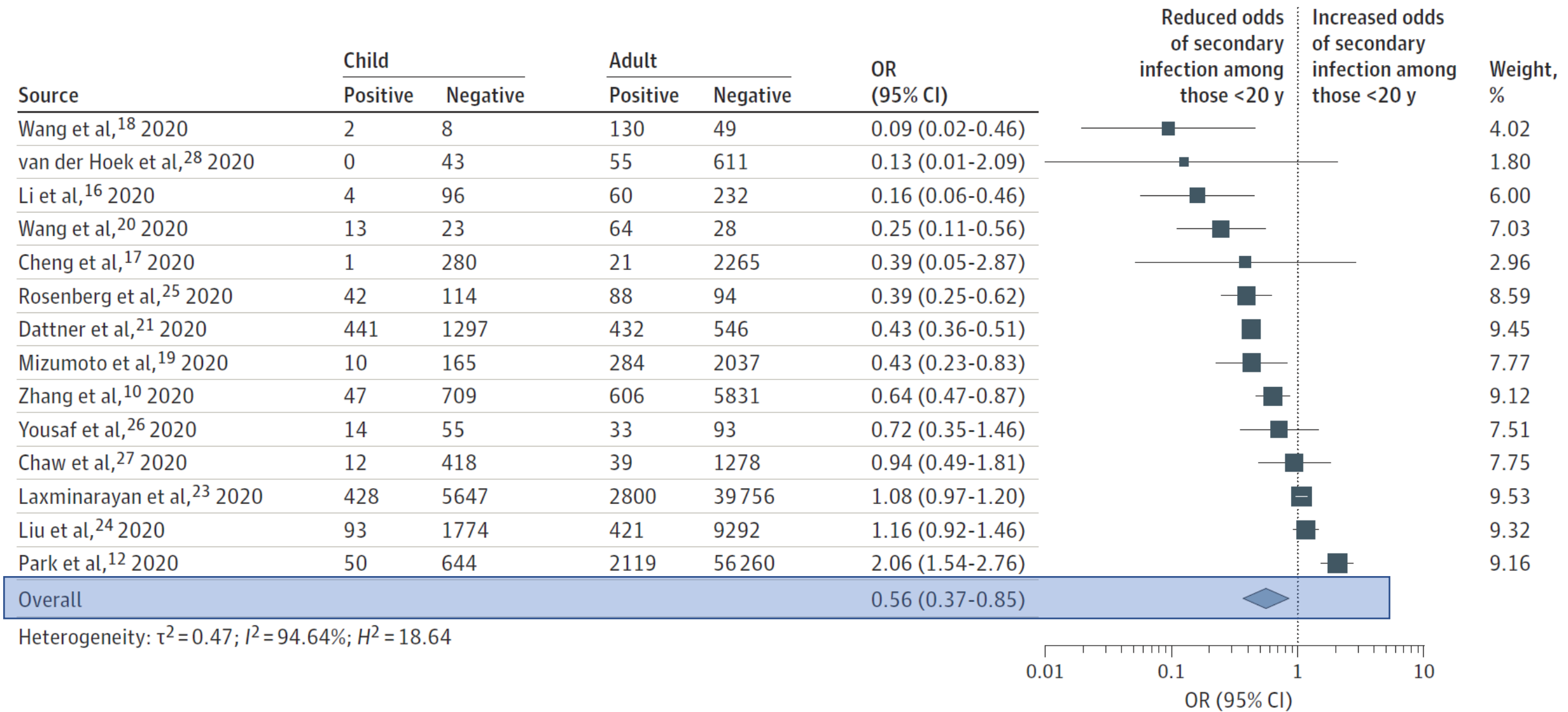
Article

Table 1 | Absolute 28-day mortality risk for B.1.1.7

Sex	Age (years)	Baseline mortality	Mortality risk for B.1.1.7	
			SGTF for complete cases	p_{VOC} IPW
Female	1–34	0.00069%	0.0011% (0.00096–0.0012%)	0.0011% (0.00097–0.0012%)
	35–54	0.033%	0.050% (0.045–0.056%)	0.052% (0.046–0.059%)
	55–69	0.18%	0.28% (0.25–0.31%)	0.29% (0.26–0.33%)
	70–84	2.9%	4.4% (4.0–4.9%)	4.6% (4.0–5.1%)
	85 and older	13%	19% (17–21%)	20% (18–22%)
Male	1–34	0.0031%	0.0047% (0.0042–0.0052%)	0.0049% (0.0043–0.0055%)
	35–54	0.064%	0.099% (0.089–0.11%)	0.10% (0.090–0.12%)
	55–69	0.56%	0.86% (0.77–0.95%)	0.89% (0.78–1.0%)
	70–84	4.7%	7.2% (6.4–7.9%)	7.4% (6.6–8.3%)
	85 and older	17%	25% (23–27%)	26% (23–29%)

Children (in general) are less likely to get infected when exposed to SARS-CoV-2 contacts

Figure 2. Pooled Estimate of Odds of Being an Infected Contact Among Children and Adolescents Compared With Adults for All Contact-Tracing Studies



But aren't children excellent at picking up respiratory viruses?



Children have lower amounts of “viable” virus

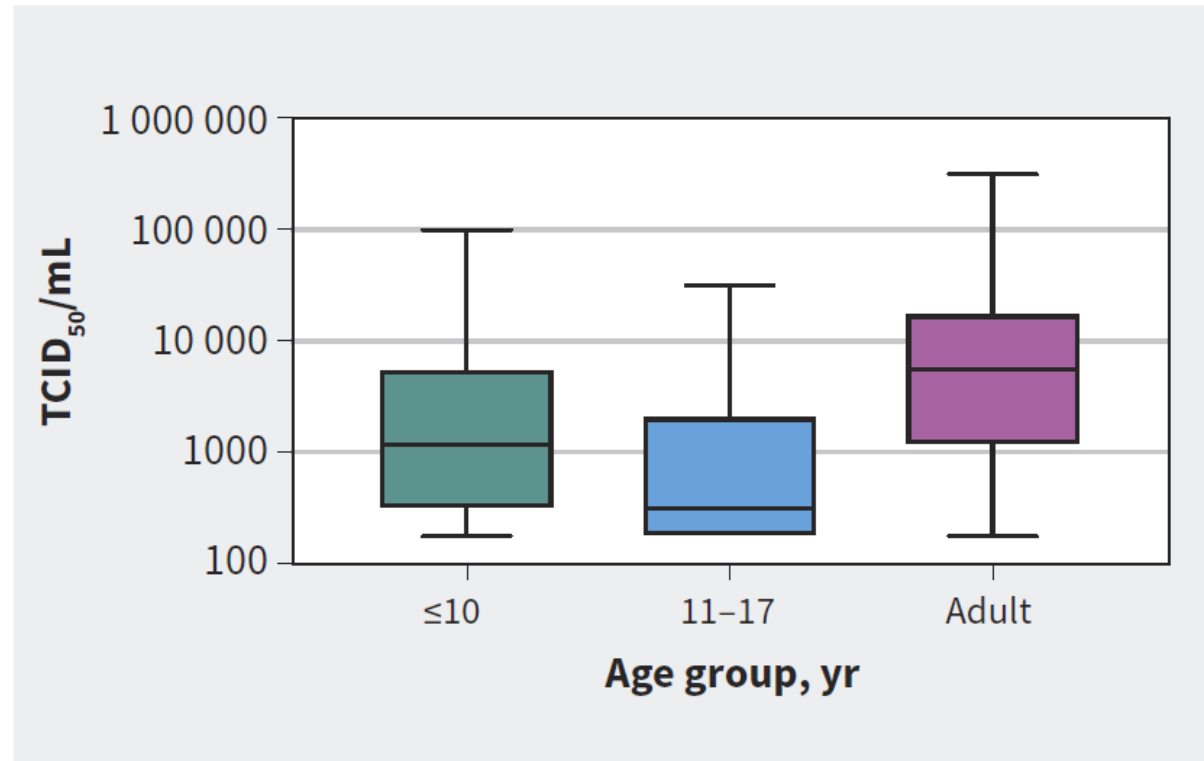


Figure 2: Tissue culture infective dose 50% (TCID₅₀/mL) by age group. Adult samples had significantly higher TCID₅₀/mL (5620, IQR 1171–17 800) than children aged 11–17 years (316, interquartile range [IQR] 178–2125, $p < 0.001$), but were not significantly higher than children aged ≤ 10 years (1171, IQR 316 to 5620, $p = 0.1$).

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Several Contact Tracing studies from infectious cases in schools

- Australia – 1.2% attack rate amongst contacts (n=1448)
 - among students and staff with face-to-face contact with a positive case for at least 15 minutes, or those who shared closed indoor space for at least 40 minutes (e.g. same class)
- Ireland – no secondary cases
- Singapore – no secondary cases

Lancet Child Adolesc Health. 2020 Nov;4(11):807-816.

Euro Surveill. 2020;25(21):2000903.

Clin Infect Dis. 2021 Mar 15;72(6):1055-1058

What about home transmission vs school transmission?

- Wisconsin – 5533 staff/student cases
 - 3.7% associated with transmission in school
- Norway - 234 school based contacts of school based cases
 - No secondary cases in schools identified



Tracking COVID-19 For Safer Schools

A study to understand COVID-19 transmission in
schools to help make ***schools safer!***

*Research study conducted by UBC, BC Children Hospital Research Institute
and The COVID-19 Immunity Task Force*

Pascal Lavoie, Louise Masse and David Goldfarb

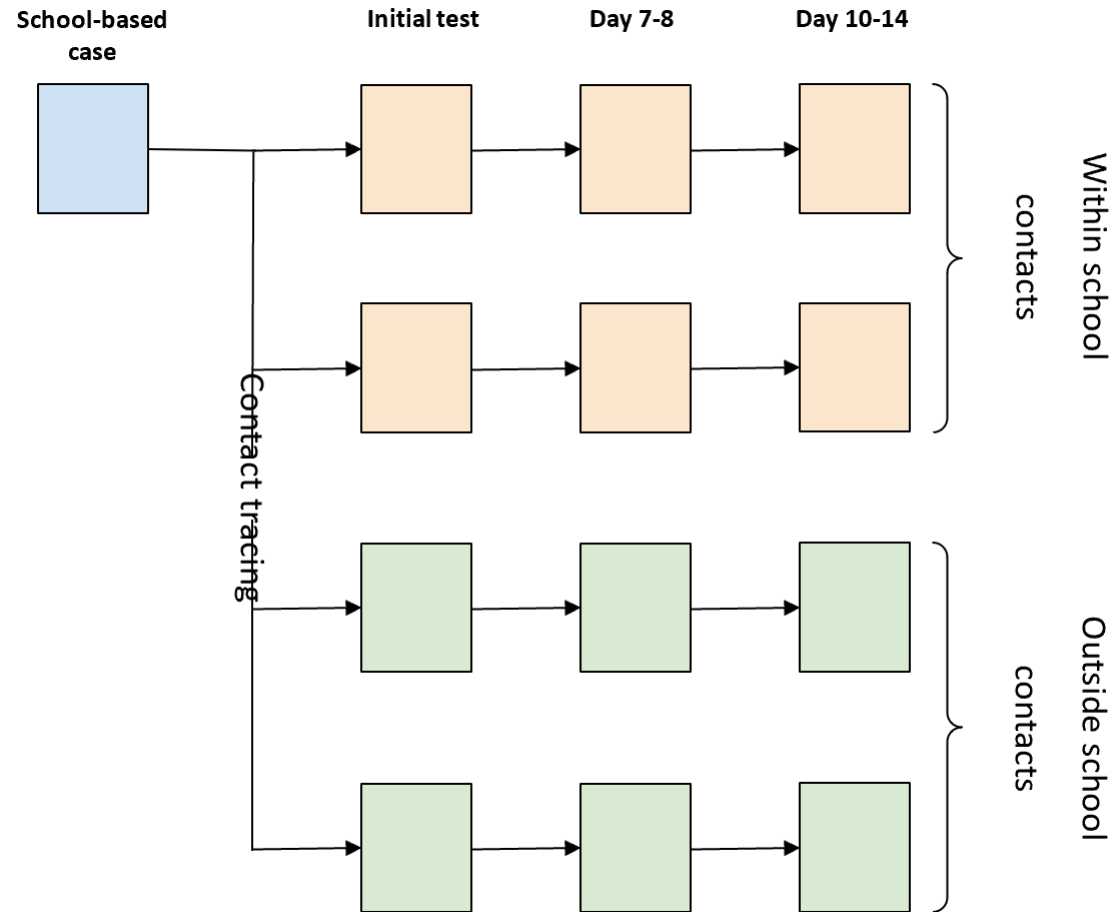
What We Hope To Find Out

- 1) What is the COVID-19 exposure risk among the VSB classroom staff in direct contact with students
- 2) Impact of the COVID-19 pandemic on VSB staff members' mental health and well-being?

What Does The Study Involves?

- Voluntary serology testing for any VSB Staff (blood sample) + COVID-19 / mental well-being / vaccine perceptions questionnaire
 - 1500+ classroom staff (direct contact with students)
 - 500 staff with no direct contact with students (control group)
- Enhanced viral testing of close contacts of student who tests positive for COVID-19
 - Additional at home testing kids, and expanded contact tracing

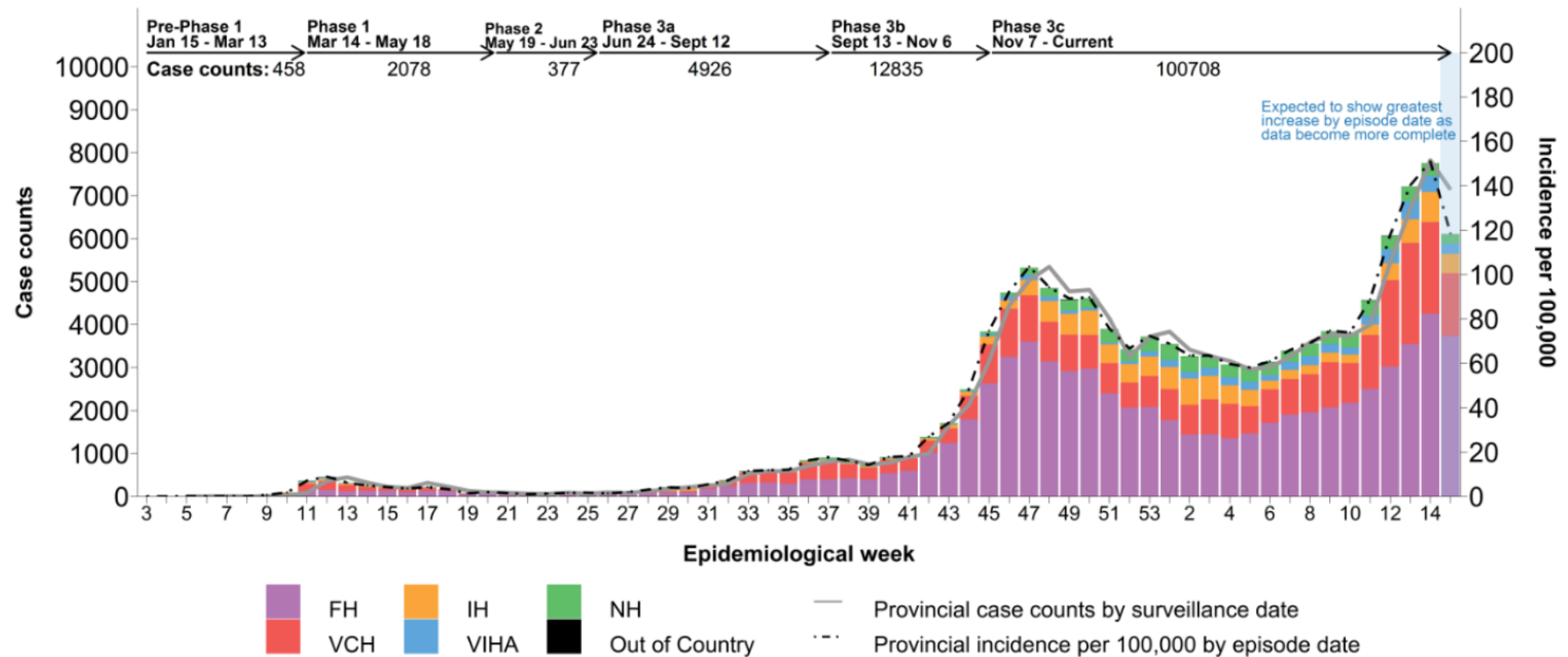
Out of school transmission vs school transmission?



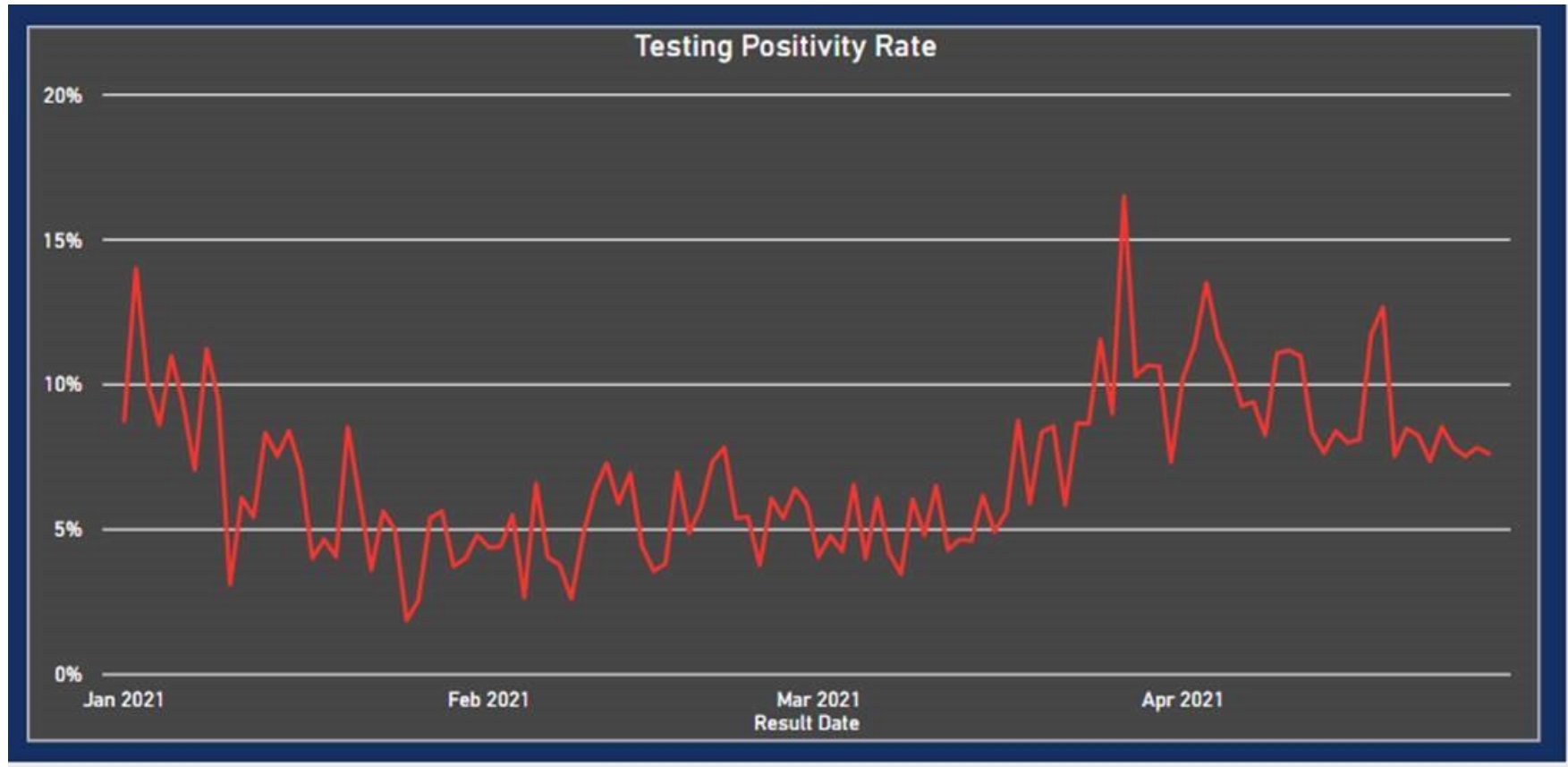
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January 15, 2020 (week 3) – April 17, 2021 (week 15) (N= 121,382)



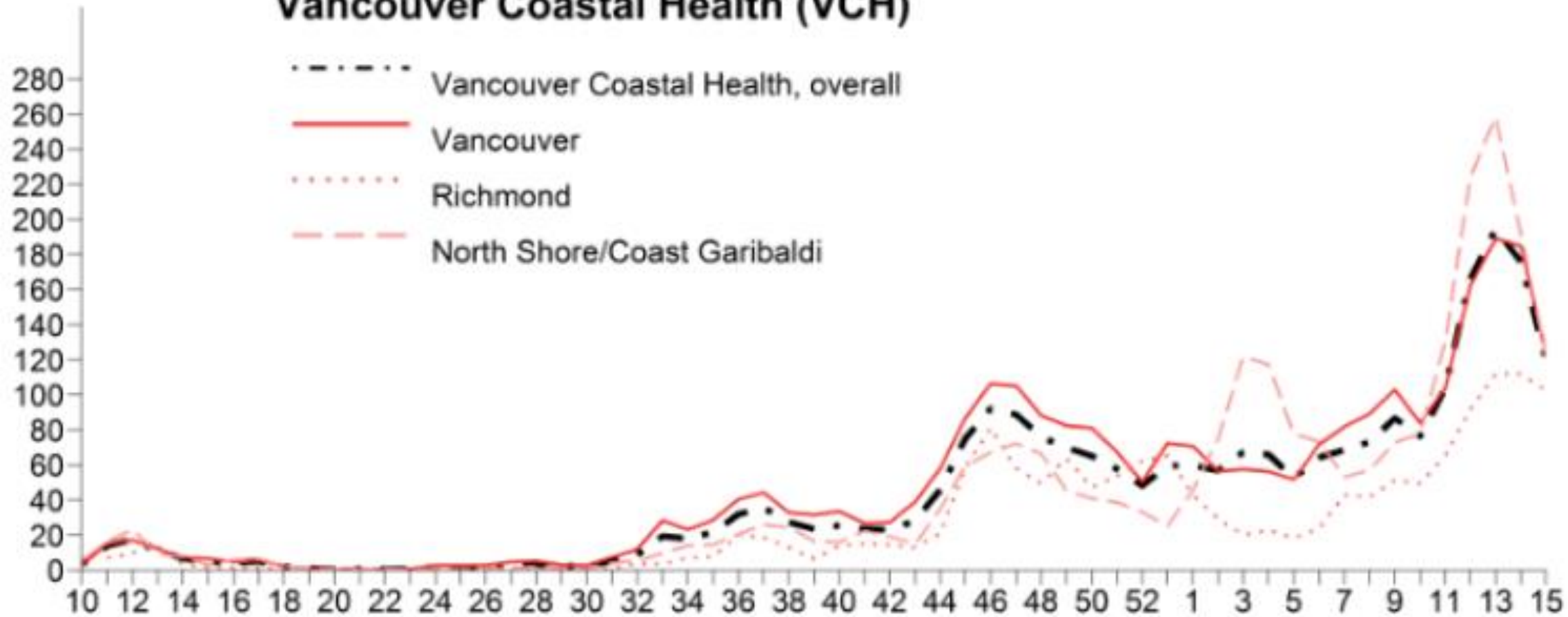
Positivity Rate in Children < 10 yrs Jan to end April, 2021 – Province wide

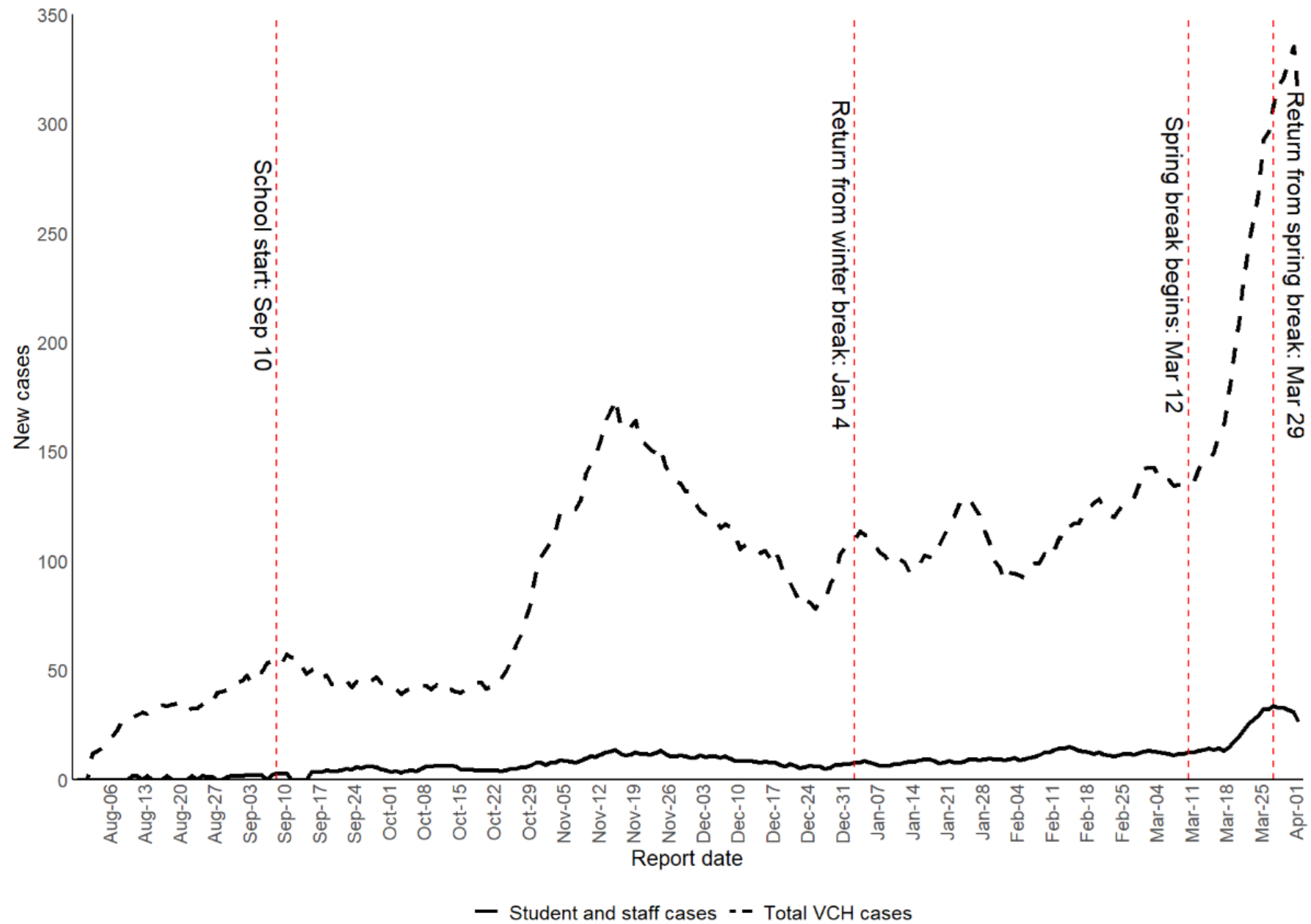


Jan 1-31 2021: $604/9787 = 6.2\%$

Apr 1-27 2021: $1797/19,703 = 9.1\%$

Vancouver Coastal Health (VCH)

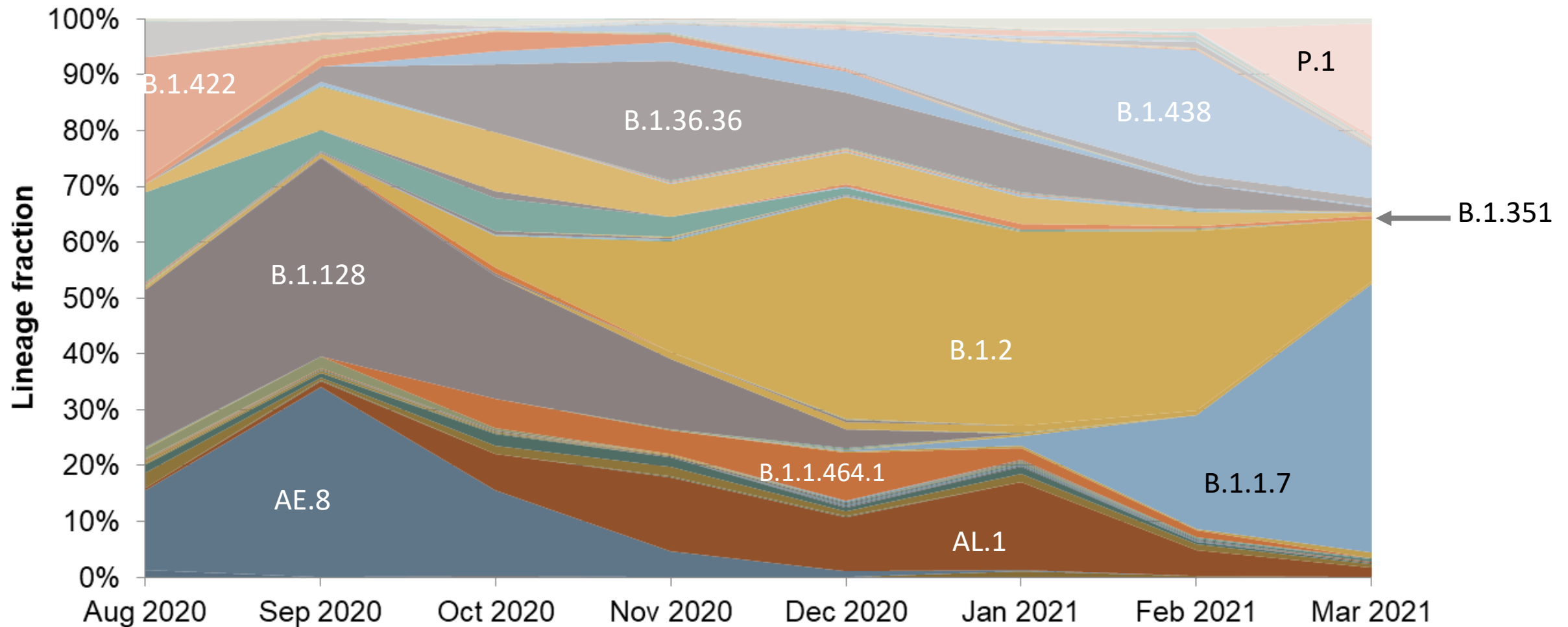




VCH Schools situation – similar to other jurisdictions

- If there is lots of transmission in the community, there will be increased cases detected in students and staff
- over 90% of student and staff cases do not lead to any transmission whatsoever, and when there is transmission it's generally limited to 1 or 2 other people

Sequenced lineage fractions per month

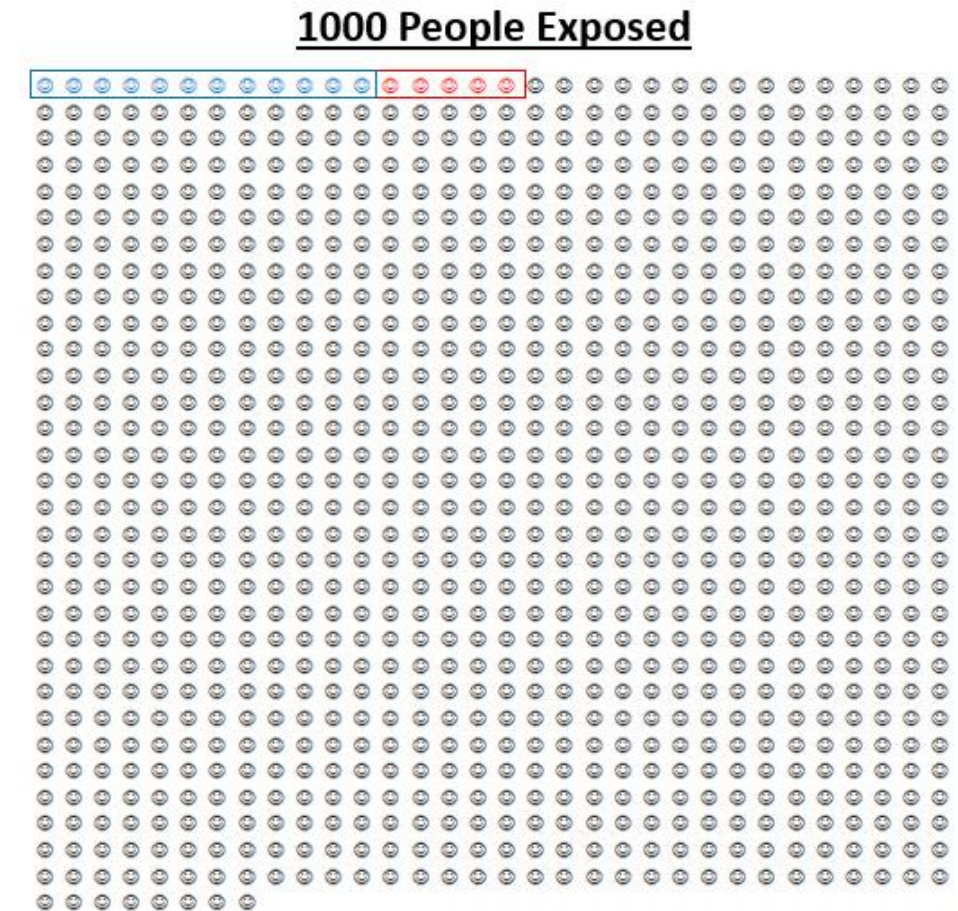


Distributions reflect significant sampling biases due to WGS for outbreaks, travel vs unbiased surveillance

I have heard that new Variants of Concern (VOCs) are more transmissible. What does this mean for students and staff in schools and possible transmissions there?

While the VOCs may be 30-50% more transmissible than non-VOCs, this is a relative risk. This means that the true size of the risk depends on the size of the risk of transmission to begin with. For instance, if risk of transmission changed from 2% to 3% this would be a 50% increase in relative risk. But if risk of transmission changed from 20% to 30% this would also be a 50% increase in relative risk. Absolute risk is the size of your own risk. The risk of transmission of COVID-19 varies between settings and is very low in school settings.

Australia study, **1.2% of those exposed (12 in 1000 people) tested positive for COVID-19**. So if a VOC was 30% more transmissible (relative risk), then we could expect that 1.7% (17 in 1000) of those exposed could test positive, **an extra 5 per 1000** (absolute risk).



VoC / VoI Profiles – It's getting complicated!

First Identified	US California		India	Nigeria / Europe		UK	Brazil	South Africa	Philippines	Brazil	R.1	R.2
	B.1.427	B.1.429	B.1.617	B.1.1.318	B.1.525	B.1.1.7	P.1	B.1.351	P.3	P.2		
	S-L452R	S-S13I	S-T95I	ORF1a-SGFdel	ORF1a-SGFdel	ORF1a-SGFdel	ORF1a-SGFdel	ORF1a-SGFdel	S-141-143del	S-E484K	S-W152L	S-E484K
	S-D614G	S-W152C	S-E154K	S-T95I	S-A67V	S-69/70del	S-L18F	S-K417N	S-E484K	S-D614G	S-E484K	S-D614G
		S-L452R	S-L452R	S-144del	S-69/70del	S-144del	S-T20N	S-E484K	S-N501Y	S-V1176F	S-D614G	S-Q677H
		S-D614G	S-E484Q	S-E484K	S-144del	S-N501Y	S-P26S	S-N501Y	S-D614G		S-G769V	S-T732S
			S-D614G	S-D614G	S-E484K	S-A570D	S-D138Y	S-D614G	S-P681H			S-E1202Q
			S-P681R	S-P681H	S-D614G	S-D614G	S-R190S	S-A701V	S-E1092K			
			S-Q1071H	S-D796H	S-Q677H	S-P681H	S-K417T		S-H1101Y			
					S-F888L	S-T716I	S-E484K		S-V1176F			
						S-S982A	S-N501Y					
						S-D1118H	S-D614G					
							S-H655Y					
							S-T1027I					
							S-V1176F					

Convergent evolution across viral lineages at certain positions – VoC designation requires both epidemiological linkages and sufficient statistical power understand their significance!

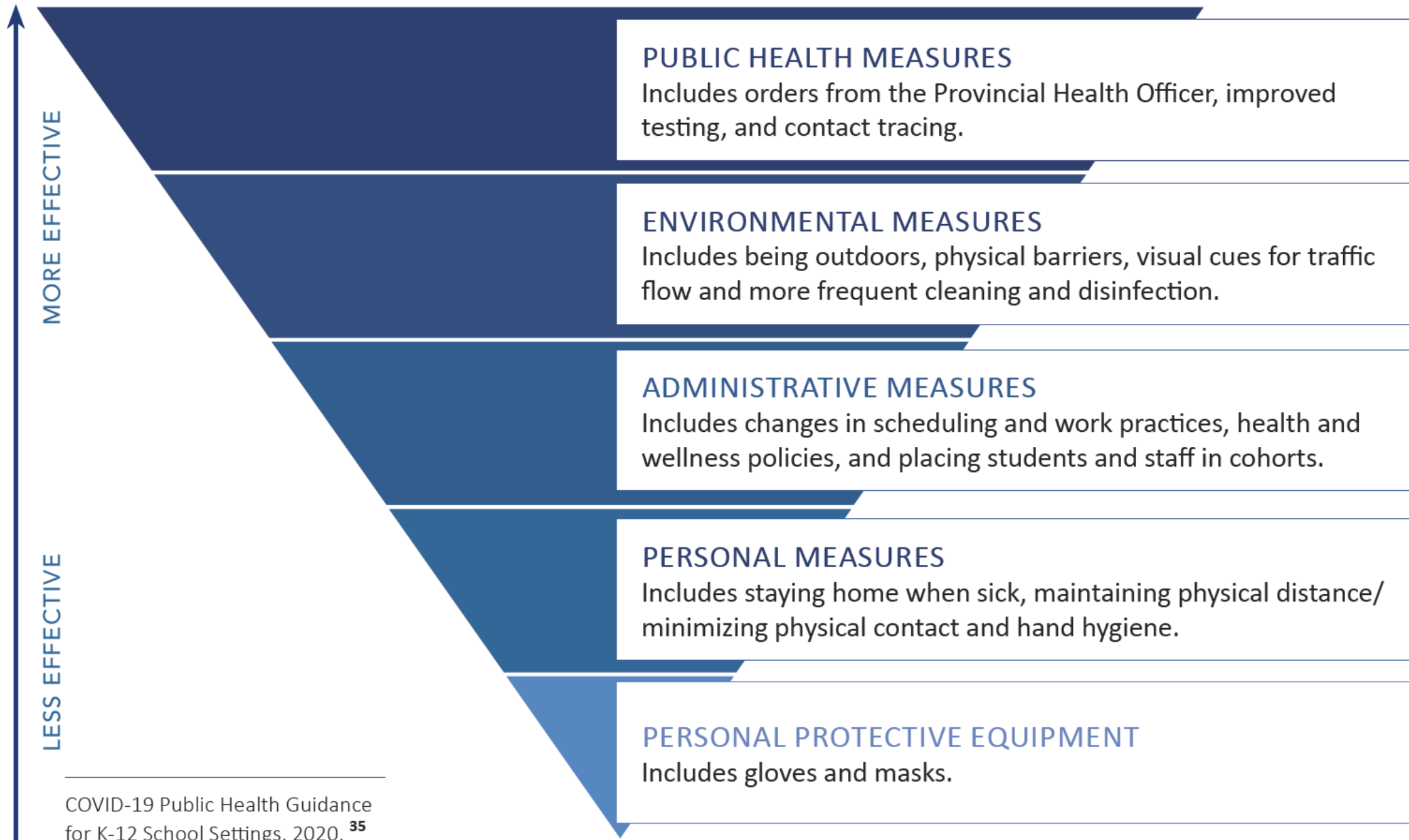
School situation...



VS.



THE HIERARCHY FOR INFECTION PREVENTION AND EXPOSURE CONTROL MEASURES FOR COMMUNICABLE DISEASE



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