
AEML, Inc.
Microbiology Laboratories

**Episode 652 | January 21, 2022 | 12:00 PM EST**

**Ed Light, CSP, CIH**
**Practice to Research: IEQ Lessons from the Real World**

This week we explored some real-world examples of Practice to Research with Mr. Ed Light. In his 40 year career as an industrial hygienist specializing in IAQ, Ed is unique in also having extensive experience in public health and HVAC engineering. Today we discussed Ed's critical review of IAQ researchers' and practitioners' response to COVID and his related study comparing the use of MERV-8 to MERV-13 filters in a school, presented at the Healthy Buildings 2021 Conference.

**Show Links:**

- COVID-19 Transmission Document
- COVID-19 Powerpoint
- Filter Powerpoint

**Ed's COVID Presentation:**

IAQ researchers and practitioners have played an active role in responding to the COVID pandemic, focusing on specific changes to building O&M-
But has this actually made a difference? Can we do better?

COVID response in buildings is generally based on aerosol science, mechanical engineering, and basic infection control principles. It prioritizes maximizing ventilation, filtration, air treatment and sanitizing based on assumptions that long-range and HVAC transmission are important. While it's been clearly established that COVID is airborne, the critical issue for control strategy is close- vs. long-range transmission. Although long-range exposure is potentially associated with HVAC, ventilation and filtration, close-range is not significantly influenced by HVAC.

While COVID research to date generally estimates exposure and calculates theoretical risk, epidemiology is based on actual disease transmission. While epidemiology has been critical to tracking the spread of COVID-19 and making overall public health decisions, it has been largely overlooked in the implementation of operations and maintenance changes to minimize transmission in buildings.

Ed recently completed a literature review and found sixty-two papers which included epidemiology related to COVID transmission pathways in buildings and the efficacy of control measures. Here are some highlights of Ed's findings (details can be found in the attached PowerPoint):

<u>How COVID spreads in buildings:</u>

- Most transmission is close-range.
- Long-range transmission is infrequent and generally associated with very poor ventilation.
- There is no evidence supporting transmission by HVAC recirculation.
- Fomite transmission is infrequent.
- Sewer gas has been associated with COVID transmission four studies.

<u>How effective are COVID control measures?</u>

- Implementation of non-O&M measures (masking social distancing, social distancing, occupancy limits, occupant screening and hand washing) has been proven to reduce COVID spread in buildings.
- The epidemiology on O&M measures, on the other hand, only suggests that addressing very poor ventilation and air distribution that concentrates the virus are likely to benefit occupants.
- Portable HEPA filters have been shown to reduce overall virus exposure with proper placement and maintenance but are unlikely to stop close-range infection.
- While UV can inactivate virus, it has not been established to reduce exposure in non-healthcare settings.
- No air cleaning systems have been shown to reduce COVID exposure or transmission.

Ed recommends:

- COVID response strategies in buildings should focus on measures established to reduce transmission. Cost-effective resource allocation should recognize the importance of administrative infection control measures and consider lower-cost options for enhancing O&M.
- COVID research should focus on determining the prevalence of transmission routes and the efficacy of response measure. Epidemiological evaluation and sampling of infectious virus in buildings are particularly important in this regard.

## Comparison of MERV 8 and 13 filters in an elementary school

Ed's team of industrial hygiene and mechanical engineers evaluated this for a school district in a school with eleven similar HVAC zones, each controlled by a rooftop unit. Different MERV 8 or 13 filters were used in 10 units and an air cleaning system in one. Filter performance was monitored over one year. Building Dynamics also conducted a literature review of the health effects of indoor particulates
His findings included:

- Evaluation of the air units prior to the study found air bypass around several filters. Correction of these substantially improved particulate control without increasing MERV rating.
- The effectiveness of filters varied widely after a year- one MERV 13 filter declined to MERV 8 and one MERV 8 performed at MERV 11.
- The air cleaning system had a much lower performance after one year.
- Pressure drop across all filters was acceptable after one year, but the air cleaning system was not.
- IAQ tests suggested that MERV 13 did reduce fine particulates and that the air cleaning system did not produce ozone.
- Accumulation of surface dust in the classrooms was a major source of airborne particulate and was not controlled by the HVAC filters.
- Available research is insufficient to establish that upgrading filters from MERV 8 to 13 improves overall occupant health. An exception is where there is a major source of outdoor air pollution near the school.
- Some occupants with pre-existing allergies may also benefit.
- MERV-13 filters cost an average of 5x that of MERV-8. Initial cost of the air cleaning system was $1700.

- Enhancing maintenance and custodial work appeared to be a more cost-effective strategy for reducing particulate exposure.

**Nuggets mined from today's episode:**

- Ed was disappointed with many school responses to COVID who, he believes, have wasted money on unproven "gizmos".
- As a kidney transplant recipient, vaccination has been ineffective for him. He's continued to do field work and stayed COVID-free relying on the protection of an N-95 respirator.

Ed closed out the show with his original song, "Here comes Cyrus the Virus," accompanying himself on banjo, kazoo and siren whistle!

More detailed information on Ed's presentations is attached and others are available for downloading at Building Dynamics' website:
www.Building-Dynamics.com

Contact info for:
Ed Light, CIH
Building Dynamics, LLC
240-899-6926
*elight@Building-Dynamics.com*

***Z-Man signing off***

Trivia:

In the 1972 movie Deliverance actor Billy Redden portrayed the inbred hillbilly banjo player, how much was he paid for his performance?

Answer: $500

Answered by: Neil Zimmerman, PhD