

## *How to Keep the Coronavirus at Bay Indoors*

Tips for dodging the virus as Americans retreat from colder weather: Open the windows, buy an air filter — and forget the UV lights.

By Apoorva Mandavilli

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As the autumn chill ushers people back into homes, classrooms and offices, the coronavirus may resurge even in states that so far have restrained its spread.

Why? The virus poses a greater threat in crowded indoor spaces than it does outdoors. Southern states, for example, saw a spike in infections when the temperatures soared this summer, prompting people to remain inside with the air-conditioners humming.

“I’m a little concerned we’re going to see that shift to the northern latitudes as the weather gets cold,” said Linsey Marr of Virginia Tech in Blacksburg, who studies how viruses move through the air.

In poorly ventilated indoor settings, like most restaurants and bars, the virus can remain suspended in the air for long periods and travel distances beyond six feet, Dr. Marr and other researchers said.

This summer, scientists isolated live virus from tiny droplets called aerosols floating in the air as far as 16 feet from an infected patient in a hospital.

Unless you are living with an infected person — in which case the Centers for Disease Control and Prevention offers specific guidelines to follow — protecting yourself at home does not particularly require extraordinary measures, Dr. Marr said.

And when you venture elsewhere, wearing a face covering and washing your hands are still the best ways to protect yourself indoors.

But fear of the risk of transmission indoors has fueled a market for expensive devices that promise to scrub surfaces — and even the air — clean of the virus. But most of those products are overkill and may even have unintended harmful consequences, experts warned.

“Anything that sounds fancy and isn’t tried-and-true — those are all things to avoid,” said Delphine Farmer, an atmospheric chemist at Colorado State University in Fort Collins. “Soap and water work beautifully.”

We asked experts which strategies people should embrace, and which ones to avoid, as the weather cools.

### **It’s not just about ventilation.**

Some school districts have focused on virus-proofing their ventilation systems, and the C.D.C. has produced an exhaustive set of recommendations for businesses trying to keep employees from becoming infected with the virus.

But “the conversation on risk reduction is beyond ventilation,” said Joseph Allen, an expert on building safety at the Harvard T.H. Chan School of Public Health. “It’s a layered defense approach where no one strategy in and of itself is sufficient, but collectively they can reduce risk.”

Dr. Allen proposed these measures for managing larger buildings:

- Eliminate exposure whenever possible — for example, by encouraging staff to work from home;
- Permit entry only to those who need to be physically present in the building;
- Adopt strategies like adding air filters and disinfecting surfaces;
- Manage the flow of people going through the building — for example, the number of those in elevators at a time;
- Require the use face coverings and other personal protective equipment as appropriate indoors.

Researchers at the Massachusetts Institute of Technology have created an app to determine how many people can safely congregate in a given space and for how long.

But regardless of these precautions, the optimal strategy is simply to wear a mask indoors, said Martin Bazant, a chemical engineer at the M.I.T., adding, “That’s a much bigger effect than any of those strategies would provide.”

## Simple solutions to try now.

Here’s one that’s easy and free: If possible, open your windows, “especially during the shoulder season when the conditions are more mild,” Dr. Allen said.

Schools are required to have enough ventilation to fully exchange the air in a room every 20 minutes, but most barely manage to do so once every hour. “Even just opening windows six inches can dramatically change the air exchange rate,” Dr. Allen said.

The trick is useful for car travel, too. Just cracking open a window a little can help disperse any coronavirus that may be exhaled by other riders.

Oscillating fans can be helpful or harmful indoors, depending on how they’re used. Ideally, they should not be placed in any spot where they might push virus-laden exhalations from an infected person around a room or into another occupant’s face.

A non-oscillating fan placed in a window and away from people may increase the airflow in a room without these risks.

If you are in a building with a mechanical ventilator, adjusting the damper settings can increase the amount of fresh air that circulates. Of course, this may not be desirable if the air outdoors is heavy with smoke and soot, as is often the case in big cities and, recently, on the West Coast.

If the air is polluted, or if there aren’t any windows to open, then air filters — even portable ones — may be the answer. They can rid the air of the coronavirus.

Based on his years of experience investigating disease outbreaks in school and office buildings, “there was never a building we couldn’t turn into a healthy building,” Dr. Allen said. “There’s always something you can do.”

## **Basic air filters are often the best.**

HEPA, MERV, HVAC: Conversations about air systems can devolve into an alphabet soup of acronyms. Relax and take a deep breath: Even the most stripped-down devices can help bring down the microbial burden in the air.

For a classroom or office, a portable air cleaner suited to the room's size "is a great low-cost plug-and-play strategy to give you several air changes per hour of clean air," Dr. Allen said. These are compact devices that can be plugged into any outlet; effective models are available for less than \$200.

Some people mistakenly think that the average air filter, portable or part of a larger system, is no match for the microscopic virus. But "the virus is not naked in the air," Dr. Marr said. "It comes out in respiratory droplets."

Even if all of the water in a droplet evaporates, salts and proteins traveling with the virus keep the droplet's size at a half micron or larger. That's big enough for an air filter to catch.

"We don't need to worry about filtering out anything as small as a virus," Dr. Marr said.

A.S.H.R.A.E., a professional society that sets standards for such devices, recommends air filters that qualify as MERV 13 or higher to filter out the coronavirus. Not all ventilation systems can handle a MERV 13 filter, Dr. Marr said, but most can at least handle MERV 11, which can keep out 60 percent of viral droplets.

HEPA filters are also generally considered to be excellent, although some experts said the research on the extent of their effectiveness was limited.

## **Beware those "air cleaners."**

Jenni Morgan replacing an air filter at her hair salon in Greeley, Colo., this year. Michael Ciaglo/Getty Images

The best way to clean the air in a room is to replace it with air from outside or run through an air filter.

But some air filters offer features that experts referred to as "gimmicks" — useless at best, and dangerous at worst. So-called exotic cleaners are not regulated by any federal agency, but they have been aggressively marketed to schools and businesses, Dr. Farmer, the atmospheric chemist, said.

## Back to School

Updated Oct. 2, 2020

The latest on how schools are reopening amid the pandemic.

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  - But New York City's public school testing plan [could miss major outbreaks](#), a study finds.
  - Do masks and social distancing stunt the emotional development of children? [Here's what we know, and what to do about it.](#)
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"There's a lot of potential for damaging side effects," she said.

Some devices generate ozone — yes, that ozone, a respiratory hazard — while others produce dangerous hydroxyl radicals that may injure cells. There are products that claim to rely on "bipolar ionization" to break down the coronavirus, but they may also produce ultrafine particles that are dangerous when inhaled.

Working with the coronavirus requires rare high-safety laboratories, so a vast majority of these marketing claims are based on research with other viruses. Those studies were mostly funded by the manufacturers themselves, and they are not vetted by independent experts or by regulatory agencies.

Some businesses, including dentists' offices, are fumigating their premises with bleach or hydrogen peroxide. But chemical sprays that "clean" the air would need to be so concentrated that they would also be toxic to people, experts warned.

So which products can you trust? The experts' advice: Avoid all of them.

"We don't need these gimmicks," said Brent Stephens, an indoor air quality expert at the Illinois Institute of Technology in Chicago. "I've got an air cleaner here that we use, and it has a weird little ultraviolet light on it. But I don't really trust it. I just turn it off and use it as a way to move air through the filter."

**Ultraviolet lights are a step too far.**

Ultraviolet lights may be useful for disinfecting surfaces, but they require expert installation and are used mostly by hospitals. Nicholas Kamm/Agence France-Presse — Getty Images

The experts had the most concerns about UV lights, which are used in many hospitals to disinfect instruments, gear and even entire rooms. But now UV lights are marketed to businesses, schools and even residential buildings as indoor disinfectants.

Unlike portable air filters that are inexpensive and can simply be plugged into an electrical outlet, UV lights need to be carefully engineered by trained individuals in order to disinfect. Installed incorrectly, they can cause skin burns and damage eyesight, said Saskia Popescu, a hospital epidemiologist at the University of Arizona in Tucson.

UV lights are regulated mostly for use as pesticides and are not well studied for use around people, she added: “I get really nervous when I see people pushing UV disinfection.”

UV light generally does not penetrate deep into a surface and will not destroy virus that’s buried beneath other microscopic detritus.

It takes time for UV light to kill the coronavirus, and experts cautioned against using UV devices unless you’re willing to spend the time and money to purchase models that can be installed by a skilled professional.

“The ones used in hospitals are from a handful of companies with scientific validation, but are extremely expensive,” Dr. Popescu said. “The average school or office doesn’t need them.”

The virus thrives in dry air, so some companies are also selling heavy-duty humidifiers for HVAC systems as a way to keep indoor spaces inhospitable to the coronavirus.

But unless the humidifier can maintain the space at precisely 40 percent to 60 percent humidity — which would require an overhaul of most building systems — it’s unlikely to be useful, experts said.

On the other hand, the kind of simple humidifier that people use at home might keep your nasal passages moist enough to mitigate some risk at an individual level.

“Everybody is inundated right now with the shiny new solutions that are being sold to them,” Dr. Allen said. “And the reality is, it’s a time for the basics.”