Novel Influenza Viruses

Novel influenza viruses are defined as influenza A viruses that are not currently circulating among humans. These influenza A viruses may be H1 or H3 viruses that originate from an animal species or result from genetic reassortment of animal and human viruses, or viruses rarely infecting humans such as H2, H5, H7, and H9 subtypes. Surveillance for novel influenza viruses is conducted so that new viruses which might cause widespread illness including pandemics can be rapidly detected.

Human Swine Influenza Virus Infections

The primary reservoirs of influenza viruses are humans, pigs, and birds. Swine cells contain receptors for swine, avian and human influenza viruses and therefore serve as potential “mixing vessels” in which genetic material from avian, swine and human influenza viruses can be exchanged. Major changes in the influenza genome, or antigenic shift, can result in new viruses to which human populations are immunologically naïve. Pandemics occur if these novel viruses can infect humans and be efficiently transmitted from person to person.

Although animal influenza viruses rarely infect humans, sporadic infections with avian and swine influenza viruses occur, most commonly in individuals with direct or indirect exposure to infected animals. Person-to-person transmission of these viruses has also been described, but sustained transmission of these viruses in humans is rare.

Worldwide, 50 human swine influenza virus infections occurring during 1958–2005 were reported in the literature, including 13 cases of Hsw1N1 among soldiers stationed at Fort Dix, New Jersey in 1976. Most of the 37 civilian cases (61%) reported exposure to swine. Since December 2005,
34 human swine influenza virus infections have been detected in the United States. While the true incidence of human swine influenza virus infections is largely unknown, an apparent increase in cases during recent years in the United States may reflect improved virologic surveillance and testing capacity in public health laboratories.

Since July 2011, 11 patients infected with similar swine-origin influenza A (H3N2) viruses have been reported from five states in this country (Figure 1). These viruses contain avian, swine and human influenza virus gene segments including the matrix (M) gene segment from the pandemic 2009 H1N1 virus (Figure 2). Of these 11 patients, 10 were children. Most had mild respiratory illness, but three required hospitalization. All patients have recovered. Six patients reported direct or indirect contact with swine but five, including four patients reported in November and December 2011, appear to have acquired their infections through person-to-person transmission. Currently, no widespread community outbreaks have been detected but investigations are ongoing. Surveillance is being enhanced nationwide for this novel virus.

**Figure 2**

Since these viruses are genetically very different from the influenza strains currently circulating in humans, the current seasonal influenza vaccine is unlikely to provide much protection. These viruses are distantly related to human influenza viruses circulating in the 1990s which may give some residual
immunity in part of the adult population. To date these viruses are sensitive to the antiviral drugs oseltamivir and zanamivir.

Other Novel Influenza Viruses

A single human case of influenza A (H1N2) was reported from Minnesota in December 2011, only the second since 2007. The virus is known to circulate in swine but this case had no such exposures. The virus is related to an H1N1 virus circulating until 2009 so some people may have some residual immunity.

Outbreaks of highly pathogenic avian influenza A (H5N1) have been detected among wild and domestic birds since 2003 in parts of Asia, the Middle East, Europe and Africa. Similar to swine influenza viruses, these viruses have been sporadically transmitted to humans primarily during direct or indirect contact with birds. In addition, limited person-to-person transmission has occurred. Since 2003, 571 laboratory-confirmed human cases of avian influenza A (H5N1) have been reported to the World Health Organization. Of these cases, 335 (59%) have died. Avian influenza A (H5N1) virus infections have not been detected in birds or humans in the United States.

Reporting Requirements

Novel influenza is a public health concern since most people have little or no immunity to these viruses. A novel virus that acquires the ability to be efficiently transmitted from human to human could spread widely and cause significant morbidity and mortality. It is important that all patients with novel infections and their contacts are thoroughly investigated to ensure that human-to-human transmission is not sustained.

In Washington State, healthcare providers, healthcare facilities and laboratories are required to report immediately suspected novel influenza virus infections, including unsubtypeable influenza A specimens, to the local health jurisdictions where the patient resides. If a laboratory using a commercial assay is unable to subtype a specimen which has tested positive for influenza A, the specimen should be immediately submitted to the Washington State Public Health Laboratories for additional testing to type the virus.

Most recent human swine influenza virus infections in the United States have been detected through routine surveillance activities. However, healthcare providers should consider the diagnosis of novel influenza in patients with severe, febrile respiratory disease, including pneumonia or acute respiratory distress syndrome (ARDS), for which no alternative cause is established, when the patient has any of the following three risk factors:

1. Direct or indirect contact with swine in the United States or elsewhere within 7 days of onset
2. Travel to areas reporting avian or human influenza A H5N1 infections within 7 days of onset AND
   o Contact with poultry or wild birds or surfaces contaminated with bird excretions/body parts OR
   o Consumption of raw or incompletely cooked poultry OR
   o Visited a market where live poultry are sold or slaughtered OR
Close contact (within 6 feet) with a person confirmed or suspected to be infected with a novel virus or hospitalized with and/or died of a severe, unexplained respiratory illness

3. Worked with lab samples suspected or confirmed to contain a novel virus within 7 days of onset.

Providers should immediately notify the local health jurisdiction of patients who meet the above criteria and submit specimens from these individuals to the Washington State Public Health Laboratories for influenza testing. Given the recent swine influenza activity in the United States, healthcare providers seeing patients with mild illness who had had direct or indirect contact with swine should also notify their local health jurisdiction promptly. Testing will be considered on a case-by-case basis for patients with a mild febrile respiratory illness and an above risk factor and for travelers with severe or fatal respiratory illness who cannot provide risk factor information.

Infection control for patients with suspected or confirmed H5N1 is essential and should include standard, contact and airborne precautions. For infection control recommendations see: http://www.cdc.gov/flu/avian/professional/infect-control.htm

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Resources:

CDC: http://www.cdc.gov/flu/swineflu/ (includes links to recent MMWR articles)
http://www.cdc.gov/flu/avianflu/


References


The main notifiable conditions and data surveillance pages have been updated: http://www.doh.wa.gov/notify/forms/default.htm http://www.doh.wa.gov/notify/survdata/survdata.htm