

## Novel H1N1—A Global Health Threat

© 2009 Kevin Patton, Professor of Life Science, St. Charles Community College (SCC)

This article first appeared in the SCC Global Pages Vo.l 10 (No. 1) Fall 2009

*Ralph Waldo Emerson once remarked, "We learn geology the morning after the earthquake." One could likewise say that we learn about an illness the morning after we are diagnosed with it.*

It seems that we've all learned a lot about the flu and about flu outbreaks over the last year, haven't we? Despite warnings from public health experts over the last couple of decades, we have pretty much ignored efforts to get us ready for a major flu outbreak . . . until now. Having recently suffered flu symptoms, I've done some catching up on flu information myself.

Now we are faced with a worldwide pandemic of a flu strain—called H1N1 or “swine flu”—that threatens the health of millions of people worldwide. That includes our local community, too. Although any flu infection can be deadly for some people, experts are concerned that H1N1 may develop into a more virulent strain. But what does all that mean? What is “flu?” What is a pandemic? How does that differ from an epidemic? Why has it been called “swine” flu? What is virulence?

To help us all understand the news stories and bulletins we are seeing so that we can make informed and reasonable decisions about our personal health, let's explore some of the basic concepts involved.

Before we get to this particular disease, it will help to explain some of the language used by public health officials. Let's start with the **CDC**. The **CDC** is **The Centers for Disease Control and Prevention**, a federal U.S. government agency charged with protecting public health in this country. Because diseases can quickly spread throughout the world, the CDC also sometimes operates in other countries—to help prevent the spread of disease to this country.

Public health officials often talk about pandemics. When the same illness affects a lot of people in a school or community, public health officials call the situation an **epidemic**. But if the illness spreads to a whole country or beyond, they call it a **pandemic**.

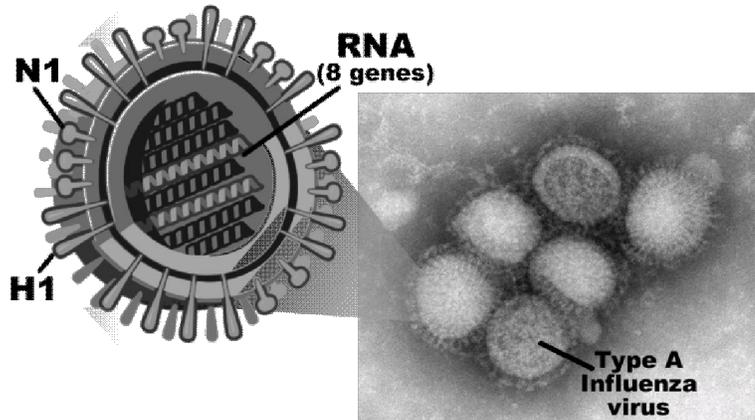
The idea of a pandemic sounds scary, eh? It *could* be, depending on the illness. **Seasonal flu**—the outbreaks of flu we see every fall and winter—often produces pandemics that spread across the globe. However, even though seasonal flu causes many deaths, it is a mild infection in most people who get it. That's not so scary, then, is it?

When people talk about the flu, they often mean **influenza**. Influenza is an infectious illness caused by a virus. A **virus** is a particle containing genetic material (RNA or DNA) that invades our body's cells to make copies of itself and in the process cause havoc in our body functions. There are three groups of influenza viruses that infect humans: A, B, and C.

Rarely, one can catch certain Type A influenza strains from close contact with a live infected pig. However, a person can catch neither H1N1 flu nor a true swine flu from eating pork or using pork products.

Type A influenza viruses also may infect other animals such as birds, swine, horses. Types B and C are often milder and affect only humans. The **H1N1 subtype** is a particular form of influenza A. Because it shares some genes with strains found in swine, it was originally thought to be a “swine flu.” However, it turns out that the influenza seen in the 2009 pandemic is a new form of H1N1, often called **novel H1N1**, that contains genes from swine, human, and bird viruses. H1N1 is *not* a true swine flu—it is instead a mixed type.

The name *H1N1* comes from the proteins that stud the surface of each virus particle. As the image shows, some are **H1 protein** (hemagglutinin type 1) and some are **N1 protein** (neuraminidase type 1).



The 8 separate genes (RNA molecules) pictured inside the H1N1 particle contain the genetic codes that determine the virus’s structure and function. When more than one type of virus particle infects a person or animal, it can “trade” genes to form a new strain. That’s how H1N1 got to be a mixed virus in the first place—by picking up various genes from both American and Asian swine flu viruses, human flu viruses, and bird (avian) flu viruses.

Right now, the mix of genes in novel H1N1 produces a mild infection in most people. However, it spreads very rapidly in human communities. As with most seasonal flu strains, H1N1 causes serious illness and death in some individuals—usually those with a previous medical condition that makes them more susceptible. Unlike most seasonal flu strains, which often severely affect the elderly, H1N1 affects those over 60 less severely than young adults and children. Perhaps those over 60 have already been exposed to a similar flu strain many years ago and survived it.

What if the novel H1N1 virus picks up a gene (or two) that makes it more likely to cause serious disease in more people? Scientists would call this an increase in the virus’s **virulence**—its ability to cause disease.

During an outbreak of novel H1N1 in Mexico this summer, many commuters wore masks to help prevent the spread of the infection in the overcrowded Mexico City subway system.



[Photo courtesy of Eneas De Troya from Mexico City, México]

The possibility of increased virulence is one reason that public health officials are monitoring this situation so closely and attempting to keep everyone informed. We’ve seen flu viruses make such a sudden change before. The most famous case is the flu pandemic of 1918, which killed between 20 and 40 million people (a half million in the U.S.).

A good start is knowing the **signs and symptoms**: fever, cough, sore throat, runny or stuffy nose, body aches, headache, chills and fatigue—and sometimes nausea, vomiting, or diarrhea. Because common colds, allergies, and other illnesses have

similar symptoms, it's sometimes hard to tell who truly has influenza. During a pandemic, many officials recommend that you assume you have the flu if you have these symptoms and act accordingly.

Knowing how to **prevent the spread of flu** also helps a lot. Always wash your hands before eating and isolate yourself if you get a fever and other flu symptoms. Stay at home until after you've been fever-free (without using a fever-reducer) for at least 24 hours. When vaccines become available, follow the recommendations of the CDC. The injected vaccines are made just like the seasonal flu vaccines—they *cannot themselves cause the flu*.

Keep up with **public health recommendations**. Reliable sources include your local officials (that includes college officials!) and the CDC—as well as your primary care physician. You can subscribe to **H1N1 flu updates** from the CDC via email at [http://www.cdc.gov/h1n1flu/general\\_info.htm](http://www.cdc.gov/h1n1flu/general_info.htm)

While in this country we are relying mainly on **self-isolation** of those infected with novel H1N1, other nations have adopted other strategies to slow the rapid spread of the flu. For example, SCC chemistry professor Carol Green reported seeing **thermal scanners** being used in Central American airports this summer. The photo [courtesy of Khemkhaeng] shows such thermal scanners also being used to screen passengers arriving in Thailand. Some border crossings use these devices that show a person's body heat to detect people with fevers. Travelers with fevers can be forcibly isolated in hopes of preventing the spread of novel H1N1 into a country.



Will Griffin, SCC social science professor, traveled to China with a group of educators this summer and reports being scanned for fever before leaving the plane in Beijing. When one passenger was found to have a fever, he was whisked off in an ambulance. Later, after the passenger was determined to have the flu, several people from Griffin's group that had been sitting nearby flu sufferer on the plane were also detained in an isolation facility.

The 2009 novel H1N1 flu pandemic seems to be kicking in full force right now in many parts of the U.S. It could have been the flu that I had just prior to Labor Day, so I stayed home for a few days. By taking such simple precautions—and staying informed—we hope to avert a major crisis.