

How to stop the flu: Researchers identify proven strategies to prevent influenza from spreading

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Washing hands thoroughly with soap and water or an alcohol-based hand sanitizer for 20 to 30 seconds can help prevent transmission of viruses, like the flu.

(Medical Xpress) -- Between 1918 and 1920, an influenza epidemic swept across the globe, infecting more than a quarter of the world's population and killing 50 to 100 million people.

If a similar outbreak occurred today, vaccines might help, but it's possible that vaccine production would not be ramped up in time to have a significant effect. Furthermore, hospitals would likely be overwhelmed, leaving many patients to be cared for by family members

at home.

In that situation, non-pharmaceutical interventions (NPIs) would be critical to minimizing the spread of infection, say Richard Larson and Stan Finkelstein, members of MIT's Engineering Systems Division (ESD), who want to get the word out about how to prevent the flu from spreading between family members and other groups of people who live or work in close quarters.

“We thought, ‘Let’s look at the dynamics of the home and see if there are any reasonably inexpensive steps that people could take to care for their loved ones and simultaneously minimize the chance of getting infected,’” says Larson, the Mitsui Professor of Engineering Systems.

Larson and Finkelstein — a senior research scientist in ESD — and their colleagues found that steps such as proper hand washing, wearing masks and strategically controlling temperature, humidity and air circulation could all help to reduce the chances of the flu spreading from a sick person. They [report their findings](#) in the December issue of *Disaster Medicine and Public Health Preparedness*, published by the American Medical Association.

Though their recommendations focus on pandemic flu, the strategies could also prevent the spread of the regular seasonal flu, which usually kills about 30,000 people per year in the United States.

Fighting back against flu

Motivated in large part by growing concern about potentially devastating flu strains such as H5N1 (bird flu), Larson and Finkelstein have been studying influenza for the past five years, focusing on non-medicinal ways to prevent the disease from spreading. In their new paper, they reviewed 40 studies of the effectiveness of various non-pharmaceutical

interventions and identified approaches that have been demonstrated to reduce the transmission of flu viruses.

The flu virus is spread when an infected person coughs, sneezes, talks or breathes, emitting virus-containing particles. Those particles may directly contact another person, coat surfaces touched by others or float through the air, where someone else can inhale them.

To prevent transmission, the researchers recommend the following steps:

- Washing hands thoroughly after leaving a patient's room. This means scrubbing with soap and water or an alcohol-based hand sanitizer for 20 to 30 seconds, or the amount of time it takes to sing "Happy Birthday" twice.
- Wearing a mask. Though it's inconclusive whether masks can block airborne viruses, "one thing we learned from the literature that we looked at is that if the healthy person is wearing a mask and walks into a sickroom and touches infected surfaces, the mask makes it hard to touch his or her own nose and mouth," says Finkelstein, who is also an associate professor at Harvard Medical School.
- Installing air filters. High-efficiency particulate air (HEPA) filters can remove nearly 98 percent of virus particles. Portable air purifiers can also help, as well as pointing a window fan out the window of the sickroom.
- Controlling temperature and humidity. Higher temperatures and humidity levels can kill or disable viruses.
- Installing an ultraviolet light. UV light is antimicrobial, and portable air purifiers with both UV lamps and HEPA filters can be purchased for \$180 to \$370.

There is already evidence that these measures can reduce flu transmission. "Nothing we're proposing is controversial," Larson says. "Our contribution is systemically going through the decades of scientific

literature and picking out what we thought were exemplary pieces of work and putting them in an engineering-systems framework.”

Minimizing risk

To calculate the rate of flu spread, Larson and Finkelstein multiply the number of face-to-face contacts that an infected person has in a day by the probability that the infection will spread from the infected person to a susceptible person. This rate can be reduced both by minimizing the number of contacts a sick person has and by taking the steps outlined in this paper, according to the researchers.

“It’s not going to reduce the risk to zero, and do we scientifically know what percentage the risk is reduced by this? No. But we feel confident that it’s significant, if the majority of these steps are taken,” Larson says.

The cost of these preventive measures varies from only a few dollars to \$1,000, depending on how many are adopted. Some, such as careful hand washing and wearing facemasks, have negligible cost, while air filters and other technologies can cost a few hundred dollars. However, taking any of the steps is better than doing nothing at all, the researchers say.

The paper “provides strong evidence that these simple hygiene and environmental prevention measures can reduce transmission of influenza within the home environment,” says Allison Aiello, an associate professor of epidemiology at the University of Michigan School of Public Health. “All of these can be easily implemented in [the household or workplace], but they need to be disseminated along with education on how to use these measures effectively,” adds Aiello, who was not part of the research team.

In February, Finkelstein and Larson plan to meet with Center for

Disease Control (CDC) officials to present their findings and encourage them to add these measures to the agency's official list of recommendations to help combat [influenza](#).

"It's a pretty good investment to reduce the chance of getting infected," Larson says. "We're hoping that the CDC will buy into this and have this as part of their portfolio of educating the American public."

Provided by Massachusetts Institute of Technology

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