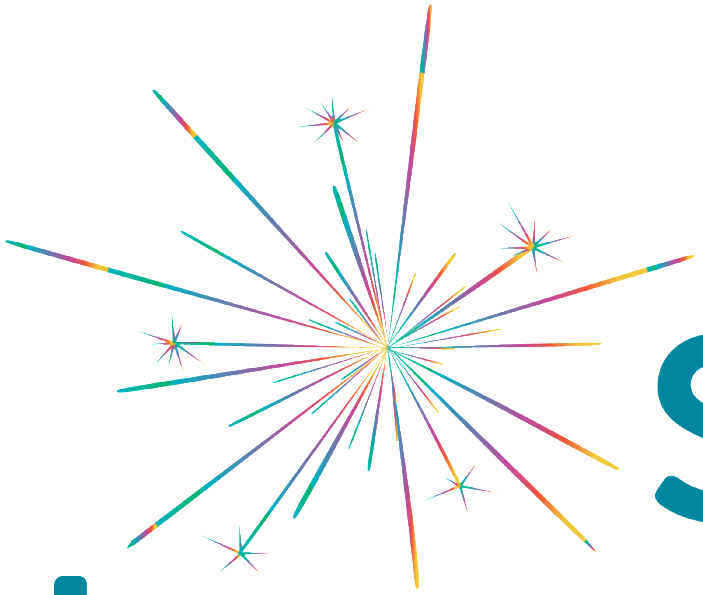

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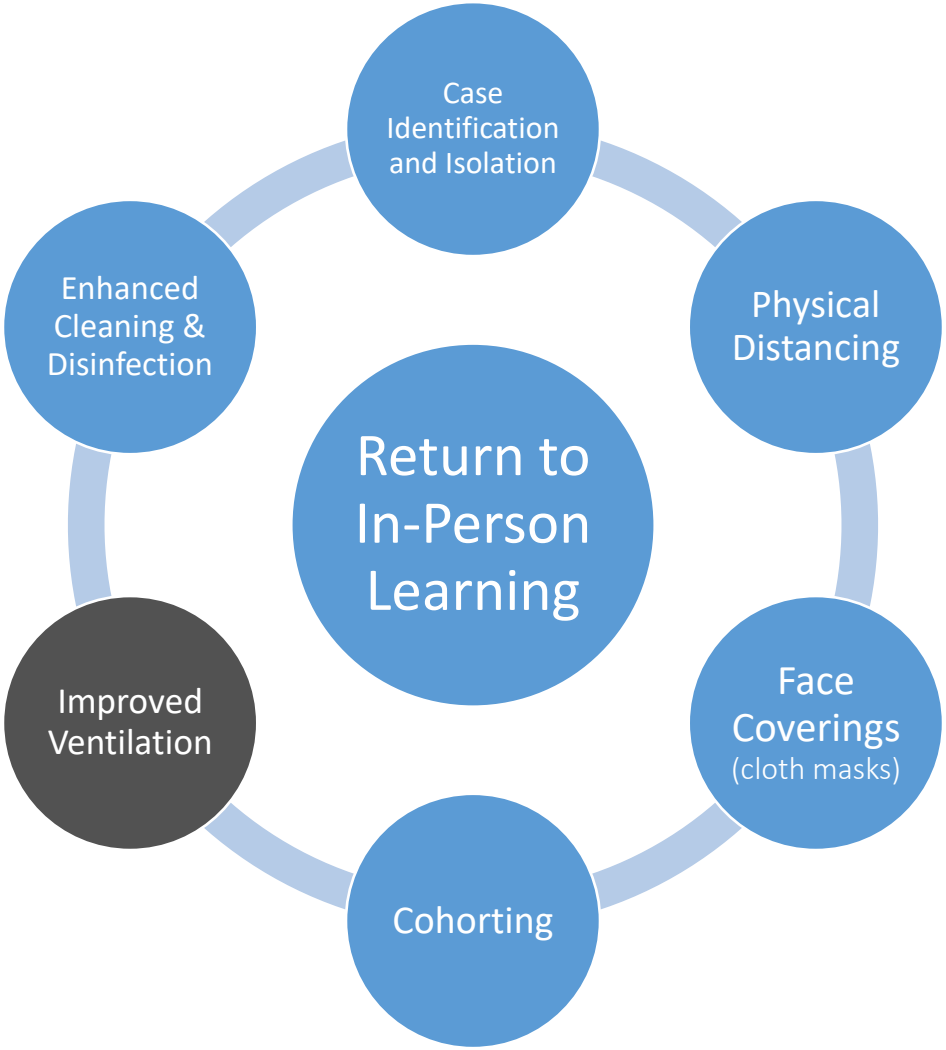
IMPROVING VENTILATION FOR HEALTHIER LEARNING ENVIRONMENTS

Tom St. Louis, MSPH and Meg Harvey, MPH
Connecticut Department of Public Health

CONNECTICUT STATE DEPARTMENT OF EDUCATION

Mitigation Strategies



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Improving Ventilation In Schools

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 and making ***effective and appropriate improvements*** will benefit schools even when COVID-19 is gone

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Main Goals for School Ventilation

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 add-ons and supplemental treatments

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Before School Buildings Open

Prior to repopulating school buildings for in-person learning this Fall, school districts should:

- **Commission** building mechanical systems
  - ✓ work with a Mechanical Engineering firm to do this, if possible
  - ✓ include facilities staff and a trusted and qualified local HVAC professional who can be called upon to assist in emergencies
  - ✓ remember that system demands will be different this year as you plan for full occupancy 5 days per week
  - ✓ Commissioning agent should leave you with a detailed report on the system's current status and recommendations for improvements

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Before School Buildings Open

Prior to and during the school year:

- **Communicate** early and often with all interested partners
  - ✓ keep local health departments aware of ventilation conditions and changes in your schools
  - ✓ include facilities staff and a trusted and qualified local HVAC professional in partner discussions and during commissioning
  - ✓ remind students and staff not to change/reset/turn off any mechanical controls in the building (bring concerns to facility mgmt.)
  - ✓ let families know what layered mitigation strategies will be used in schools and where current ventilation and upgrades fit in

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After School Buildings Are Open

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

- Running systems for full occupancy with **maximum fresh air intake for 1 hour** prior to occupancy (priming)
- 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, including continuous exhaust ventilation in bathrooms
- Including facilities staff in event schedule planning so that ventilation systems will operate appropriately for events outside the normal school day (e.g., sporting events, performances, public meetings, etc.)

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Cost Considerations

Consider these questions for targeting HVAC improvements to the greatest benefit of your school:

- Where is your system now and where do your trusted professionals think it should be? *(striving for ASHRAE 62.1)*
- Do the improvements being considered require time and vacancy?
- How much money do you have to invest now? *(upgrades can range from no-cost to millions)*
- How much money will be available in budgets for necessary maintenance in the future? *(are you installing a complicated system in a district with traditionally "shoestring" maintenance budgets)*

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The smartest way to spend your money for school building ventilation is to ***invest in contracts with independent, qualified, and trusted professionals*** (as opposed to product manufacturers or salespeople) who can assist you with short-term improvements and longer-term maintenance.

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Investing in contracts with independent, qualified, and trusted professionals

Mechanical system improvements should then focus on:

1. Increasing the amount of **fresh outdoor air** being introduced into classrooms and other occupied spaces during the school day
2. Increasing the system's ability to **dilute/filter/remove air contaminants** (carbon dioxide, concentrated aerosols, outdoor air pollutants, etc.)
3. Increasing the system's ability to **control temperature and humidity** (thermal comfort)
4. Improving the level of **automation and efficiency** of the system

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Considering new technologies

UV-C? Upper-Room Germicidal Units? Bipolar Ionization?
Antimicrobial coatings? Electrostatic sprayers? HEPA Units?

Best to **stick to the basics** and not jump at shiny new objects

- Most are very expensive and the evidence for their **real-world impact** on COVID-19 transmission or the improvement of indoor air quality ranges from **unknown to non-existent**
- Some can actually make indoor air contamination and exposure **worse**
- Additional **hidden costs** for parts, warranty, inspection/verification
- Maintenance requirements may be extreme and require **special training**

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Nurse's Office & Isolation Rooms

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 HEPA unit in these rooms, particularly if ventilation cannot be continuously run
- Stand-alone unit 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 the floor)
  - Run at all times when the space is occupied

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Areas without central ventilation systems

- 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
- HEPA filtering units are only recommended for classrooms without central mechanical ventilation in use (e.g., unit ventilators, 100% natural, etc.)
  - Effectiveness highly variable, impact likely insignificant with low viral loads in 'well' classrooms, cost to buy and maintain, noise, energy impact and heat generation

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Improving Ventilation in Schools

Most importantly, school systems must remember that:

- Improved Ventilation is just **one part** of a system of strategies
- Vaccination, 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!

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