

# **Guidance for State and Local Health Departments for the Investigation of Human Infections with Novel Influenza A Viruses at the Animal-Human Interface**

## **A. EXECUTIVE SUMMARY**

One of the most important aspects of preparing for a pandemic is ensuring that procedures for a rapid and comprehensive response to newly emerging, novel influenza A viruses are in place. Timely investigation of human cases of novel influenza A virus infections is imperative for assessing the possible source of infection, identifying other persons at risk, determining whether human to human spread has occurred, limiting transmission to other persons and animals, and identifying viruses with pandemic potential against which vaccine candidates are needed. Early identification and sharing of novel influenza A viruses of potential public health concern will maximize the amount of time available to develop vaccine candidate viruses and for vaccine production, if needed. In addition timely collection of respiratory specimens will ensure appropriate characterization of the virus, including assessment for antiviral resistance, markers of virulence and properties that may confer efficient transmission among humans. Comprehensive field investigations, are the first steps to assessing the pandemic potential of a novel virus.

A joint animal and human health investigation of potential animal sources and possible spread of novel influenza A viruses should be conducted as soon as possible after a laboratory-confirmed human case of a novel or unsubtypeable influenza A infection is detected. Because of the transient nature of many animal populations and of influenza infections in those populations, it is imperative that public health officials coordinate case investigations promptly with state animal, environmental and wildlife health officials. It is therefore vital to have good working relationships in place prior to any investigations among public, domestic animal, environmental and wildlife health agencies and officials. Every attempt should also be made to incorporate exercises for both human and animal health personnel into pandemic planning.

## **B. BACKGROUND**

### **Zoonotic influenza:**

Many animals are known to be susceptible to infection with influenza A viruses. These viruses are enzootic in birds and are host-adapted in a number of mammalian species. However, transmission of influenza viruses between species is well documented, including transmission from humans to animals, animals to animals, and animals to humans.

The hallmark of influenza A viruses is their ability to evolve through point mutations during virus replication or through unpredictable reassortment of gene segments between different influenza A virus strains. The strains can infect multiple species and occasionally jump to new species. Although most instances of transmission to a new species are sporadic with limited to no further transmission, occasionally a novel influenza A virus can become adapted to a new host. The virus may then be efficiently transmitted and become endemic in this new host species. As an example, the 2009 H1N1 pandemic virus was found to contain a unique genetic combination originating from influenza A viruses from three species – humans, swine and birds –and from viruses found predominantly on two different continents<sup>1</sup>. Although exposures to pigs as a potential source of infection for the first identified human cases were investigated, no specific animal source of infection was identified. Below are some known characteristics of cross-species transmission:

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<sup>1</sup> Garten RJ, Davis CT, Russell CA, et al. Antigenic and genetic characteristics of swine-origin 2009 A(H1N1) influenza viruses circulating in humans. *Science* 2009;325:197-210.

- Avian influenza A virus infections in humans appear to be rare. Infected birds can be asymptomatic or present as acute deaths, depending upon whether the virus is a low pathogenic avian influenza (LPAI) or highly pathogenic avian influenza (HPAI) virus, the species of bird and the presence of co-infections. Birds shed the virus either via the fecal-oral-route or the respiratory tract, depending on species. Most human infections are believed to occur as a result of direct or close contact with sick or dead infected poultry. The severity of the disease in humans seems to depend mainly on the specific viral characteristics of avian influenza A virus subtype and strain. Symptoms, when they occur, can range from conjunctivitis and a mild upper respiratory disease to severe pneumonia and death. Additional information can be found at: [www.cdc.gov/flu/avianflu/](http://www.cdc.gov/flu/avianflu/)
- Novel influenza A virus infections in humans with recent exposure to infected pigs (also referred to as variant influenza A virus infections) have been sporadically identified in the U.S. and elsewhere. Physical contact with pigs has been reported in some, but not all cases. Pigs may be either asymptotically infected, or exhibit respiratory illness that ranges from mild to severe. Exposures have occurred on farms and at places where pigs are exhibited, such as fairs and live animal markets. The clinical presentation in humans generally includes fever, cough, rhinitis, sore throat, body aches, headache, and fatigue with some reporting diarrhea, vomiting, and/or conjunctivitis. Severity of human illness has ranged from predominantly upper respiratory illness to severe respiratory illness, including pneumonia and death. Additional information about human infections with viruses that normally circulate in swine (i.e. variant influenza A viruses) can be found at: [www.cdc.gov/flu/swineflu/variant.htm](http://www.cdc.gov/flu/swineflu/variant.htm)
- Canine influenza A virus, H3N8, appears to have evolved from equine influenza A(H3N8) viruses that have adapted to dogs, and become established as a canine influenza A virus lineage. This illustrates how an influenza A virus, that had not been previously known to infect aberrant hosts can adapt and subsequently spread rapidly in a new animal host population. Both horses and dogs infected with influenza A viruses exhibit respiratory illness. To date, no human infections with canine or equine influenza A viruses have been reported. Additional information can be found at <http://www.cdc.gov/flu/canine/>
- Infected humans can also transmit influenza A virus infections to animals. It has been recognized for many years that swine and ferrets are susceptible to human seasonal influenza A viruses. Molecular analyses of swine influenza isolates provide evidence of periodic introductions of human origin viruses into the swine population. More recently, 2009 Pandemic Influenza A H1N1 (2009 H1N1) virus has been recovered from cats (domestic and exotic), dogs, ferrets, pigs and turkeys – all most likely infected by humans.

### C. PURPOSE AND GOALS

This document provides non-regulatory guidance for state and local health department staff conducting epidemiologic investigations of human infections and illness associated with influenza A viruses that are novel in humans and that are, or are suspected to be, associated with animal exposure. The goal of these investigations is to reduce human morbidity and mortality through the understanding of risk factors and application of appropriate, timely intervention measures. Investigation of the human illness, history of potential exposures to animals, and reports of illness in family members, healthcare workers who cared for the index case, and other close contacts should begin as soon as possible after a novel or unsubtypeable influenza A virus is identified. Investigation of potential animal sources of infection should be managed jointly with all state, federal and local public health, state and federal agricultural, environmental and wildlife agencies that may be involved in such a response. Human respiratory specimens identified as novel or unsubtypeable influenza A virus should be sent to the CDC's Influenza Division laboratory without delay for confirmation and additional genetic testing and characterization.

This guidance is based on the current state of knowledge regarding human infection with novel influenza A viruses, however, each novel influenza A virus identification is unique and the responses must be tailored to specific situations. The document does not replace the need for a more specific state influenza response plan tailored to each state's specific situation. This guidance provides general direction for outbreak investigations, but does not include detailed protocols for in-depth epidemiological and laboratory studies that may be warranted when a novel influenza A virus is identified in humans. Such studies may include collection of detailed exposure information from human cases and their contacts, additional respiratory sample collections and collection of acute and convalescent serum samples from cases and close contacts, assessment of possible increase in community influenza activity, assessments of workers or other human contacts exposed to potential animal sources of the novel influenza virus, sampling of potential animal sources and/or their environments, and other observational or longitudinal studies as indicated by the specific situation.

#### **Novel influenza A virus infection:**

[CSTE Position Statement Number: 12-ID-04]

Novel human influenza A virus infection is defined as a human case of infection with an influenza A virus subtype that is different from currently circulating human influenza H1 and H3 viruses. Novel subtypes include, but are not limited to, H2, H5, H7 and H9. Influenza H1 and H3 subtypes originating from a non-human species or from genetic reassortment between animals and human viruses are also novel influenza A viruses.

For the purpose of this document novel influenza A virus infections in animals would include, but are not limited to, H5, H7, H9 and H11 LPAI viruses, all HPAI viruses, swine influenza A viruses that are not of recent human or swine origin (e.g. a new subtype) and certain novel equine and canine influenza viruses when available.

#### **Objectives of this document:**

- Provide guidance to state and local public health agencies in their investigation of a laboratory-confirmed novel or unsubtypeable influenza A virus detection in humans, including collection of clinical and epidemiological information related to the human case(s) and close contacts, and identification of potential animal source if suspected.
- Provide guidance to prevent transmission of influenza viruses from animals to humans, focused on preventing infection and disease in individuals who by their occupations or activities may be at risk of exposure to and infection with novel influenza A viruses.
- Define the various agencies which may be involved during an investigation of a laboratory-confirmed novel or unsubtypeable influenza A virus of potential public health concern, including USDA, CDC, Department of the Interior and state animal, wildlife and public health agencies in order to coordinate seamlessly and promptly across jurisdictional boundaries and avoid duplication of effort.
- Outline notification and communication procedures and content for educating appropriate stakeholders in joint agreement with other agencies involved in the investigation.
- Delineate other agencies to coordinate with regarding the release of information pertaining to identification of novel influenza A cases in humans and the investigation.

*Note: The recommendations in this document are intended for the surveillance and investigation of human infections and illness associated with influenza A viruses that are novel in humans and that are, or are suspected to be, associated with animal exposure. If transmission to humans progresses to efficient, sustained human-to-human transmission where the potential for a pandemic is considered to be significant, the management strategy should shift to focus on the corresponding recommendations in the HHS Pandemic Influenza Plan that can be found in "Supplement 8: Community Disease Control and Prevention" at:*

*<http://www.hhs.gov/pandemicflu/plan/sup8.html>.*

## **D. NOTIFICATION OF HUMAN INFECTION WITH A NOVEL INFLUENZA A VIRUS**

State and federal animal health and public health officials must be in close communication. State public health officials should be informed when animal health, environmental or wildlife health agencies have indications of a suspected or confirmed outbreak of influenza A in animal populations which may have implications for human health, e.g. a new subtype of influenza not previously known to circulate in pigs or the presence of a highly pathogenic avian influenza virus. Animal and human health public information and communications staff, agency leadership and emergency management staff should also be kept informed of the progress of the investigation and be made aware that there are public health reporting requirements for human novel influenza A virus infections.

Novel influenza A has been a nationally notifiable condition in humans since 2007 and suspect human cases are reportable to CDC. Reporting of novel influenza A infections in humans to the World Health Organization (WHO) in compliance with International Health Regulations is required upon CDC confirmatory testing. Once cases are confirmed by the CDC they are included in weekly influenza surveillance reports which are posted at [www.cdc.gov/flu/weekly](http://www.cdc.gov/flu/weekly) and are included in the MMWR reports of notifiable conditions.

### **Public release of Information**

Each state should develop a zoonotic influenza virus communication plan. Decisions pertaining to the public release of laboratory results associated with the identification of novel influenza A viruses, in humans or animals, should be made by involved state, local and federal agencies within the confines of data privacy regulations. Laboratory results will, generally, first be reported back to local, state and federal animal and public health and environmental agencies, before being made available to the public. Precise address information, including names of locations on which animal were found, including maps, such that this information would breach confidentiality, should not be released unless it is deemed necessary by public health or animal health officials to contain the outbreak. Other information that may allow the public to identify the person, institution or location should not be released unless it is necessary to the medical or public health investigation. For example, if an animal is a rare species within a particular town and release of that species identity would allow the public to identify the owner or location of that animal, release of that information would not, generally be permitted, unless absolutely necessary for disease control activities.

To limit the risk of breaching confidentiality, sharing of such information should also be limited to those with a need to know. For example, to facilitate a joint investigation, local and perhaps state animal and public health authorities would need to know the location of the likely exposure to possible source animals in order to assess risk to workers and illness in animals. However, federal authorities would not need to know the name or other personal identifiers of the case patient or farm or market at which an exposure may have taken place. The importance of safeguarding confidential patient, farm and animal information cannot be overstated. Inadvertent release of confidential information will undermine future outbreak response activities.

## **E. GENERAL AGENCY ROLES AND RESPONSIBILITIES ASSOCIATED WITH ZOOONOTIC ANIMAL INFLUENZA SURVEILLANCE AND RESPONSE**

### **State and/or Local Public Health:**

- Initial rapid laboratory identification of suspected novel or unsubtypeable influenza A virus infection in a human
- Notification of CDC when such viruses are detected or suspected to facilitate prompt sampling, shipment and virus typing at CDC
- Investigation of human cases

- Notification of local, state and federal, animal health officials if an animal source is suspected
- Human disease surveillance among persons exposed to the human index case and possibly exposed to the same animal source, as well as those in the community
- Formal reporting of novel influenza A virus infections in humans to CDC for reporting under the International Health Regulations (IHR) and CSTE nationally notifiable diseases
- Recommendations on personal protective equipment for outbreak investigators and health care workers, in consultation with CDC
- Vaccine recommendations, in consultation with CDC
- Procedures for medical consultations for outbreak responders [e.g. plans for testing of respiratory specimens, provision of antiviral medications, and isolation policies of responders who develop a respiratory illness after exposure to potential source patient or animal(s)]
- Antiviral treatment and chemoprophylaxis recommendations for: laboratorians, those involved in outbreak response, health care workers and the general public, in consultation with CDC

**State Animal Health Agencies:**

- Influenza virus surveillance in animal populations and outbreak response
- Regulatory authority over animal diseases including animal-source disease outbreak control
- Notification of USDA when H5 and H7 influenza A virus infections are identified in poultry
- Oversight of animal sample collection and submission to approved state and federal animal disease laboratories
- Expertise regarding industry within state
- First responders to animal disease outbreaks
- PPE for responders (in collaboration with Public Health Agencies)
- Trace back and trace forward animal movements, if applicable
- Notification of state counterparts, if risk of interstate movement of infected poultry has occurred

**State Wildlife Agencies:**

- Influenza surveillance and response in wildlife populations
- Wildlife expertise
- PPE for responders (in collaboration with Public Health Agencies)
- Oversight of animal sample collection and specimen submission

**Centers for Disease Control and Prevention:**

- Confirmation and identification of novel influenza A viruses, including genetic and antigenic characterization and antiviral susceptibility testing
- Technical consultation and assistance to state and local health departments as needed, including expertise on human influenza, field epidemiological investigations, sero-epidemiologic studies and virus detection and testing, infection control, and clinical management of human infections with novel influenza A viruses
- Human influenza surveillance
- Infection control guidance for health care settings
- Reporting of novel influenza A infections in humans to WHO, as required
- Notification of USDA when a novel influenza A infection from a possible animal source is identified in humans
- Sharing of reagents, viruses, test results incl. virus sequence data with USDA
- National guidance on human influenza surveillance, outbreak investigation, influenza testing, vaccinations, personal protective equipment, antiviral treatment and chemoprophylaxis
- Development and distribution of reagents for influenza diagnostic tests for public health laboratories

- Development of vaccine candidate strains for novel influenza A viruses that pose a potential pandemic threat
- Risk assessment of novel influenza viruses that may pose a pandemic threat
- Coordination of multistate investigations of human cases

**United States Department of Agriculture (APHIS Veterinary Services):**

- Technical expertise on animal influenza viruses
- Notification of CDC when novel influenza A viruses are identified in domestic livestock and poultry to which humans may be exposed
- Sharing of reagents, viruses, test results incl. virus sequence data with CDC
- Animal influenza surveillance
- Poultry influenza outbreak response
- National guidance on animal influenza surveillance, outbreak investigation and response, influenza testing, personal protective equipment for Federal responders
- International notification to the OIE, as required
- Maintenance and deployment as appropriate of the National Veterinary Stockpile
- Coordination of multistate response

**United States Department of Agriculture (APHIS Wildlife Services):**

- Wild bird and feral swine surveillance and response
- Wildlife expertise
- PPE for Agency responders
- Oversight of animal sample collection and specimen submission
- Regulatory authority over wildlife including disease control measures

**Department of Interior:**

- Influenza surveillance and response in wildlife populations
- Wildlife expertise
- Oversight of sample collection and submission
- Regulatory authority over wildlife

*Note: Novel influenza A virus case investigations in pets may be led by the state public health or state animal health or state wildlife agencies after joint consultation.*

**F. TRIGGERS FOR INVESTIGATIONS WHEN NOVEL INFLUENZA A VIRUSES ARE IDENTIFIED**

1. Detection of a novel influenza A virus infection in a human
2. Detection in an animal of a novel influenza A virus that has potential for spread to humans

**Trigger 1: Detection of a novel influenza A virus infection in a human**

**Initiation of the Joint Human/Animal Investigation**

The joint investigation of potential sources of the novel influenza A virus and determination whether additional cases have occurred should be initiated as soon as possible after a laboratory-confirmed human case of a novel or

unsubtypeable influenza A infection is detected . This will maximize the opportunity to collect appropriate epidemiologic information and laboratory diagnostic samples from both human and animal contacts as soon as possible. Ideally public health and animal health investigations should be coordinated whenever possible to maximize the value of data gathering, sample collection, educational opportunities and resources.

Case and contact definitions and classifications have been developed as preliminary guidance for use in the event of investigations of a novel influenza A virus infection of humans and should be adapted, as necessary, for the specific outbreak conditions.

CDC's 2010 Novel Influenza A Case Definition can be found at:  
[http://www.cdc.gov/osels/ph\\_surveillance/nndss/print/novel\\_influenzaA.htm](http://www.cdc.gov/osels/ph_surveillance/nndss/print/novel_influenzaA.htm) .

### **Components of the Human Health Investigation:**

- Implement a response that includes an epidemiologic investigation of the suspect novel influenza A case and their contacts to assess the likelihood of and risk factors for human-to-human transmission and ongoing animal-human transmission. This would include health care workers if the case sought medical care, others in contact with the suspected source animals, others exposed to the case such as household members, school or work contacts, etc. Case finding in the wider community may also be considered as appropriate. It is important that the human case investigation does not interfere with the animal disease control investigation or facilitate further spread of animal viruses.
- Collect respiratory specimens from ill persons exposed to the case or exposed to the possible source animals. Additionally acute and convalescent serum samples or single convalescent serum samples if timing of investigation precludes acute sampling should be considered in consultation with CDC. Such samples may be collected from the suspect case, contacts that were exposed to a possible animal source or contacts that were exposed to a suspected or confirmed human case. See Section G. for guidance on Personal Protective Equipment (PPE) use.
- Describe the clinical presentation and assess the severity of illness of the novel influenza A virus infection in people.
- Implement appropriate preventive and control measures to reduce the risk of additional animal or human cases, including possible isolation and antiviral treatment for suspected and confirmed ill cases, quarantine and antiviral chemoprophylaxis for exposed individuals, and measures to reduce human exposure to an animal source of the novel virus, if applicable.
- Implement active monitoring of contacts of infected human(s) (e.g. phone contact) to determine if they develop symptoms compatible with acute respiratory illness (two of the following: rhinorrhea or nasal congestion, sore throat, cough and fever), conjunctivitis, diarrhea or other symptoms and make arrangements for influenza testing of ill persons. Contacts may include household members, healthcare workers and other people to whom the case had contact with during the day before illness onset through resolution of their symptoms.
- Implement active monitoring of persons exposed to animals that may be a source of novel influenza A infection, e.g. other children who exhibited pigs at a fair if the case patient's virus is a variant virus and the case patient was exposed to pigs at a fair.

- Ensure prompt testing of specimens from acutely ill suspect novel influenza A cases by a public health laboratory qualified to test for influenza A via RT-PCR testing with concurrent testing at the CDC. Ideally, testing of novel influenza A cases should be conducted in parallel with CDC, rather than tested sequentially, to avoid delays.
- Ensure immediate reporting of suspect and confirmed cases to CDC using the novel influenza A reporting form. [http://www.cdc.gov/h1n1flu/clinicians/clinician\\_forms\\_templates.htm](http://www.cdc.gov/h1n1flu/clinicians/clinician_forms_templates.htm).
- Notify any other states and neighboring health departments where cases or contacts linked to the case may be located (e.g., workers involved in avian influenza eradication activities who are returning to their home State in the instance where a novel virus has been identified in another worker). Notification should occur directly between states to avoid delays and should include (as permitted by State requirements) the individual's name, contact information and clinical status. If workers involved in the state/ federal disease eradication effort develop a novel influenza infection, public health and agriculture officials need to work closely together to evaluate the effectiveness of implemented PPE and biosafety procedures.
- Develop a risk communication plan.

#### **Testing of People with Suspected Infection with a Novel Influenza A Virus:**

Contact CDC immediately upon suspicion of a novel influenza A virus to assist with laboratory confirmation. Human infections with novel influenza A viruses are nationally notifiable in the United States (CSTE Position Statement Number: 12-ID-04).

Novel influenza A viruses cannot be specifically identified by commercially available influenza tests in most laboratories and hospitals. Clinicians that suspect influenza illness and a potential animal source of infection should collect respiratory specimens both for viral culture and RT-PCR testing to be done by state public health laboratories. Laboratory protocols and capabilities vary at the local and state levels. Specialized testing of respiratory specimens, predominantly by RT-PCR testing using the CDC FDA-approved protocols at state public health laboratories with confirmation and additional testing at CDC, is needed to identify a novel influenza A infection. CDC also performs genetic, antigenic, virus-host interaction and antiviral resistance analysis of the novel viruses to assess pandemic risk and assist in vaccine seed virus production if necessary. Because optimal serodiagnosis of infection requires collection of paired acute and convalescent phase sera, clinicians should also consider collection of an acute phase serum sample when influenza illness and a potential animal source of infection is suspected.

#### **Human Specimen Collection:**

Information on human influenza specimen collection and testing can be found on CDC's website at: <http://www.cdc.gov/flu/swineflu/h3n2v-testing.htm#testing>

In addition to respiratory specimens (nasopharyngeal swab, nasal aspirate or wash or a combined nasopharyngeal swab with oropharyngeal swab or if these are not possible to collect, a nasal swab or oropharyngeal swab), paired serum samples collected during the acute phase of the infection and 2 – 3 weeks later may aid diagnostic investigations both of cases and their contacts, especially when respiratory samples are not available or were not collected within the first 3-7 days of illness onset or were not collected because contacts did not report illness. Serologic testing may also detect subclinical or asymptomatic influenza infections. Although not optimal, collection of single convalescent phase (>14 days post symptom onset) serum samples should be considered if the timing of the investigation precludes acute serum sampling.

#### **Laboratory Biosafety Guidance for Clinical Specimens and Isolates:**



Interim biosafety guidance for all individuals handling clinical specimens or isolates containing 2009 H1N1 Influenza A Virus (Novel H1N1), including vaccine strains, can be found at:

[http://www.cdc.gov/h1n1flu/guidelines\\_labworkers.htm](http://www.cdc.gov/h1n1flu/guidelines_labworkers.htm)

Although written during the 2009 H1N1 Influenza A pandemic, the guidance is applicable to individuals handling other influenza strains as well.

General biosafety guidance for influenza A viruses, including animal influenza viruses can be found at:

[www.cdc.gov/biosafety/publications/bmb15/index.htm](http://www.cdc.gov/biosafety/publications/bmb15/index.htm)

### **The Animal Health Investigation:**

If it can be determined that there is a suspect animal exposure associated with the human case(s), then it is critical to coordinate promptly with animal health officials so that a thorough investigation can commence and so that transmission patterns can be clearly identified and interrupted. The animal health investigation would ideally occur in parallel to and in conjunction with the human health investigation to maximize opportunities for information sharing and dissemination. This also serves to minimize redundancy and inconvenience to patients, contacts, and agricultural employees. Animal, environmental and/or wildlife health agencies will conduct the epidemiological investigation and diagnostic sampling of animals associated with human cases as appropriate. If the suspected source animals are not available, then environmental sampling or sampling of replacement animals may be conducted after consultation with animal influenza experts. See Section G. for guidance on PPE use.

### **Animal Specimen Collection:**

Collection of specimens from animals or their environments for influenza A virus testing or serologic testing must be coordinated with state and federal animal health, environmental and wildlife agencies depending upon the species involved. During the investigation of illness caused by a potential novel influenza A virus in humans who work with animals, visits by public health and animal health officials to worker locations should be coordinated whenever possible.

Testing of samples from swine linked to human novel influenza infections must be carried out by National Veterinary Services Laboratory (NVSL), as detailed in the USDA SIV Surveillance Manual. (see below). Testing of influenza infected poultry is discussed in the Foreign Animal Disease Preparedness and Response Plan (FAD Prep) at:

<https://fadprep.lmi.org>.

For information on animal influenza specimen collection and testing, please visit the NAHLN website at:

[http://www.aphis.usda.gov/animal\\_health/nahln/labs.shtml](http://www.aphis.usda.gov/animal_health/nahln/labs.shtml)

### **Trigger 2: Detection of an influenza A virus in an animal that has potential for spread to humans**

Currently there are federal surveillance programs for swine and avian influenza type A.

Avian influenza outbreaks of H5 or H7 influenza in poultry are notifiable to the state animal health veterinarian. State animal health officials will then notify the USDA and their State Public Health counterparts. Poultry infections with H5 or H7 viruses are reported by USDA to the World Organisation for Animal Health (OIE).

In recent years USDA APHIS and the swine industry have also implemented an SIV surveillance program to characterize the distribution of SIV in U.S. swine herds. The most recent version of the SIV Surveillance Procedures Manual titled *Influenza Surveillance in Swine* (published July 15, 2010). These documents and annexes can be found at the following link:

[http://www.aphis.usda.gov/animal\\_health/animal\\_dis\\_spec/swine/siv\\_surv\\_manual.shtml](http://www.aphis.usda.gov/animal_health/animal_dis_spec/swine/siv_surv_manual.shtml)

Upon notification of a confirmed novel influenza A infection in animals, public health authorities should consider initiating a human health assessment and investigation of individuals with known exposures to infected animals. At a minimum, this would consist of contacting persons who have been exposed to infected animals to determine if they developed illness. Influenza testing should be offered to persons who develop respiratory illnesses or conjunctivitis in the week after exposure to the infected animals.

**Purpose of the Investigation:**

- Provide information to exposed persons regarding their exposure and information regarding how to access the health department for testing if they develop illness
- Determine if human illness is associated with exposure to animals infected with an influenza A virus of concern or their environments
- Timely collection of appropriate samples from suspect human cases
- If available, request information from animal health officials to define the number of animals present, the number ill, clinical signs, vaccination status, onset date(s), age, source, recent movement(s), disposition of the animals and results for any samples submitted
- Identify risk factors for zoonotic influenza A virus transmission to people
- In conjunction with animal, environmental and wildlife health officials, describe the epidemiology of the novel influenza A virus infection in animals and people and potential for spread among animals

Animal caretakers and others working directly with the infected animals should be reminded about safe animal handling, asked to report illness and given information as to who to contact should they become ill or have additional questions. Information provided should include basic infection control practices, such as hand washing, personal protective equipment, etc. Workers should be offered seasonal influenza vaccine and, if indicated, antiviral chemoprophylaxis as appropriate. Individuals exposed to infected animals should be instructed who to contact if they develop signs of influenza-like illness. In most cases this will be the state or local health department of residence. In instances where there is suspect transmission or evidence of human infection with a novel influenza A virus then it may be appropriate for public health officials to conduct active surveillance and contact the animal caretakers to determine their health status. If a human case(s) is discovered to be associated with exposure to the infected animals then appropriate samples should be collected and the investigation should follow the guidance outlined in Section F1.

**The Animal Health Investigation:**

Animal health officials, including the private veterinary practitioner, may conduct an epidemiological investigation and diagnostic sampling of animals and/or animal environments as appropriate. The response to swine and LPAI virus investigations are state specific. Reporting requirements for notifiable subtypes of avian influenza findings to animal health authorities should be followed. The USDA APHIS Veterinary Services (VS) HPAI Response Plan and other integrated documents can be found at the VS FAD Prep website. To gain access to the site go to the following link and register: <https://fadprep.lmi.org>.

Within 24 hours you will receive an e-mail from the site administrator informing you that your account has been activated.

Upon public health officials being notified of a confirmed novel influenza A virus infection in animals, public health authorities should work closely with animal health authorities to characterize the novel animal strain. If needed and requested by the USDA the CDC may be able to provide additional diagnostic testing support.

## **G. INFECTION CONTROL PRECAUTIONS IN OCCUPATIONAL AND NON-OCCUPATIONAL SETTINGS AND PERSONAL PROTECTIVE EQUIPMENT (PPE)**

Influenza viruses are thought to spread primarily via large infectious droplets expelled during coughing or sneezing. Influenza viruses can be transmitted through contact with surfaces recently contaminated with influenza viruses and inoculated onto the mucus membranes or eyes. A third possible mode of transmission is via the airborne route where small particulates containing virus remain suspended in the air for long periods of time and are then inhaled. The relative contributions of these three modes of transmission to the spread of influenza viruses are not fully understood.

### **PPE for Occupational Exposure**

All employees with occupational exposure to humans, birds, swine or other animals possibly infected with influenza viruses should wear appropriate PPE (including respiratory and eye protection) and take other recommended protective measures. Ideally, use of PPE should be part of a comprehensive program that includes appropriate selection of PPE, training in the use of equipment, respiratory medical clearance and respirator fit testing. Frequent hand washing is also recommended. Because some influenza viruses also are known to cause conjunctivitis in humans, eye protection is also recommended.

Information about PPE and respirators can be found on OSHA's Safety and Health Topics Web pages at: <http://www.osha.gov/SLTC/personalprotectiveequipment/index.html> and <http://www.osha.gov/SLTC/respiratoryprotection/index.html>.

For more information on infection control and protecting people exposed to potentially infected people or animals during a novel influenza virus detection or outbreak investigation, the following resources are available:

### **CDC's Questions and Answers Regarding Respiratory Protection for Preventing 2009 H1N1 Influenza Among Healthcare Personnel (includes link to infection control measures):**

<http://www.cdc.gov/flu/professionals/infectioncontrol/index.htm>

Although the recommendations concerns preventing infections with 2009 H1N1 influenza they are also applicable to other influenza virus strains.

### **CDC's Interim Guidance on Protecting Commercial Swine Workers from Variant Influenza at:**

<http://www.cdc.gov/flu/swineflu/guidance-commercial-pigs.htm>

### **CDC's Interim Guidance on Protecting People who Work with Pigs in Non-Commercial Settings at:**

[http://www.cdc.gov/h1n1flu/guidelines\\_noncommercial\\_settings\\_with\\_pigs.htm](http://www.cdc.gov/h1n1flu/guidelines_noncommercial_settings_with_pigs.htm)

### **CDC NIOSH: Protecting Poultry Workers from Avian Influenza at:**

<http://www.cdc.gov/niosh/docs/2008-128/>

**CDC NIOSH omnibus website:** <http://www.cdc.gov/niosh/topics/flu/>

### **Occupational Safety and Health Administration (OSHA)**

Guidance Update on Protecting Employees from Avian Flu (Avian Influenza) Viruses at:

<http://www.osha.gov/dsg/guidance/avian-flu.html>

### **United States Department of Agriculture (USDA)**

Ensuring the Protection of Employees Involved in Highly Pathogenic Avian Influenza Control and Eradication Activities at:

[http://www.aphis.usda.gov/library/directives/pdf/APHIS6800\\_1.pdf](http://www.aphis.usda.gov/library/directives/pdf/APHIS6800_1.pdf)

**Biosecurity for Bird and Poultry Owners:**

[http://www.aphis.usda.gov/publications/animal\\_health/content/printable\\_version/USDA\\_BioGuide\\_Eng\\_8-2006.pdf](http://www.aphis.usda.gov/publications/animal_health/content/printable_version/USDA_BioGuide_Eng_8-2006.pdf)

**Protective Precautions for Collectors and Submitters of Swine Influenza Samples:**

PPE Guidance for collectors and submitters of samples in the SIV manual page 15 of procedures manual.

[http://www.aphis.usda.gov/animal\\_health/animal\\_dis\\_spec/swine/siv\\_surv\\_manual.shtml](http://www.aphis.usda.gov/animal_health/animal_dis_spec/swine/siv_surv_manual.shtml)

**PPE for Public Health Investigators:**

In the course of a public health investigation, investigators could be at risk of exposure to novel influenza A viruses from a variety of settings. As part of an investigation, investigators may need to enter the affected area or premises to observe response activities, collect information about the type of work being performed, conduct environmental assessments, interview cases and contacts and collect respiratory and/or blood samples from ill persons and their contacts. When possible, these visits should be conducted jointly with agricultural officials.

The levels of PPE recommended will vary, depending on the type of work being performed:

- Interviewing suspect or confirmed cases who are ill may pose a risk to the interviewer. During these interviews, investigators should maintain a distance of at least 6 feet between themselves and the interviewee and should wear a surgical mask during the interview and should strictly follow proper hand hygiene practices. Ideally, such interviews should be conducted in a well-ventilated setting. Interviews should follow the guidance on infection control precautions for healthcare workers who are caring for suspected novel influenza A patients.
- Interviewing non-ill contacts is considered a low-risk activity. Therefore, routine use of PPE is not necessary. However, during such interviews, investigators should maintain a distance of at least 6 feet between themselves and the interviewee and should strictly follow proper hand hygiene practices. Ideally, such interviews should be conducted in a well-ventilated setting.

When entering agricultural premises affected or suspected to be affected by influenza, investigators should follow PPE and agricultural biosecurity recommendations as determined by animal and human health authorities in consultation with the owner. These recommendations may include the use of respiratory protection, eye protection, and protective clothing (disposable gowns, gloves; use of boots that can be disinfected) and following appropriate hand-hygiene practices, as well as disinfecting protocols for equipment and vehicles.

Public and animal health personnel involved in the investigation should be:

- Instructed to self-monitor for fever, respiratory symptoms, diarrhea, and conjunctivitis for 10 days following last exposure to known or suspected sources.
- Vaccinated with the current seasonal influenza vaccine according to national recommendations if they have not yet received it (see vaccination recommendations, see below).
- Advised to strictly adhere to all personal protection and infection control precautions.

**Use of Antivirals for Treatment and Chemoprophylaxis of Novel Influenza A viruses:**

Recommendations for antiviral use should be reviewed and modified as necessary based on the epidemiology, demonstrated transmissibility, clinical presentation and antiviral resistance characteristics of the specific novel influenza

A virus strain. Recommendations may change as more information about the epidemiology of the novel influenza A virus strain or the efficacy/safety of other antiviral medications becomes available. It may be necessary for State and/or local Health Departments to contact primary health care providers in the area of residence of the animal caretakers to provide information regarding exposure and the need to consider chemoprophylaxis.

Ill persons who are suspected or confirmed with novel influenza A virus infection should be administered antiviral treatment as soon as possible after onset of illness. Those exposed to infected animals and contaminated environments should be considered for daily antiviral chemoprophylaxis throughout the time of exposure. Once begun, chemoprophylaxis should continue throughout the exposure period and continued for seven to ten days after the last known exposure. Please see CDC's current recommendations for antiviral treatment and chemoprophylaxis of influenza at <http://www.cdc.gov/flu/antivirals/index.htm>

**Vaccination:**

CDC recommends that all persons 6 months of age and older receive a yearly influenza vaccination in the United States. Annual influenza vaccination with human seasonal influenza vaccine of persons likely to be exposed to animal influenza viruses, including poultry and swine workers and cullers, may reduce the risk of transmission of human influenza viruses to animals and reduce the potential for humans to be co-infected with seasonal and animal influenza viruses, thereby reducing the risk of influenza A virus reassortment. For the latest seasonal vaccination recommendations from the Advisory Committee on Immunization Practices, please visit ACIP's Provisional Recommendations for the Use of Influenza Vaccines: <http://www.cdc.gov/vaccines/pubs/ACIP-list.htm>

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