How does COVID-19 compare with the flu?

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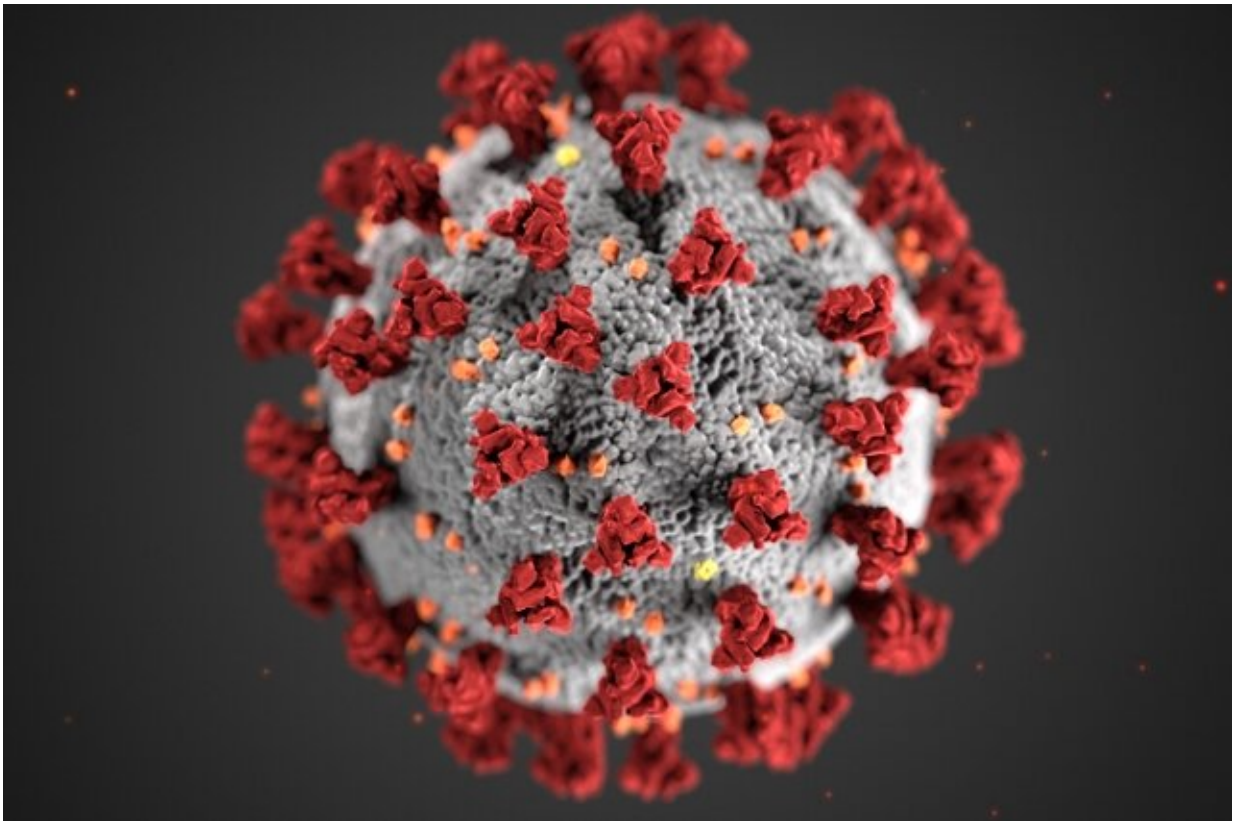

"If COVID-19 becomes widespread in the U.S. and other parts of the world, that will still add up to many people getting exposed to the virus and a large number of people developing severe disease," said Jonathan Runstadler. Credit: CDC

The new coronavirus that causes COVID-19 in many ways is exactly the type of situation that has motivated Jonathan Runstadler, a professor in the Department of Infectious Diseases and Global Health at Cummings

School, and his research team in their efforts to keep the world ahead of the next influenza pandemic.

Runstadler leads a team of Tufts researchers who sample animals in the wild and return to the lab to analyze the samples for influenza viruses. Their mission is to better understand the ecology and lifecycle of the flu—as well as what strains are circulating in nature—to help predict and prevent deadly, wholly new strains that arise every decade or so.

Given the many purported similarities between the novel coronavirus and influenza, Tufts Now asked Runstadler about how what we know about regular and pandemic flu might apply to this quickly evolving situation.

Tufts Now: How do you expect this COVID-19 epidemic to unfold in the United States and across the globe?

Jonathan Runstadler: This situation is still very unpredictable. We don't know enough about the virus itself or how it spreads. The confirmed cases are slowly climbing in the U.S., and they seem to be pretty widely distributed. But they still represent a fairly low number on the scale of this epidemic.

So the majority of the data we have on this virus and disease is still that from China, and it's difficult to know or to understand how reliable that data is and how representative it is of what may occur in other parts of the world, such as in the U.S. It's too early to predict the course of this outbreak with any certainty, but—given that it has already been detected in more than 100 locations internationally, including in the United States, where several states have declared a state of emergency and the virus does appear to be spreading—I wouldn't be surprised if we're dealing

with this virus for quite a while.

Do you feel the spread of the new coronavirus has taken the U.S. by surprise?

The U.S. seems to be behind in terms of available tests, protective equipment and other readiness measures. Ironically, I think that this delayed response may have been driven by what has previously happened with avian influenza, where there were local outbreaks or minor epidemics of different flu strains in parts of Asia that didn't ultimately blow up into a pandemic.

I wonder if that set a pattern that many people expected this new coronavirus to follow after its initial emergence in China. And now we're seeing that it's not following that recent experience at all and that we're in a different situation altogether. This is a different virus that we're much less familiar with—and that may be all the difference.

There's typically a somewhat regular "flu season." Do we know at this point if COVID-19 likely will have some sort of seasonal aspect to it—perhaps a spike before it burns out?

We don't know. COVID-19 is a very similar disease to influenza. This new coronavirus seems to cause similar symptoms and to progress in a similar way to flu. And, as a respiratory disease, COVID-19 likely is transmitted in a similar fashion to the flu, via direct contact with respiratory droplets.

So you might hypothesize that it would behave similarly to the influenza virus in other ways as well, and for flu, we know that it typically has a

seasonality. There are things that can knock that timing out of whack, and there are some seasons that are exceptions to the norm, depending on how transmissible and how severe the circulating strains of seasonal flu are. In general, though, the seasonality of the flu is driven by the propensity of influenza viruses to like low humidity and moderate temperatures.

The coronavirus is from an entirely different family of viruses, so it very well could behave differently. And, to my knowledge, we have not done experiments to verify why flu viruses seem to do better in those conditions, so we can't know how different—and similar—these two viral families would be in that regard. Much of the seasonality to flu is also driven by human behavior in winter versus summer, but I think the idea that there will be a seasonal aspect to COVID-19 is more of a hope than an expectation at this point.

How sick does this new coronavirus tend to make people?

From the information that we have at this point, in some ways, COVID-19 has behaved similar to the flu, though perhaps it's a bit more contagious in the right conditions. The caveat is that this assumption is based mostly on information from cases seen in the Chinese population. But from that data, it appears that for most people, COVID-19 is a mild disease—probably a little flu-like, but maybe even milder and more like a cold.

There are other coronaviruses that regularly infect people and cause a common cold. And for the most part, people never bother to seek medical attention for these more common coronaviruses because they do not make people as ill as the flu.

That's why people in the scientific community are a little wary about interpreting the data coming out of China. It's likely that there many more cases of COVID-19 that have not been accounted for. Many people probably have been ill with a much milder disease for which no clinical help was sought and no diagnostics done—and recovered without ever being diagnosed with COVID-19.

However, we can expect immunocompromised people to be more susceptible to contracting the disease and to have more severe disease or worse clinical signs than the average person. The disease seems to much more severely affect both the elderly and people who have other diseases or general health conditions that make them immunocompromised.

These groups of people may typically represent only a relatively small percentage of the total population. But if COVID-19 becomes widespread in the U.S. and other parts of the world, that will still add up to many people getting exposed to the virus and a large number of people developing severe disease. And the same holds true for an expectation of a large number of people dying from infection.

What's interesting is that—according to the Chinese data and most of the other recorded infections around the world—the new coronavirus doesn't appear to affect younger kids in the same way the flu does. The flu tends to have a severity profile that peaks in very young children as well as in the elderly, but we are not seeing this with coronavirus in kids under age five, which is great. So hopefully this disease may not be such a worry for younger kids, although they could still be spreaders of the virus.

If other coronaviruses are common and usually mild in humans, what makes this one so different or dangerous? Are there any parallels to flu?

Coronaviruses indeed infect lots of animals, including humans. The coronaviruses routinely circulating in any species tend to be well adapted to that host and don't usually spill over into new species. For example, human coronaviruses that cause the common cold to the best of our knowledge don't infect the dogs and cats that people live with. And vice versa—the coronaviruses that infect dogs and cats typically don't infect their owners.

But this new coronavirus causing COVID-19 in people hasn't been in humans before. It appears to have recently spilled over from wildlife. We don't fully understand where it came from yet and what host it was in prior to spilling into humans, but our lack of prior exposure to this virus means none of us have had the chance to develop an immune response to protect against COVID-19. That's the kind of situation we worry about as well with pandemic flus, which typically occur when one of the strains circulating in birds or in other animals makes the jump into people.

Once a virus spills over into a new species, it has to do several things in order to successfully replicate itself and be transmitted by the host that it's infecting. The ability to keep reproducing and spreading is gained through small changes in the virus's genome—and that may take a long or a relatively short time. Viruses like coronavirus and flu, which are both RNA viruses, tend to be able to mutate—or change—more rapidly than some other viruses and certainly some other pathogens.

Do you have a sense of how close we are to a vaccine? Is it easier to create a vaccine for this new coronavirus than for the flu, which seems to be a hit or miss endeavor every year?

There is some scientific debate that there could be multiple lineages of

the new coronavirus, some of which cause perhaps more severe disease and some which are milder, but there isn't convincing evidence of that yet. Further epidemiology and analysis of the virus will come out the more things progress. For now, it appears the epidemic was started in a single spillover event, which emphasizes the importance of improving our understanding of the ecology of infectious pathogens in animal hosts and the human-animal interactions that result in spillover.

In terms of creating a vaccine for COVID-19, the immediate goal would be to create a vaccine against what appears to be for the most part a single strain or type of coronavirus. That target might be a little easier than creating a vaccination for the flu, a virus that is endemic and has different strains and different subtypes that can dominate and appear in different years—making it very difficult to predict which will be the emerging flu viruses and costly to develop vaccines, which is why researchers are trying to develop one universal flu vaccine against all of them.

However, the process to develop a vaccine for COVID-19 is still potentially a difficult one. In general, it's easy to create a vaccine, but harder to create an effective one, and maybe even harder still to create a vaccine that you can get to enough people in the right amount of time.

A vaccine is probably months away at a minimum, if some of the newest technologies and approaches prove successful. If we are using standard technology for developing a vaccine, we probably shouldn't expect a coronavirus vaccine until next year. And those timelines are just for the development of the vaccine itself. It's the rest of the process that really takes time—making sure a vaccine is safe and effective, doing the human clinical trials, and then being able to produce it.

What are the best things people can do to keep both

themselves personally safe from COVID-19 and to protect the most vulnerable people around us from this new coronavirus?

This coronavirus, to the best of our knowledge right now, does behave like most respiratory diseases. And so, the same advice that applies to illnesses such as influenza or the common cold applies here.

Pay attention to personal hygiene and follow all that advice you've been hearing about how frequently and thoroughly to wash your hands. Don't touch your face with your hands. Try to keep an advisable social distance—at least six feet, if possible—between you and anyone with symptoms of a respiratory illness. Avoid situations where you may likely encounter groups of people who could be sick.

If you or someone in your family is diagnosed with COVID-19, take all the precautions recommended by the CDC and your health provider to keep yourselves and others safe, including avoiding close contact with other people and pets. And if you're ill with flu-like or respiratory symptoms, contact your doctor for guidance if necessary and stay home until you're well so you don't pass this illness on to a senior or anyone else.

Provided by Tufts University