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Written by Ann Gerhardt, MD

2009 H1N1 Influenza & Vaccine

by Ann Gerhardt, MD *November 2009*

Since the first 6-month-old girl in Mexico contracted H1N1 influenza in April and the United States declared a public health emergency, the disease has generated controversy. For those who refuse to believe there's a problem, the low attack rate in the spring justified their skepticism. But the spring is usually off-season for flu. For the more than 1 million people infected by early August (still off-season), this was no fire drill. More than 1000 have died from it, and we haven't even hit peak flu season, December to February.

Outbreaks in Mexico and Canada each lasted about 3 months. Their epidemics peaked for only a few weeks. In Mexico 27% of those infected died, whereas 'only' 14% died in Canada. What's really scary is that the vast majority of influenza deaths has mirrored the 1918 flu pandemic, in which an extremely aggressive virus killed mostly young, healthy people. Like the 1918 virus, this year's H1N1 virus can cause a rapidly progressive respiratory failure refractory to intensive care.

While influenza-related deaths in the total population did not diverge from the usual pattern until October this year, children clearly have experienced the brunt of 2009 H1N1 devastation from the very beginning. The graph of children's influenza-related deaths clearly shows an unusual pattern this year. In 2007 and 2008 almost all deaths occurred in January thru March. This year has seen a surge of deaths in April-May and now again in October.

2009 H1N1 is an unusual influenza A virus that has acquired genes from both swine and avian influenza viruses, creating one that has never been seen before. Influenza viruses are either A or B types and have names based on two proteins, H and N, for short. Because viruses with the same H and N label may differ, they are named things like A/Bangkok. H1N1 viruses have come and gone, so they need names that distinguish one from another. That's why the current H1N1 virus is called 2009 H1N1.

2009 H1N1 influenza victims have symptoms not usually seen with the usual seasonal influenza. In addition to the usual seasonal flu symptoms of fever, cough, runny nose and horrific muscle aches, nausea, vomiting and diarrhea are common with 2009 H1N1. All influenza viruses spread in droplets of nasal discharge, sputum from an uncovered cough and saliva sprayed into the air every time an infected person says a word with a P or T. We also infect ourselves with virus by touching a contaminated surface and then touching our nose or mouth.

As of early October, almost all influenza illness this year has been caused by 2009 H1N1 influenza. Influenza A H3N2 and influenza B have caused only a few infections nationwide. From August 30 to October 24, 2009, there were 530 laboratory-confirmed influenza-related deaths; 25,985 patients were hospitalized with pneumonia and influenza; and there were 2916 deaths related to pneumonia and influenza syndrome. Deaths as a result of pneumonia and influenza accounted for 7.1% of all deaths, which is above the 6.6% epidemic threshold for the fourth week. (The statistics are a little hard to follow, since 2009 H1N1 appeared in April 2009, which is part of the 2008-2009 flu season. The 2009-1010 season started August 30, so infection and death counts started over.)

Seventy percent of those hospitalized with 2009 H1N1 were "high risk," meaning they are more likely to die or suffer complications. High risk people include children younger than 2 years, adults 65 years or older, pregnant women, women who have delivered a baby or miscarried within the last two weeks, and those with underlying conditions that would make a bad outcome more likely. These conditions include taking medications like chemotherapy that suppresses the immune system, chronic lung, heart, kidney, liver, blood disorders, and diabetes. **These high risk people, along with healthcare workers who will have close contact with patients infected with 2009 H1N1 should be vaccinated.**

Vaccination: In response to a vaccine or being infected with a virus, we make antibodies which are very specific for the strain in the vaccine or causing the infection. Having antibodies to strain A/Brisbane/10/2007, which is like an H3N2 virus, won't protect against A/Brisbane/59/2007, which is like an H1N1 virus. Even an antibody against an older H1N1 virus won't protect against the 2009 H1N1 virus. This is why we need to be vaccinated every year. And it's why vaccine producers work very hard to predict which virus will cause infections in the coming year, and why they have to do a bit of guess-work for that prediction.

People worry about the risk of a hastily produced H1N1 vaccine subjected to little pre-market testing. The H1N1 vaccine is different from typical seasonal vaccines in that vaccine makers have in hand the specific virus they are trying to prevent. This takes the guess-work out of vaccine making. They take the actual virus and grow it in eggs, then inactivate (kill) it and package it in liquid for the vaccine. 2009 H1N1 is making life difficult for vaccine makers in that it's not growing quickly in eggs, slowing the time to produce the number of viruses needed for each dose.

Some of the reluctance to take the vaccine revolves around the accounts of increased risk for Guillain-Barré syndrome (GBS) associated with the 1976 H1N1 vaccine. In 1976 H1N1, vaccination added approximately 1 additional GBS case per 100,000 people receiving vaccine over the usual incidence of 140 cases per week in the U.S. Some attribute vaccine-related GBS to the "adjuvant" added to the vaccine to stimulate a better immune response, which permits a lower number of viruses per dose, increasing the supply of vaccine. The current H1N1 vaccines contains no adjuvant.

Thimerosal, a mercury-based preservative, is only used in multi-dose vials. Some believe that thimerosal causes behavioral problems in children. To eliminate exposure to thimerosal, get vaccinated from a single-use vial, which contains no preservative. If you experience a possible side effect other than runny nose or mildly swollen/red arm, report it to the U.S. Department of Health and Human Services Vaccine Advers Event Reporting System at http://vaers.hhs.gov/index.

The FDA has granted approval to four companies for their adjuvant-free vaccine. Sanofi-Aventis, Novartis and CSL Limited all make standard, injectable vaccine in single- or multi-dose vials. A single dose pre-filled syringe is also available from Sanofi-Aventis. The multi-dose vials contain thimerosal, the single-dose vials and syringes do not. MedImmuneLLC produces a live, attenuated, intra-nasal vaccine intended only for people aged 2 – 49 years.

Early vaccination data demonstrated good tolerance and induced a "strong immunologic response" when a single dose was given to healthy adults. The trial data with vaccine from Sanofi-Aventis showed a response rate of 96% in adults ages 18-64 years and 56% in persons older than 65 years. CSL Biotherapeutics' vaccine showed response rates of 80% in adults ages 18-64 years and 60% in persons older than 65 years. Older persons are expected to generate a lesser response. For most people a single adult dose should suffice. Older people with a lower expected antibody response rate need to avoid sick people, crowds and other people's cough and spit.

Most available data do not show any protection against 2009 H1N1 by the regular, seasonal flu vaccine. You should get the H1N1 vaccine if you are in one of the high-risk groups and don't have an allergy to eggs.

Treatment: 2009 H1N1 influenza infection responds to oseltamavir (Tamiflu) and zanamivir (Relenza) and is resistant to the older flu drugs amantadine and rimantadine. Antiviral medications can decrease the severity and duration of influenza illness and can lower the risk for severe illness, mortality, and other complications.

Rapid treatment also reduces the risk of others contracting the illness from sick people. This could attenuate the epidemic… as long as the virus is sensitive to the drugs.

Treatment works best if started within 48 hours of onset of symptoms. For someone with suspected influenza who also has risk factors for complications or deteriorating clinical status, treatment should not be delayed for the results of a nasal swab test for virus, which has at best 70% virus detection sensitivity. A later start may still reduce symptoms and duration of illness, particularly in people who don't seem to be getting better on their own. Only 0.4% of tested viruses are resistant to Tamiflu and Relenza.

Treatment or prevention with antiviral medications is not necessary for most previously healthy individuals who have flu-like symptoms, are recovering from influenza or have no symptoms but were exposed to someone with H1N1. Some people with a very high risk condition who are exposed to an influenza-infected person might take an anti-flu drug to ward off infection. However most doctors recommend that even these people wait until the first sign of symptoms to immediately start the drug.

Tamiflu and Relenza usually cause no side effects, but Tamiflu is associated with more nausea and vomiting, and it contains sorbitol, which may induce diarrhea. Inhaled Relenza may provoke asthma. Both are rarely associated with delirium or self-harm.