

# How long do cold and flu viruses stay contagious on public surfaces?

By Julia Griffin and Nsikan Akpan, PBS News Hour on 01.07.19

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Torrey Jewett looks on as her roommate Donnie Cardenas recovers from the flu at the Palomar Medical Center in Escondido, California, January 10, 2018. Photo by: Gregory Bull/AP Photo

It is the season for gathering with friends and family to share food and also dreaded colds and bouts of the flu.

As temperatures drop, both illnesses start to tick up, as does the risk of taking you, your co-workers and loved ones down one-by-one. The Centers for Disease Control and Prevention estimates the average person gets two to three colds per year — mostly in the winter and spring. The country as a whole sees 9.3 to 49 million cases of the flu annually.

Before you isolate yourself inside your home and scrub every surface in sight, you should know that these pathogens don't actually last for days or weeks outside the body, as commercials for some cleaning products might suggest. That's because cold and flu viruses, despite their ferocity inside our warm bodies, are structurally wimpy and cannot bear the harsh conditions of the dry, outside world.

Here's what you should know about how long these pesky viruses persist and how you can protect yourself.

## **What Is The Cold? What Is The Flu?**

Most colds are caused by rhinoviruses, though other pathogens like coronavirus, parainfluenza and respiratory syncytial virus are sources, too. All can lead to serious complications like bronchitis and pneumonia, especially in individuals with respiratory conditions like asthma, and in those with compromised immune systems.

Influenza A is the main family of viruses behind the flu in humans. The CDC estimates 12,000 to 56,000 American deaths are attributable to the flu each year, while the World Health Organization estimates the virus kills up to 650,000 people worldwide.

Viruses are nonliving pieces of genetic code — DNA or RNA — covered in protein coats known as capsids. Flu viruses and many cold viruses also have a viral envelope, meaning the capsid is covered by two layers of lipids similar to the cell membranes found on organisms.

Viruses can't multiply on their own — they must infect the cells of a living creature. Because they aren't actually living entities, using terms like "live" or "survive" to describe viruses outside the body can cause confusion, said Dr. Anthony Fauci, the director of the National Institute of Allergy and Infectious Disease.

"People say, 'Well (a virus) can live on a doorknob for four days,'" Fauci said. "Well, maybe you can isolate it and grow it in culture by swabbing a doorknob, but that doesn't mean that it's infectable for four days."

Viruses outside the body can be better described as either infectious or identifiable — meaning the genetic material that was once inside the virus can be detected via a lab technique like polymerase chain reaction, or PCR. This is usually what advertisements for cleaning products are referring to when they say flu viruses can survive on surfaces for days on end.

Let's say you had an influenza virus on top of a clean desk, said Dr. Paul Auwaerter, the clinical director for the Division of Infectious Diseases at the Johns Hopkins University School of Medicine.

"Five days later, if you take a swab, put it into a molecular machine like a PCR machine and you still find DNA remnants there, that doesn't mean you have an intact virus," Auwaerter said. "It just means you've found the DNA."

An intact virus is necessary for an infection, but this propensity reduces over time as its capsid and viral envelope begin to degrade. Once weakened, the virus is less able to attach to cells and spread its genetic material.

## **How Long Are Cold And Flu Viruses Infectious?**

There's not a lot of rigorous data on this question, which is probably why there's also a lot of confusion.

Prior to this decade, only a handful of studies looked at how long flu viruses retain their infectiousness on common surfaces. A 1982 study found influenza A remained contagious up to 48

hours on hard plastic or stainless steel, while a 2008 publication found these viruses stayed infectious for up to three days on Swiss bank notes.

Influenza viruses may actually have a much shorter infectious lifespan, based on more recent work by virologist Dr. Jane Grotzinger at Public Health England. In a 2011 study, her team took two strains of influenza A and analyzed how long they remained infectious on a variety of common surfaces. After nine hours, viable viruses were no longer found on most non-porous metal and plastic surfaces, such as aluminum and computer keyboards. On porous items, like soft toys, clothes and wooden surfaces, viable viruses disappeared after four hours.

Because common colds are caused by a plethora of viruses, research on surface infectious rates are harder to nail down. In general, most are no longer dangerous after 24 hours, and their ability to infect dissipates faster on porous materials like facial tissues.

What's the best surface for killing viruses? Our skin. In the cases of both flu and cold-causing viruses, infectious particles on our hands are usually gone after 20 minutes.

Between its pH and its porous nature, our body's natural barrier to the world does a great job at killing viruses, Grotzinger explained. "Our hands are quite antimicrobial themselves," she said. "They have their own bacteria that live on them — no matter how clean you are — and they don't actually harbor viruses that well."

That said, any open wounds on our skin would be an easy gateway for viral infection, so remember to use those bandages.

### **Why Don't Cold And Flu Viruses Live Forever?**

Cold and flu viruses' rapid decrease in viability outside the body is thanks to three main factors: their enveloped structure, environmental conditions and how much our mucus surrounds it after a sneeze.

An enveloped virus — like influenza A and most cold-causing viruses — is by nature set up for destruction, Grotzinger said. While these enveloped viruses are typically neutralized within 48 hours, a non-enveloped one — like norovirus, an intestinal disease that has caused multiple mass outbreaks on cruise ships — can be viable on surfaces for weeks.

"Anything that disrupts the proteins on the virus surface pretty much kills these enveloped viruses," Grotzinger said. "They are not particularly resistant."

Temperature, ultraviolet radiation from sunlight, pH changes and salt can play a role in weakening a viral envelope. But one of the main factors is moisture.

"Viruses tend to be more stable in environments for which they're known to reproduce," Auwaerter said. "If they live in warm, moist environments — for example, in your nostrils, in your throat, in your bronchial tree — they're more stable. But when they're exposed to a different material or to a non-moist environment, they can break down."

This is why cold and flu viruses remain infectious on non-porous surfaces like light switches and countertops longer than porous surfaces like fabric and tissues. Porous surfaces suck moisture away from the viruses, causing the structures to collapse.

Not all non-porous surfaces serve as ideal havens for these viruses. Greatorex's work found flu viruses could remain contagious for nine hours on stainless steel, and other research has suggested they can be infectious on the metal for up to seven days. But on copper surfaces, the virus stops being infectious after six hours.

Mucus from a sneeze can protect a virus from the damaging influences of a dry environment and make the virus maintain infectiousness longer. But on the plus side, Greatorex said, the more mucus a friend or co-worker sneezes, the shorter distance it will travel because of its increased weight and size.

All the same, if someone in your office is ill, tell them to take a sick day. "Just pack 'em off," Greatorex said. "Fewer people will get sick if you send them home."

### **How Best To Protect Yourself**

Because flu viruses don't often last beyond nine hours, Greatorex's work suggests public spaces like classrooms, offices and kitchens that are not populated at night will usually be free of contagious flu viruses the next morning. But for those who want to be more proactive, Auwaerter recommends sanitizing surfaces periodically with wipes or other chemicals.

"Chlorine, hydrogen peroxide, soaps, detergents or alcohol-based gels all disrupt the capsules of the viruses, and they're no longer capable of being infectious," Auwaerter said.

Even if these viruses seem to disappear quickly, don't let down your guard. The CDC and National Institutes of Health still recommend that everyone get a flu shot and wash their hands regularly.

"Hand-washing trumps everything," Fauci said. "Even if the virus lives 20 minutes on your hands, it may touch you, shake your hands, touch something that you touch and then you put your hand to your mouth."

That point is worth driving home, considering individuals alone touch their faces an average of 15 times per hour.

Greatorex also suggests keeping the UK's "Catch it. Bin it. Kill it." campaign in mind. The message, promoted by the England's National Health Service, recommends using tissues to cover the mouth and nose when coughing or sneezing, throwing said tissue away and then washing your hands to eliminate the germs.

## Quiz

1 Read the following sentence from the introduction [paragraphs 1-4].

*That's because cold and flu viruses, despite their ferocity inside our warm bodies, are structurally wimpy and cannot bear the harsh conditions of the dry, outside world.*

Which sentence from the article BEST supports this idea?

- (A) Flu viruses and many cold viruses also have a viral envelope, meaning the capsid is covered by two layers of lipids similar to the cell membranes found on organisms.
- (B) Viruses outside the body can be better described as either infectious or identifiable — meaning the genetic material that was once inside the virus can be detected via a lab technique like polymerase chain reaction, or PCR.
- (C) Cold and flu viruses' rapid decrease in viability outside the body is thanks to three main factors: their enveloped structure, environmental conditions and how much our mucus surrounds it after a sneeze.
- (D) But on the plus side, Greateorex said, the more mucus a friend or co-worker sneezes, the shorter distance it will travel because of its increased weight and size.

2 Read the following selection from the section "How Best To Protect Yourself."

*Because flu viruses don't often last beyond nine hours, Greateorex's work suggests public spaces like classrooms, offices and kitchens that are not populated at night will usually be free of contagious flu viruses the next morning. But for those who want to be more proactive, Auwaerter recommends sanitizing surfaces periodically with wipes or other chemicals.*

Which of the following conclusions can be drawn from the selection above?

- (A) Though research suggests that there is little likelihood of catching a flu virus from a space that has been unoccupied overnight, there are still safety precautions individuals can take to minimize the likelihood of infection.
- (B) Though research suggests that there is a significant likelihood of catching a flu virus from a space that has been unoccupied overnight, individuals can gain some protection by taking precautions to minimize the likelihood of infection.
- (C) Research suggests that there is little likelihood of catching a flu virus from a space that has been unoccupied overnight, yet individuals continue to engage in taking unnecessary safety precautions to try to minimize the likelihood of infection.
- (D) Research suggests that there is a significant likelihood of catching a flu virus from a space that has been unoccupied overnight, yet individuals continue to engage in taking ineffective safety precautions to try to minimize the likelihood of infection.

3 What role do surface properties play in determining the lifespan of a flu virus?

- (A) Surface properties have less to do with virus lifespan than does the type of virus.
- (B) Viruses tend to remain viable longer on surfaces with low moisture content.
- (C) Viruses tend to remain viable for longer on porous materials than on non-porous ones.
- (D) Viruses tend to remain viable for longer on non-porous materials than on porous ones.

4 Which of the following ideas did the author develop the LEAST in this article about viruses?

- (A) the physical structures of viruses
- (B) ways to protect oneself from viruses
- (C) various factors that affect the lifespan of a virus
- (D) the differing ways various types of metal affect virus lifespan

## Answer Key

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