

Guidance for the Preparation and Operation of Ventilation Systems in Schools during COVID-19

Environmental Health and Drinking Water Branch
Environmental and Occupational Health Assessment
July 30, 2020

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CONNECTICUT DEPARTMENT of PUBLIC HEALTH

Yale SCHOOL OF PUBLIC HEALTH



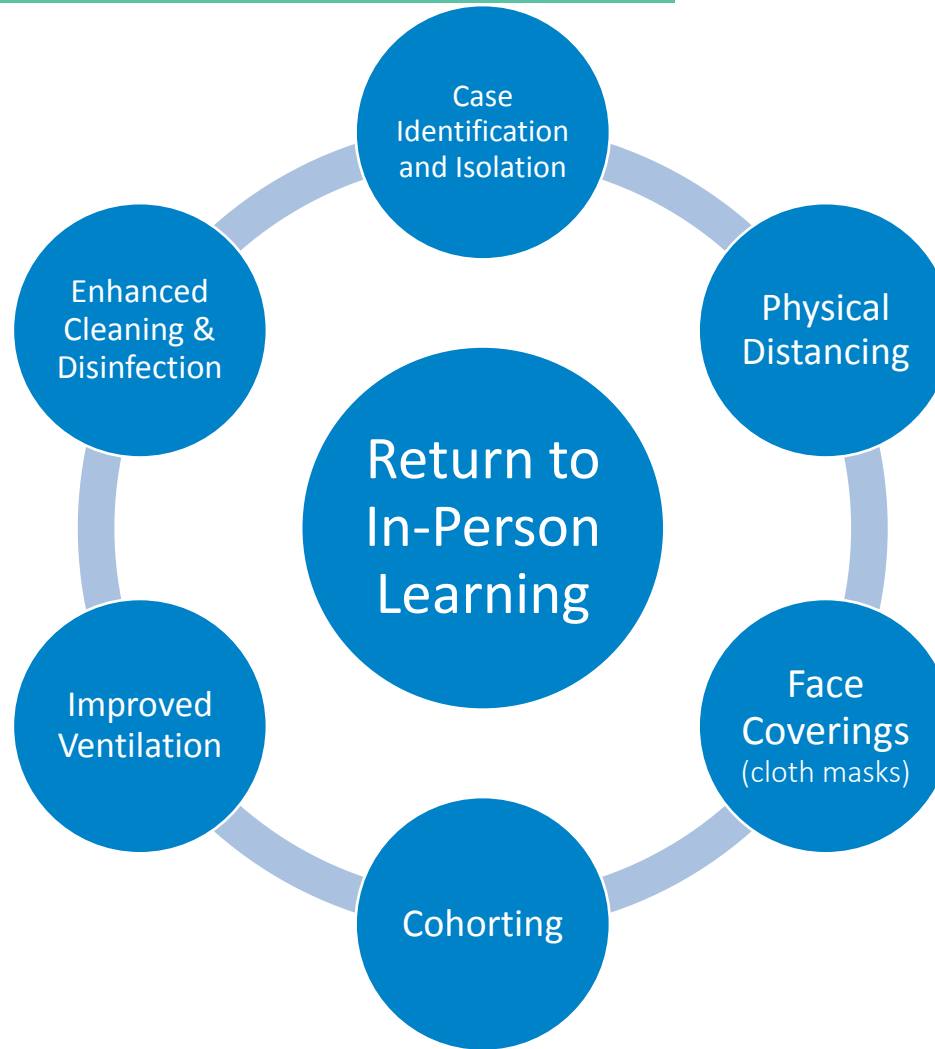
Mitigation Strategies

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Improving Ventilation in Schools

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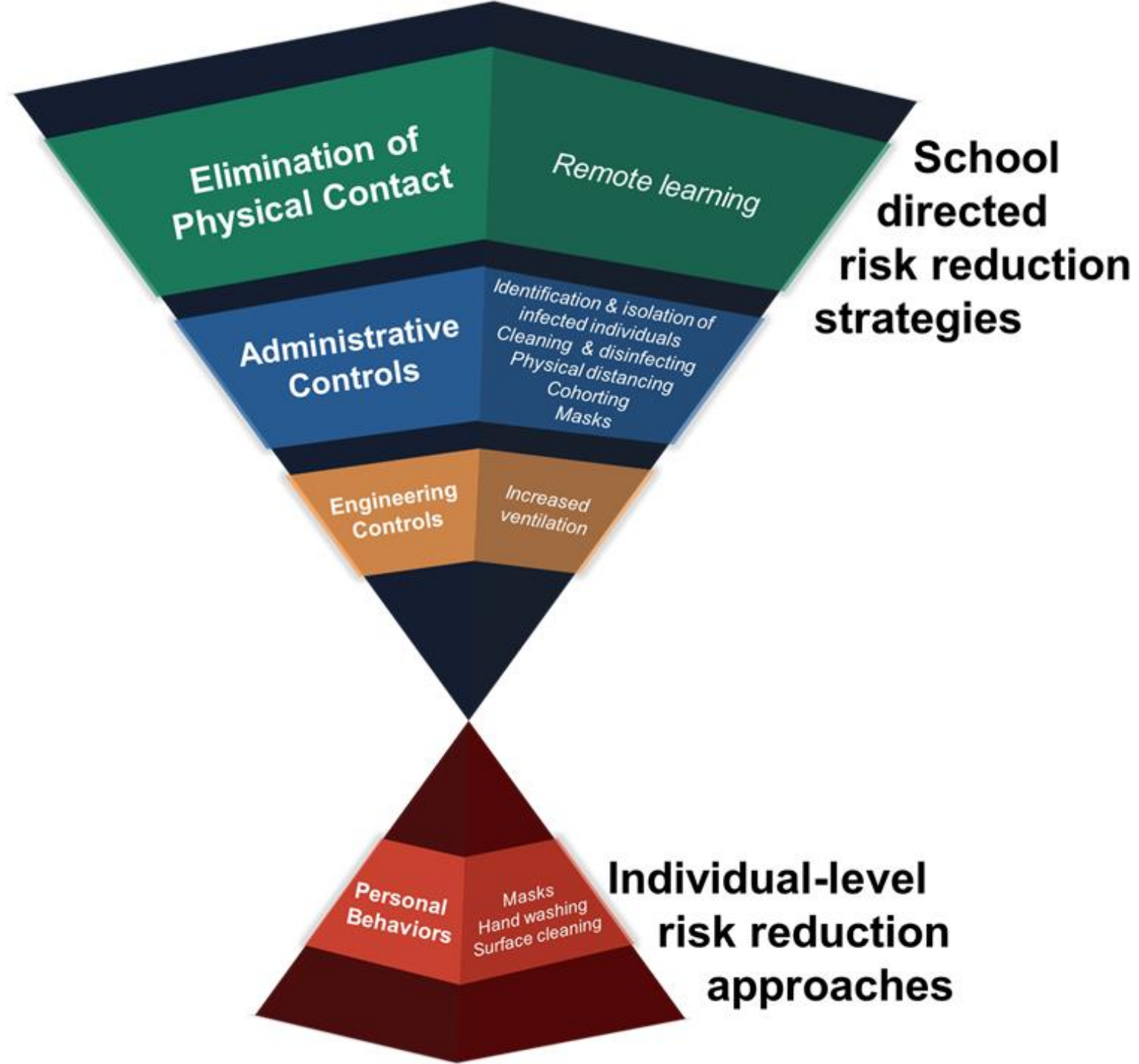
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Systems Approach to Maximize Health and Safety

- Face Coverings (masks), Physical Distancing, Isolating/Excluding illness, Cohorting, Cleaning and Disinfection
- Improved ventilation is just one part of a system of strategies:
 - ✓ Attention to good ventilation can reduce the virus load indoors
 - ✓ Good ventilation is known to improve student/staff performance
 - ✓ Optimizing systems already in place will benefit schools even when COVID-19 is gone

DPH
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Main Goals for School Ventilation

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The **three main goals** that every school system should target to improve ventilation in schools and help reduce COVID-19 risk are:

1. To fully understand the design and components of every building's mechanical systems, what those components are capable of, and their limitations
2. To adjust the functioning of your current systems to optimize their capabilities for air flow, filtration, and fresh air intake
3. To make cost-effective and manageable improvements where necessary (filter upgrades, replacing worn parts, etc.), while avoiding unnecessary and costly upgrades, add-ons and system supplemental treatments



Before School Buildings Open

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Prior to re-opening school buildings for in-person learning, school districts should:

- Commission building mechanical systems for full occupancy (working with a Mechanical Engineering firm is best)
- Operate ventilation systems at full capacity for one week prior to opening school buildings for occupancy
- Communicate your plan and new procedures for mechanical systems to:
 - Facilities team
 - School administrators
 - School staff
 - Parents and students



Questions to Ask Commissioning Agent

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How many and what types of HVAC systems serve your buildings?

What are the capabilities and limitations of your current systems?

Are your systems currently working to their full capabilities?

Can your current systems satisfy your needs for operating at full capacity now?

Can demand-based system controls be converted to constant volume?

To what extent can air recirculation be minimized and outside air be increased?

What effect will system changes have on thermal comfort (temp/RH)?



Commissioning Process Expectations

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As part of the commissioning process, your Commissioning Agent should be able to provide you with:

- ✓ A summary of performance expectations for your ventilation systems (i.e. fresh air delivery, air change rate for individual classrooms)
- ✓ Measurements to understand total air distribution throughout the building(s)
- ✓ Inspections and evaluations of all building ventilation systems (manually-controlled and automated)
- ✓ Air balancing and retesting to ensure that parameters are satisfied for full occupancy
- ✓ Certification that the work performed is in accordance with the guidelines from a certifying body (NEBB, TABB, AABC)



Commissioning Process Expectations

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At a minimum, mechanical system inspections should include:

- Filter frames. Fix or replace broken or misshapen frames to prevent air bypass. Discuss filter upgrades recommended for COVID-19.
- Dampers and all associated controllers and actuators.
- Automated set points (inspect, verify, and modify as needed). Discuss temperature, humidity, and CO₂ set points.
- Supply and return diffusers. Are they allowing air flow? Are they too close to each other (or located in different rooms)? Is short circuiting occurring?



After School Buildings are Open

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Once school buildings are re-opened for in-person learning, procedures should include:

- Daily Building Air Flushing Periods: Running systems for full occupancy with maximum fresh air intake for **2 hours prior** to occupancy and **1 hour after** the building is empty for the day
- Programming/locking fans to align with the normal occupancy schedule
- Not allowing anyone but designated facilities staff to change ventilation controls in classrooms or common areas
- Always running the ventilation system while the building is occupied
- Running bathroom ventilation systems continuously (24/7)



Nurse's Offices and Isolation Rooms

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Branches of the system supplying nurse's offices or rooms designated for sick students should run continuously

- Consider locating isolation rooms on the same branch as the nurse's office to increase efficiency
- Consider adding a window fan to exhaust room air or a portable air cleaner (HEPA unit) in these rooms, particularly if ventilation cannot be continuously run
- Portable air cleaner advice:
 - HEPA filters only. NO ionizers, ozone generators, UV light, other add-ons
 - Correct size for the room, with appropriate clean air delivery rate (CADR 250+ cfm)
 - Located for greatest efficiency within the space (and off of the floor)
 - Run at all times when the space is occupied



Areas without central ventilation systems

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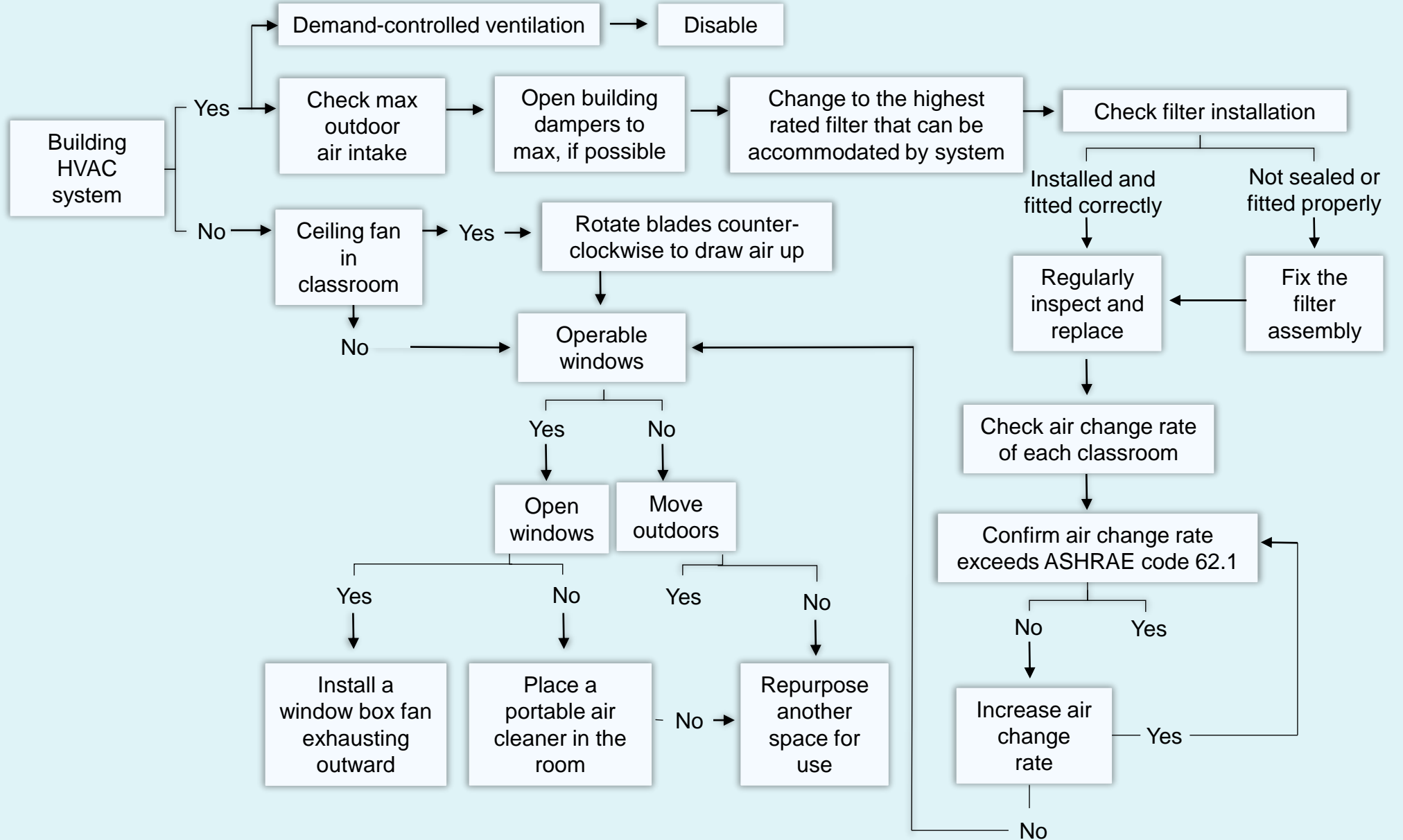
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- At a minimum, open windows to allow for fresh air exchange. Window fans can be used to exhaust air outdoors, but not directly into outdoor areas where people walk or congregate. Do not use fans that blow air into a room or only serve to move room air currents around.
- If window AC units are available, they should be located properly. Bypass any efficiency functions that promote recirculation. Set AC speed on low, and point them away from room occupants.
- Adjust ceiling fans so fins rotate in direction that draws air currents up towards ceilings rather than down onto occupants
- Air cleaner units are only recommended for classrooms where no other ventilation options are available.
 - Effectiveness highly variable, impact likely insignificant with low viral loads in 'well' classrooms, cost to buy and maintain, noise, energy impact and heat generation





Should We Consider UV-C Components?

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Short answer, **no**. Longer answer, because...

- They are very expensive and their real-world impact on COVID-19 transmission is unknown (aerosol impacts vs. droplet transmission)
- Additional costs for parts, warranty, inspection/verification
- Maintenance requirements may be extreme (some in-system lamps may require daily cleaning)

Instead of exotic solutions, focus on...

- Maximizing the systems you have in place
- Adding proven and cost-effective upgrades, if needed
- Making up for deferred maintenance (Years? Decades?)



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Most importantly, school systems must remember that:

- Improved Ventilation is just **one part** of a system of strategies
- Face Coverings (cloth masks), Physical Distancing, Cohorting, Cleaning/Disinfection, Identification/Isolation/Exclusion of sick students/staff are all also important
- If compliance with other mitigation strategies is poor in schools (or even less than good), there isn't much that ventilation systems can do to offset that increased risk for school populations.

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**Thank you for all you do to make CT schools
healthy environments for learning!**

Questions?

