

Hutch Influenza Experts Assay the Latest Science

Flu shots remain your best bet for protection, but no guarantee against infection

December 9, 2019 By Sabin Russell

Flu shots are an imperfect way to prevent influenza, but vaccinations every fall are your best bet for protecting yourself and those around you from a dangerous and often unpredictable bug — until researchers come up with a better alternative.

That was the advice of four top Seattle flu physicians and scientists during a recent Facebook Live session at Fred Hutchinson Cancer Research Center. Their assessment of flu research touched on current trends in tracking the globe-girdling virus, and they offered up-to-date advice on what people can do to prevent or treat it.

Fred Hutch infectious disease specialist [Steven Pergam, MD, MPH](#), led the discussion, and he stressed that it is important to get a flu shot not just to protect yourself, but also your loved ones and those who may be more vulnerable to infection.

“Flu is an underrated pathogen, in many ways. It often is expected to be a minor ailment with a runny nose and a sore throat. It is actually quite severe,” said Pergam, who also directs infection prevention at the Hutch’s clinical-care partner, [Seattle Cancer Care Alliance](#). “I deal with cancer patients who are the most immunocompromised and are potentially at risk for developing life-threatening flu.”

Panelist [Helen Chu, MD, MPH](#), a University of Washington infectious disease physician, also urged pregnant women to make sure they get a flu shot to protect not only themselves, but their children after they are born.

“That protects your baby through antibody transfer to the fetus during pregnancy, and that antibody in the baby protects them for the first six months of life,” Chu said.

Babies don’t mount a strong immune response to flu vaccines on their own until they are six months old. “And then, they can get the vaccine as well,” she said.

Chu described how she became interested in flu during her fellowship training in 2009, the year of a dangerous worldwide outbreak of an influenza subtype known as H1N1.

“One of the more vivid memories was taking care of women in the intensive care unit and watching them die of H1N1, then seeing their babies have no parent to take care of them. It was incredibly hard,” she said.

Panel member [Jesse Bloom, PhD](#), an evolutionary biologist at Fred Hutch, said the rapid evolution of the flu virus offers scientists a model for understanding how gene mutations change proteins. He studies the evolution of flu viruses in individuals, particularly in patients who are immunocompromised and may endure flu infection not for weeks, but months.

“You can actually see the virus evolving within these patients in a somewhat similar way you would see it evolving [in populations] around the globe,” Bloom said.

To take the guesswork out of formulating flu shots each year, scientists look forward to developing a “universal” vaccine that will target parts of the virus that do not mutate so quickly. Bloom likens the target proteins on the surface of a flu virus to the florets on a head of broccoli. The rapidly mutating parts are on the broccoli crown; the slower evolving pieces reside on the stalk. Vaccines today target the crown. Bloom believes a better target is the stalk.

“The goal is to have one shot that would last you the rest of your life,” Bloom said. “I think we’re very, very far from that. But I don’t think we are very far from the goal of making vaccine better than it is right now.”

Understanding how flu viruses evolve globally is critical for doctors and scientists who attempt to predict — more than half a year in advance — what flu strains are likely to emerge at the height of winter flu seasons in the Northern and Southern hemispheres. It is important to pick the right strain, because it takes manufacturers months to make enough vaccine to reach hundreds of millions of people during each flu season. Most flu vaccine is still made by growing the selected strain in chicken eggs, killing the virus and formulating purified bits of it into shots. The bits of dead virus stimulate the immune system to create flu-blocking proteins that can prevent infection.

Fred Hutch computational biologist [Trevor Bedford, PhD](#), is an international expert on tracking virus evolution around the globe. He sits on a World Health Organization panel that uses such data to recommend which flu virus strains to target in vaccines twice a year.

For each of the four major subtypes of influenza, the panels must make an educated guess as to which strain of virus should be targeted in the next round of vaccines. “They only get to pick one out of many thousands of viruses they have on hand to use,” Bedford said. “That’s quite a challenge because things can change fairly dramatically over the course of nine months.”

The panels met in February to pick the strains for the flu shots now being given in the Northern Hemisphere; and they met again in September to pick the strains for the Southern Hemisphere shots that will be given there in beginning in March.

Tracking influenza virus strains around the world

Bedford uses computer models to track the strains of a wide variety of other diseases including Ebola, Zika and Dengue viruses. Researchers worldwide tap into that data on [Nextstrain.org](https://nextstrain.org), a publicly accessible website.

“Lots of viruses are getting genetically sequenced, and so you can watch their evolution. With these viruses, things happen more quickly. So, basically 10 years of flu evolution is like a million years of fruit fly evolution, and you can watch it unfold,” Bedford said.

His global tracking of influenza shows that the virus constantly moves and changes, and that this evolutionary journey is more complicated than following the winter “flu season” as it hops hemispheres.

“What we generally see is that the strains that eventually make it to Australia and the U.S., Japan and Europe come from a circulation network within southern China, India and Southeast Asia,” Bedford said.

“So, there is not a direct, causal relationship between what is circulating in Australia and what arrives in the United States.”

Despite surprising cold snaps, snow and other hints of an early winter, flu season has yet to arrive in much of the U.S., but the panelists said the best way to prepare for the unpredictable bug is to get a flu shot — and get one quickly.

The researchers noted that people oftentimes think they have come down with the flu, when in fact it is just a head cold or any number of “flu-like” illnesses such as respiratory syncytial virus (RSV) or parainfluenza. It is possible to track whether flu is active in your region, and how severe the seasonal outbreak has become, by [linking to FluView](#), the detailed, year-round influenza monitoring system of the federal Centers for Disease Control and Prevention.

For those who come down with the illness, there are two helpful drugs available by prescription if the infection is diagnosed early. Chu said a five-day prescription for [oseltamivir, or Tamiflu](#), can reduce symptoms, and for most patients should be started within the first two days of illness. Last year, the U.S. Food and Drug Administration approved [baloxavir, or Xofluza](#), which is a two-pill dose taken once within two days of symptom onset.

“Baloxavir is a drug that’s currently used widely in Japan, not so much in the United States,” said UW physician Chu. High rates of resistance to the drug are turning up among children in Japan, however, so its future as a flu-buster is uncertain. Nevertheless, Chu believes it could be an ideal drug for responding to pandemics.

“Having just one dose that you can administer to prevent spread of a virus within a community would be really important,” she said.

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