Medical Xpress

This summers' return of West Nile

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West Nile carrier, the mosquito. Credit: www.sxc.hu, Gabor Bibor

In 2002, much of North America became acquainted with an infection that few people had heard of – West Nile Virus. Governments and public health offices launched massive awareness programs to get people to take up practices that would help to avoid the virus. It seemed to work – after that summer, we rarely heard about West Nile Virus.

But in late July of this year, the media was full of reports of a re-emergence. By mid August, there was a notable buzz on daily TV news broadcasts about West Nile Virus, making 2012 feel like 2002 again.

Why did the virus return? And is it as prevalent and dangerous as media reports have led us to believe?

For the inside story, we turned to Professor David Fisman, an M.D. and professor in the Division of Epidemiology at U of T's Dalla Lana School

of Public Health.

West Nile was a big thing in 2002. Then it went away. But this summer, it came back in a big way in Canada and the United States. Why?

The first thing to remember with West Nile Virus (WNV) is that humans are very peripheral to the story. This is primarily a bird virus. What happens is that you have an amplification cycle which begins with mosquitoes being infected. They can make it through the winter being infected and can actually pass the virus to their eggs. In the late spring, mosquitoes start buzzing around and that's when the amplification cycle begins – an infected mosquito bites a bird, the bird is then infected and is bitten by a bunch of uninfected mosquitoes that become infected, they bite other birds, and so on. There's an exponential growth process. And it was an explosive exponential growth process in the early 2000s when West Nile was first introduced, because we had never had WNV in North America, so all the birds were susceptible.

What you get with an explosive epidemic like that is you get a depletion of susceptible creatures. Lots of birds died in 2002. I was medical officer of health at that point and we had the ability to quantify human risk of WNV infection based on how many dead crows people were seeing per square kilometre.

We've not returned to that level of activity but we know there will be turnover. Some birds died. Those that were more resistant were spared. Some birds that were infected survived and became immune. So you then have fewer targets for the virus and that's what makes epidemics end, when you have fewer numbers of susceptible people or animals to become infected.

Over time you'll get a decrease of immune or resistant birds because they're going to die out and be replaced by young birds that haven't had that same experience. And what you'll get over time is a re-accumulation of bird numbers sufficient to drive another epidemic. And this is what we see with the introductions of infectious diseases, it's like a big explosion followed by echoes. So there was a big bang in 2002 and this is our first reverberation from 2002, which tells us enough birds have re-accumulated to drive another bird epidemic. The re-emergence actually started last summer and it's peaking this summer.

How do humans factor into this?

The first thing to realize is that there are many species of mosquitoes. Some species will bite only one other living species, such as birds or horses. Other mosquito species are omnivorous – they will bite birds, horses and humans. So what you start to see is crossover of risk, particularly toward the end of the summer, which is what we're seeing this year. When the colder weather comes, of course, it will all stop.

It was a big story in the media for a few weeks. Was the media overreacting?

Yes. For individuals in the population, the risk is very low. In Ontario, you're talking about a jurisdiction of 14 million people. There have been about 50 recognized cases. Now it is important to remember that the cases we see represent the tip of the iceberg, but this is not a widespread illness.

Probably two thirds of people with WNV infection don't have symptoms, about one third do have symptoms and most of those people are going to have a non-specific fever and will be fine and that's more likely in younger individuals. In older individuals and with individuals

with underlying medical conditions like diabetes there seems to be a higher risk. I believe the figure usually quoted is that one in 30 symptomatic cases will get what's called West Nile encephalitis and that can be a horrible situation. But the majority of people who get WNV infection don't get sick at all from it, with a very small minority who get quite sick. And that's typical of most infectious diseases.

How do you decrease the transmission?

A lot of cities and regions have active programs where they try to prevent too many mosquitoes coming up in the spring. Mass spraying of insecticide is a workable option if necessary, but we try to avoid that because insecticide can have some negative health effects, especially for people with asthma.

Standing water is the key problem. The initial outbreak in North America was in Queens, New York in 1999. It happened in a drought year when there were a lot of half-filled swimming pools in this very affluent neighbourhood in Queens. That standing water was prime mosquito breeding ground. It's good to remember that mosquitoes don't fly that far. So keeping anything that allows water to pool around areas close to people, such as a patio, will increase the likelihood of mosquito breeding. If you have a birdbath, for example, change the water daily. And wear mosquito repellent that contains DEET. It also repels ticks, which carry Lyme disease. But use it cautiously on children and pregnant women.

Before we go further, I'd like to understand your field. What is epidemiology and how does it relate to something like West Nile Virus?

Epidemiology is about the study of disease at the population level. I'm

also a doctor and I see patients. When I'm seeing a patient I'm thinking at the level of that one individual and what's going on with that person and how can I help them feel better.

With epidemiology, we are looking large populations. It's been said that epidemiology is about the idea that disease doesn't happen randomly. You can dig down and find the causes of disease and we can then control it by understanding why it happens in some populations more than others. And by population, I don't necessarily mean that in terms of one side of town versus the other. It could be why does lung cancer happen more often with smokers, why does diabetes happen so commonly in northern First Nations communities? By digging down and finding what the drivers are we can understand what causes disease with the ultimate goal of learning how to control it.

Why do some infectious diseases spread so easily?

Part of the problem relates to how connected the globe has become. West Nile Virus and SARS are good examples. If you have SARS in Hong Kong, or if you have West Nile in the Middle East, you're only an airplane ride away from that virus becoming a problem in Texas or Saskatchewan.

It seems that many infectious diseases that affect humans have connections with animals. Is that true?

Yes. You see this with SARS, West Nile, HIV, H1N1 and many others.

The thought is that most emerging infectious diseases hotspots have humans and animals interacting in a way that they historically have not, often due to environmental degradation. SARS is a perfect example. SARS normally infects bats. In a big area of southern China, bats are a

food item. So let's say there is a live animal market, where the bats infected local civet cats, which passed it onto humans. WNV is similar. One of the theories is that it was related to the smuggling of exotic birds.

So these unhealthy practices we have of dealing with the natural world are also contributing to speeding along these viruses. We have to pay attention to the changing environment. Polar sea ice is going away, we have new extreme weather events increasing, we have massive population movement, we are cutting down rainforests and putting farms on that land, we have movement of cities out into surrounding jungle and savannah and all of these increase human risk via infectious diseases in the natural species. Add our global movement and if it's a problem in Nigeria, it will become a problem in North America. That's my worry. We've set up a global economic system that creates a witches brew of potential infectious disease.

Provided by University of Toronto

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