

Mitigation strategies for preventing SARS-CoV-2 spread in K-12 schools

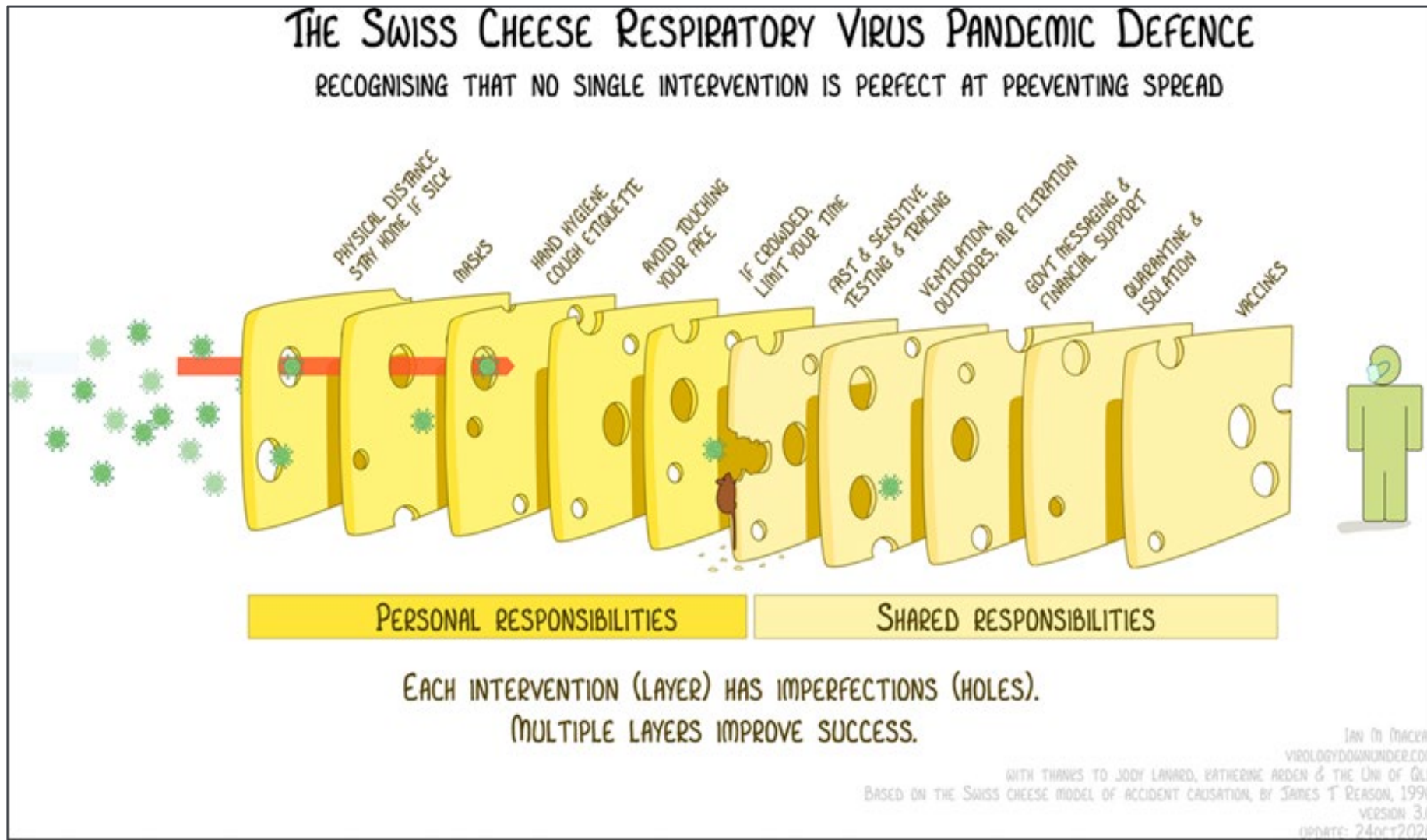
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THE ABC SCIENCE
COLLABORATIVE

Learning | Informed Decision-Making | Research

A number of mitigation strategies



What are we mitigating against?

- ***March 2020 – school closures because of concern that schools would fuel the COVID-19 pandemic (influenza)***
 - *of particular concern because of COVID-19 morbidity and mortality in adults*
- ***Within school transmission of SARS-CoV-2 is the single most important metric for determining the safety of in-person school***
 - When there are cases in the community, there will be cases in schools; this is fundamentally a question of controlling transmission

ABC Science Collaborative: A data-driven approach to support decision making

Informing Evidence-Based
Decision Making

Delivering Educational
Resources for All

Advancing
Public Health

- Superintendent lifeline
- Coordination with state and local health departments
- Stakeholder groups



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Learning Resources

Our goal is to provide information help school make informed decisions.

COVID-19 & The Classroom

Why Do We Need Masks or Face Coverings to Prevent Transmission of COVID-19?

Infected person without a mask

Infected person with a mask

Adapted from J. Wu, Y. Li, American Journal of Infection Control 44: S102-S108

El Consejo Científico Asesor para las escuelas presenta:

La COVID-19 y la serie de seminarios web en el aula

THE ABC SCIENCE COLLABORATIVE

Partners: CHARTER HILL SCHOOLS, ORANGE COUNTY SCHOOLS, DURIAM, WAKE COUNTY PUBLIC SCHOOLS, THE ABC SCIENCE COLLABORATIVE, Duke University School of Medicine, UNC, Duke Clinical Research Institute.

THE ABC SCIENCE COLLABORATIVE

Remote COVID-19 Symptom Monitoring to Support a Safe Return to Campus

The scientific community has emphasized that COVID-19 prevention and isolating positive cases is vital to slow virus spread rates. The new ABC Science Collaborative App is a user-friendly application that is based on state and CDC screening guidelines to conduct a fast, daily, self-reported survey for early identification of potential COVID-19 symptoms and infections to minimize transmission at your school.

APP BENEFITS AT-A-GLANCE

- Assistance that students and staff are arriving on campus without COVID-19 symptoms and illness.
- Easy campus check-in of healthy students and staff.
- Identification of students and staff with COVID-19 or COVID-19 symptoms so that the school administration can remove precautions are taken to reduce transmission on campus.
- Links to local resources, like testing sites.
- Automated reminders to use the application.
- Educational content to increase knowledge of COVID-19 transmission and prevention.
- Opportunity to participate in scientific research related to COVID-19 and other topics relevant to students, families and school staff.

FAST, VIRTUAL HEALTH CHECKS

Step 1: Download the app.

Step 2: Create an account.

Step 3: Complete a daily two-minute virtual symptom survey.

Step 4: Receive your daily pass.

Step 5: Show your pass upon entry to school. Green pass? You're off! Red pass? You should probably stay home or seek medical care.

Step 6 (optional): Want to go the extra mile to help your community? Sign COVID-19! Use the app to sign up for research opportunities.

ABOUT THE ABC SCIENCE COLLABORATIVE

The ABC Science Collaborative is a program that pairs scientists and physicians with school and community leaders to help understand the most current and relevant information about COVID-19. The program helps school leaders make informed decisions about returning to school using data from their own communities.

The Duke School of Medicine and the Duke Clinical Research Institute have established the ABC Science Collaborative with funding from the National Institutes of Health.

NEW FEATURES COMING SOON

Dashboard display of de-identified COVID-19 symptom and diagnosis data for students and staff in your school as compared to the school district, local, state and national communities.

THE ABC SCIENCE COLLABORATIVE

LEARN MORE AT: abcsciencecollaborative.org

ABC Science Collaborative studies NC schools

Period	Grades	Number of School Districts	Number of Staff	Number of Students	Total (Students and Staff)	Community-acquired infections	Within-school transmission Students and Staff
Fall 2020	K-12	11	18,184	117,417	135,601	773	32
Winter 2020-21	K-12	13	23,134	138,071	161,205	4,969	209

In masked environments, data from North Carolina tell us **the secondary attack rate** was

- 1% in the fall, 32 cases from >3,000 quarantined
- <1% in the winter, 209 cases with 26,619 quarantined

****Without changes in ventilation practices and screening testing; masking adherence HIGH**

Success in preventing COVID-19 transmission in classrooms is defined by strength of leadership in enforcing mitigation strategies → not by community transmission

Impact of distancing: NC and Wisconsin schools with universal masking*

	Districts, n (%) ^a	Students, n (%)	Student Primary Infections, n	Student Secondary Infections, n	Secondary-to-primary Infection Ratio ^b	Relative Rate of Secondary Transmission ^c	95% CIs ^d
Bus practice (children per seat)							
1	13	36,975	190	12	0.06		
2	17	656,444	4388	210	0.05	0.76	0.19 - 2.96
3	17	205,996	1758	83	0.04	0.75	0.18 – 3.19
Other ^e	6	43,519	353	25	0.07	1.12	0.27 – 4.71
Distancing							
6 feet	10 (9%)	54,557	276	12	0.04		
3 feet	76 (67%)	610,236	4140	207	0.05	1.15	0.31 – 4.24
<3 feet	27 (24%)	278,141	2273	111	0.05	1.12	0.28 – 4.45
^a analysis excludes the composite NC charter schools district because of varying practices among schools. ^b calculated by the composite number of student within-school–acquired infections (secondary infections) divided by the student community-acquired infection (secondary infections) for districts in each category of bus practices or distancing ^c Relative rate of secondary transmission for each primary infection, compared to the reference range (for bus analysis: 1 child per seat; for distancing analysis: 6 feet of distancing). Relative rates were calculated by quasi-Poisson regression with the number of primary student cases as the denominator. ^d Robust CIs calculated to account for overdispersion ^e Other category was assigned when districts could not give a policy practice for children per bus seat because of widely varying practices CI, confidence interval; NC, North Carolina; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2							

*Schools did not make substantial investment in ventilation or screening testing

Research from N.C. is consistent with other studies with universal masking

State	Period	Grades	School Districts	Staff	Students	Students and Staff	Community-acquired infections	Within-school transmission students and staff
Georgia	12/2020-01/2021	Elem.	1	700	2,600	--	--	45
Missouri	12/7/2020-12/18/2020	K-12	2	--	21,342	--	--	2
Utah	12/3/2020-1/31/2021	K-6	20*	1,214	10,171	11,385		5
Virginia	9/14/2020-1/29/2021	K-12	1	20,681	4,282	24,963	787	33
Wisconsin	8/31/2020-11/29/2020	K-12	1	654	4,876	5,530	184	7

*In Utah study, data are from 20 schools.

1. Gettings JR, Gold JAW, Kimball A, et al. *MMWR Morb Mortal Wkly Rep* 2021;70:289–292.
2. Dawson P, Worrell MC, Malone S, et al. *MMWR Morb Mortal Wkly Rep* 2021;70:449–455.
3. Hershow RB, Wu K, Lewis NM, et al. Rowland LC, Hahn JB, Jelderks TL, Welch NM, Ramirez DWE. *JPIDS* 2021; piab075
4. Falk A, Benda A, Falk P, Steffen S, Wallace Z, Høeg TB. *MMWR Morb Mortal Wkly Rep* 2021;70:136–140.

SCHOOL SAFETY, MASKING AND THE DELTA VARIANT

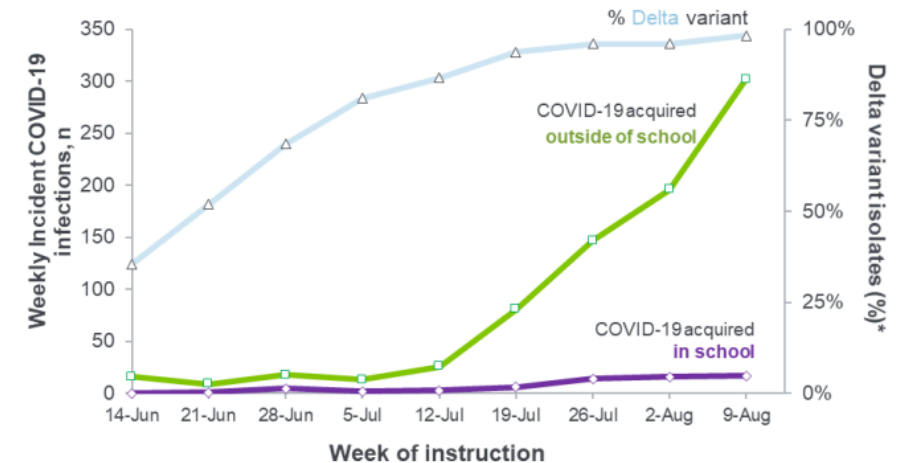
- Goal: Assess K-12 school safety in the Delta era
- Methods: Study time, 14 June-13 August 2021, NC; mitigation (<3ft recommended, mask mandate, quarantine for contacts)
- Results: Participants = 20 school districts, 783 schools, 59,561 students, 11,854 staff.
 - No schools closed as result of COVID-19
 - community-acquired to school acquired infection ratio was ~12.4 (808/64).
 - Secondary attack rate of 2.6% (64 secondary infections/2,431 quarantined close contacts).

Table 1. Primary Infections, Secondary Infections, and Quarantine Occurrences in Students and Staff

	Total Districts, n	Total Children, n	Total staff, n	COVID-19 Transmission				Quarantine	
				Student Primary, n	Student Secondary, n	Staff Primary, n	Staff Secondary, n	Student	Staff
Total districts	20	59561	11854	619	60	189	4	2032	399
District size									
Small	6	4071	484	26	1	9	0	84	7
Medium	7	9915	1599	47	14	21	1	248	31
Large	7	45,575	9771	546	45	159	3	1700	361

COVID-19, coronavirus 2019

COVID-19 Infections Among >70,000 NC Summer School Staff and Students in 2021: Cases Acquired in School (universal masking) vs. Cases Acquired Outside of School



*Percent Delta variant in HHS Region 4, which includes: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee

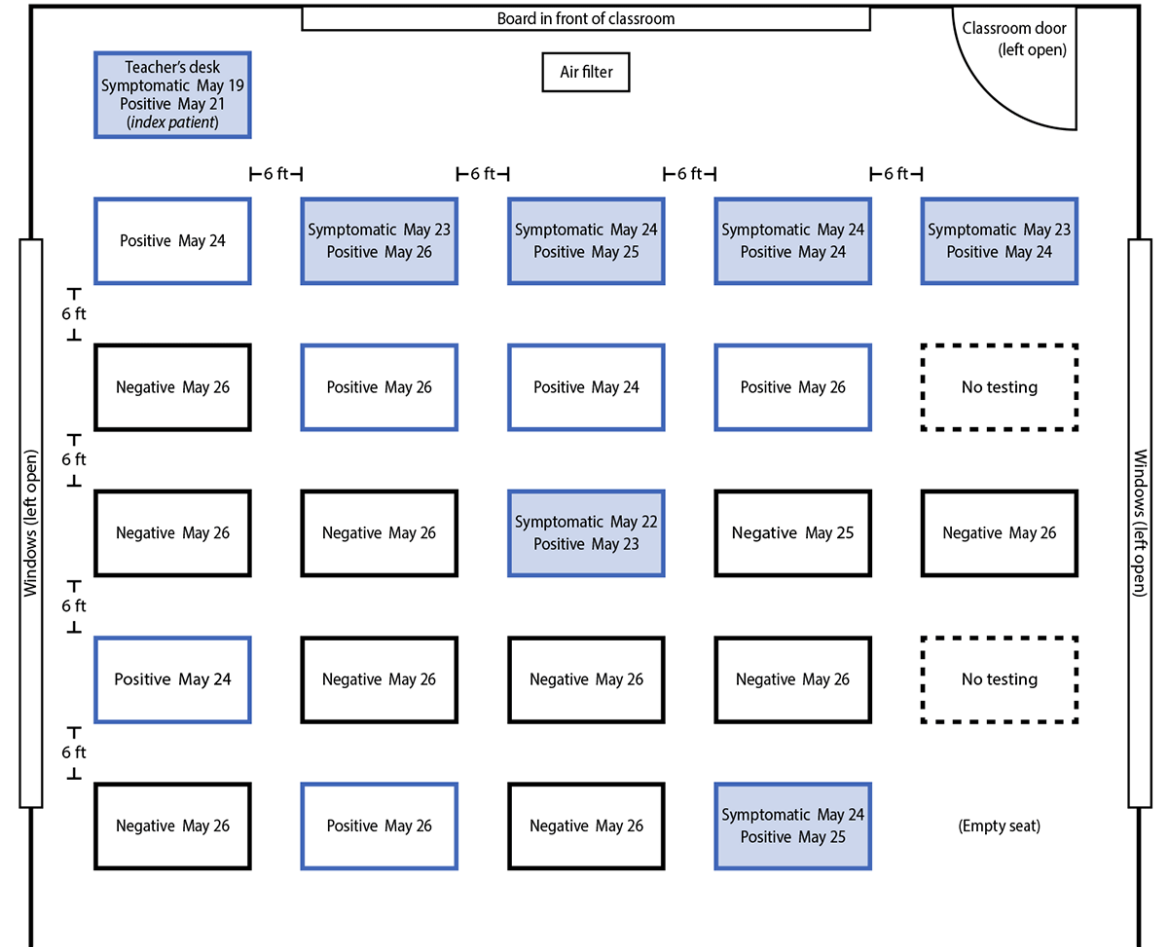
Figure 1. COVID-19 Infections among Summer School Staff and Students

COVID-19 infections among >70,000 North Carolina summer school staff and students, displayed according to weekly cases acquired in school vs. cases acquired outside of school, with an overlay of weekly proportion of SARS-CoV-2 isolates in the region consistent with the B.167.2 (Delta) variant.

COVID-19, coronavirus 2019; NC, North Carolina; SARS-CoV-2, severe acute respiratory syndrome coronavirus-2

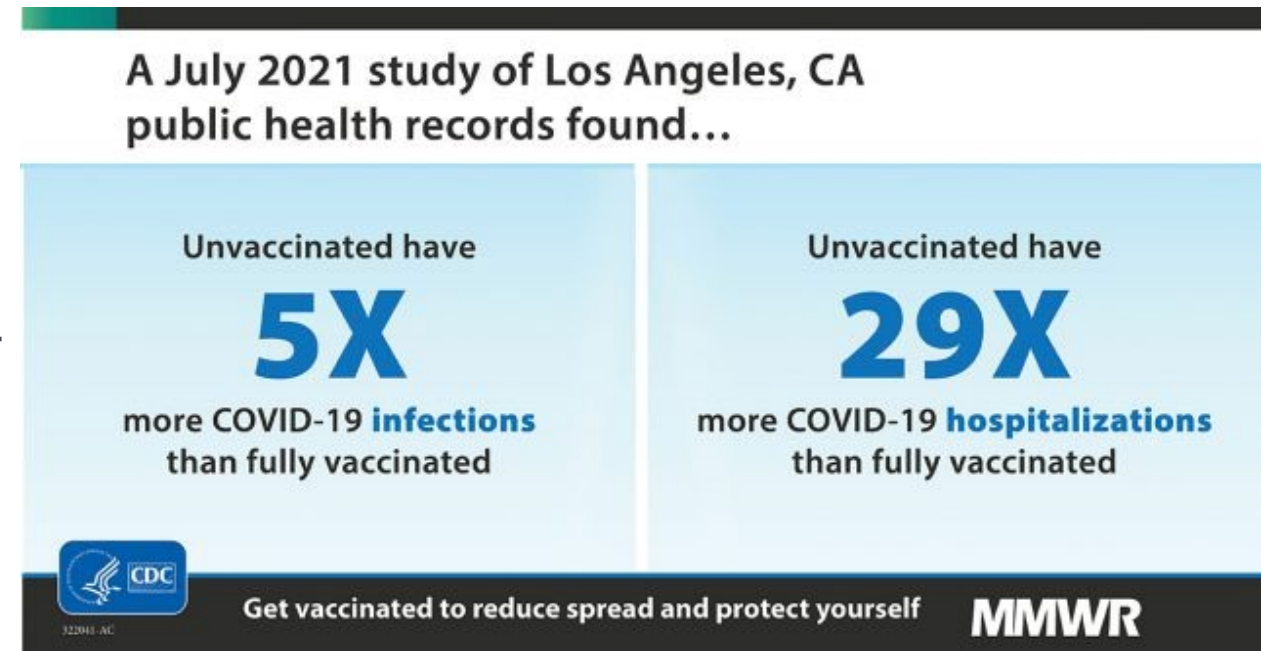
Outbreak Associated with SARS-CoV-2 B.1.617.2 (Delta) Variant in an Elementary School

- **Symptomatic, unvaccinated teacher unmask**s to read aloud to class despite school requirements to mask while indoors.
- Class with open windows and doors and portable HEPA filter
- 6ft Distancing between students
- 26 cases were identified
 - 12/22 students test positive test results.
 - 6/18 students in a separate grade are positive and with same genome sequencing
 - 8 additional cases in parents and siblings of students in these two grades



We now have THE key to avoid the morbidity and mortality for which schools closed: VACCINATIONS

- Now approved ≥ 5 years of age
- Single most important opportunity to protect yourself...all other strategies rely on others and come with uncertainty
- Vaccines REMAIN HIGHLY EFFECTIVE AGAINST COVID-19
- During May 1–July 25, 2021, among 43,127 SARS-CoV-2 infections
 - 10,895 (25.3%) were in fully vaccinated persons
 - 1,431 (3.3%) were in partially vaccinated persons
 - 30,801 (71.4%) were in unvaccinated persons.
- On July 25, infection and hospitalization rates among unvaccinated persons were 4.9 and 29.2 times, respectively, those in fully vaccinated persons.



Next Steps for COVID and schools

- What we know:
 - In 2020-2021: foundational understanding that consistent universal masking allows for safe in-person instruction (independent of community transmission)
 - Vaccination substantially reduces spread of infection, acquisition of infection, and severity of infection
 - Prior infection provides some protection for at least several months
 - At some point, mitigation strategies will unwind...foundational understanding will relate to vaccination and community transmission
 - Lot's of work to do to recover from the last year+ (learning loss, obesity, mental health, etc)
- What we don't know:
 - How much vaccination and recent infection provides protection to a community
- What we can do: develop plans to start to unwind mitigation strategies → **data monitoring is key**

Key Takeaways

- Within-school transmission is the key measure by which to measure school success
- Within-school transmission does not depend on community transmission when mitigation strategies (universal masking) are in place
- We can have success in limiting within-school transmission– even with Delta
- Vaccinations are the single most effective strategy to protect the K-12 school worker (and students) from SARS-CoV-2
- As mitigation strategies unwind, data monitoring is key