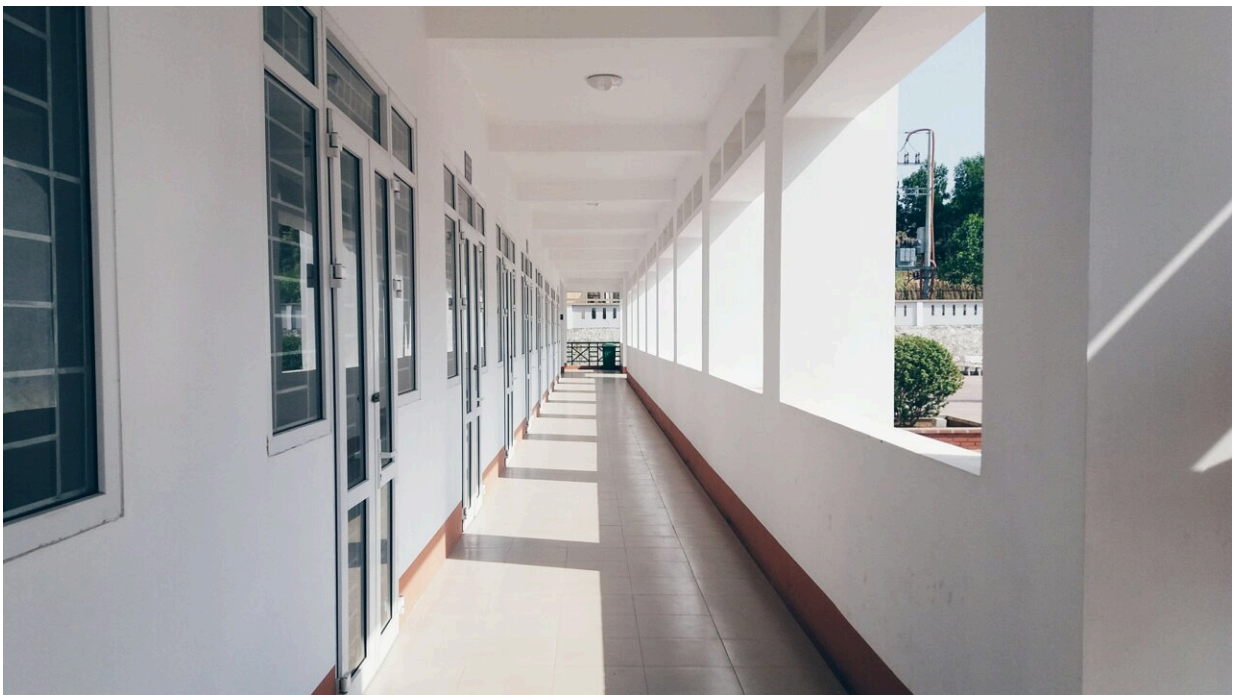


Air quality in schools: Shielding kids with intellectual and developmental disabilities from COVID

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During the pandemic, University of Rochester Medical Center (URMC) researchers, including those from the Intellectual and Developmental Disabilities Research Center (IDDRC), teamed up with the Mary Cariola Center to study ways to prevent COVID infection among children with

intellectual and developmental disabilities (IDD), a particularly vulnerable population. Together, they found that good airflow and filtration in schools may help these children and their teachers avoid COVID infections. The study is published in *PLOS ONE*.

The COVID pandemic was a particularly difficult balancing act for children with IDD and their families. The Mary Cariola Center, a special education school in Rochester, NY, serves more than 450 students aged 3–21 years with severe IDD and complex medical needs. Many of these children are at heightened risk for infection, but they may also struggle with protective measures, like masking and distancing. Many students rely on the Center for needed services and therapy, so it was imperative to keep these kids in school—and to make sure school was as safe as possible.

With an eye toward expanding the limited COVID prevention toolbox available to these children, URMIC researchers and Mary Cariola Center administrators turned their attention toward airflow and filtration in the school.

"COVID, like flu and RSV, is primarily spread through the air," said Martin Zand, MD, Ph.D., dean's professor of Medicine and senior associate dean for Clinical Research at URMIC, who co-led the study. "The virus that causes COVID can circulate in the air for up to three hours, so the quicker you filter or circulate out that air, the better."

Zand, who is also a co-director of the Clinical and Translational Science Institute at URMIC, and colleagues from across the Medical Center measured levels of [carbon dioxide](#), a gas we breathe out, in 100 rooms across three buildings on the Mary Cariola Center campus. While not a direct measure, carbon dioxide offers a relatively easy way to estimate ventilation: lower levels of carbon dioxide indicate better ventilation and air quality.

All 100 rooms, which varied in size and purpose—from small classrooms, therapy rooms, and offices to large activity rooms and gyms—stayed well below the Occupational Safety and Health Administration's carbon dioxide limit. And only three rooms appeared to have lower ventilation (carbon dioxide levels over 2,000 parts per million) for two or more hours during the testing period, which lasted one to three days.

However, many rooms reached moderate carbon dioxide levels (1,001–2,000 parts per million), which are generally safe, but may indicate less-than-optimal airflow. According to the study, the number of COVID cases recorded among people who spent time in a given room was linked to the amount of time that room had moderate carbon dioxide levels (i.e. suboptimal ventilation).

The research team also found a link between COVID cases and air filtration. One building on the Mary Cariola campus has a relatively new ventilation system that can support high efficiency air filters, called MERV-13, that can capture more virus particles. The other two buildings have older systems that aren't strong enough to move air through the tighter, high-efficiency filters. These systems use more porous MERV-11 filters that may allow more virus particles to circulate through the buildings.

Researchers found classrooms that relied on the more porous air filters had higher numbers of total COVID cases. However, the study was not designed to test if infections were acquired in or outside of school.

Since conducting the study, the Mary Cariola Center has been working on several fronts to improve ventilation in any areas of concern across their campus. They have also pursued state funding and begun conversations with property owners to make overall improvements to the ventilation systems.

While this study focused on testing airflow and filtration, it was part of a larger project. That project, collaboratively led by Zand, John Foxe, Ph.D., director of the Del Monte Institute for Neuroscience and co-director of the UR-IDDRC, and Stephen Dewhurst, Ph.D., vice dean for research at the University, brought COVID testing to students and staff in the Mary Cariola Center and helped catch cases early to prevent spreading.

"One thing that COVID taught us is that there isn't one single magic solution that will prevent all infection from all viruses," said Zand. "Rather, a combination of approaches is most effective, including masking, vaccination, ventilation, and air filtration."

More information: Ventilation during COVID-19 in a school for students with intellectual and developmental disabilities (IDD), *PLoS ONE* (2024).

Provided by University of Rochester Medical Center

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