

Influenza (Novel and Laboratory-confirmed Deaths)

1. DISEASE REPORTING

A. Purpose of Reporting and Surveillance

1. To determine mortality rates for laboratory-confirmed influenza.
2. To monitor the effectiveness of vaccination programs.
3. To monitor the epidemiology of severe influenza infections.
4. To detect emerging threats such as avian and other novel influenza strains.

B. Legal Reporting Requirements for Novel or Unsubtypeable Influenza

1. Health care providers: **immediately notifiable to local health jurisdiction**
2. Health care facilities: **immediately notifiable to local health jurisdiction**
3. Laboratories: **immediately notifiable to local health jurisdiction**; specimen submission required – isolate or clinical specimen (2 business days)
4. Veterinarians: suspected human cases **immediately notifiable to local health jurisdiction**; animal cases notifiable to Washington State Department of Agriculture (see: <http://apps.leg.wa.gov/WAC/default.aspx?cite=16-70>)
5. Local health jurisdictions: **immediately notifiable to Washington State Department of Health (DOH) Communicable Disease Epidemiology Section (CDES)**

C. Legal Reporting Requirements for Influenza-associated Deaths (Laboratory-confirmed)

1. Healthcare providers: notifiable to local health jurisdiction within 3 business days
2. Health care facilities: notifiable to local health jurisdiction within 3 business days
3. Laboratories: no legal reporting requirement
4. Local health jurisdictions: notifiable to Washington State Department of Health (DOH) Communicable Disease Epidemiology Section (CDES) within 7 days of case investigation completion or summary information required within 21 days

D. Local Health Jurisdiction Investigation Responsibilities

1. Novel Influenza: Contact CDES **immediately** regarding suspected novel influenza infections. Determine exposures for the case. Facilitate the transport of specimens to the Washington State Public Health Laboratories for testing. Ensure that appropriate infection control practices are implemented while testing is pending.
2. Influenza-associated Deaths: Request and review medical records. Additional response is per local health jurisdiction discretion.

3. Complete the influenza case report form for novel infections and influenza-associated deaths (laboratory-confirmed) (<http://www.doh.wa.gov/notify/forms/influenza.pdf>), and enter the data into the Public Health Issues Management System (PHIMS) as Influenza. In addition, complete the CDC influenza-associated pediatric death case report form (<http://www.doh.wa.gov/ehsphl/Epidemiology/CD/swineflu/cdc-pedfludeath.pdf>) for deaths in children < 18 years old and fax the completed form to CDES.

2. THE DISEASE AND ITS EPIDEMIOLOGY

Background

Seasonal influenza epidemics occur every year in the United States most commonly during the fall and winter months. Every year, influenza results in approximately 220,000 hospitalizations (JAMA 2004;292(11):1333–40) and somewhere between 3,000 and 49,000 deaths (MMWR 2010;59(33):1057–62).

A. Etiologic Agent

There are two main types of influenza, influenza A and influenza B. Influenza A viruses are divided into subtypes based on the hemagglutinin (H) and neuraminidase (N) proteins on their surfaces. The specific strains of influenza change frequently, necessitating parallel changes in the seasonal influenza vaccine.

Since 1977, three influenza virus subtypes have been in circulation: influenza A H3N2, influenza A H1N1, and influenza B. In April 2009, a novel H1N1 virus was identified from several states and Mexico and caused the first influenza pandemic of the 21st century. This virus is no longer considered “novel” and is now expected to regularly circulate as a seasonal strain.

Human infections due to avian and swine influenza viruses are considered novel virus infections. In 1997, human infections due to H5N1 avian influenza were identified in Asia and through December 2010, 512 laboratory-confirmed cases mainly in Asia and Africa have been reported and have resulted in 304 deaths (case fatality ratio = 59%). No cases of human H5N1 avian influenza have been detected in the United States.

Surveillance information on H5N1 avian influenza is available at:

http://www.who.int/csr/disease/avian_influenza/en/.

Human infections with swine-origin influenza viruses have been detected sporadically in the United States since 2005 (see: <http://www.cdc.gov/flu/swineflu/>).

Any influenza A virus that is unsubtypeable is potentially a novel virus and should be submitted to Washington State Public Health Laboratories for subtyping at Centers for Disease Control and Prevention (CDC).

B. Description of Illness

Patients with uncomplicated influenza may have symptoms that include fever, chills, cough, headache, sore throat and other upper respiratory tract symptoms (rhinorrhea), myalgias, arthralgias, fatigue, vomiting, and diarrhea. Symptoms can be minimal.

Complications of influenza can include primary viral pneumonia, secondary bacterial pneumonia, ear infections, sinus infections, dehydration, worsening of chronic medical conditions (such as congestive heart failure, asthma, or diabetes), and death.

Those at higher risk for influenza-related complications include: children younger than 5 years of age, adults 65 years and older, pregnant women, and persons with chronic medical conditions such as asthma, chronic obstructive pulmonary disease (COPD), obesity, immunosuppressive therapy or disease, diabetes, hemoglobinopathy, and neuromuscular disease. (See MMWR 2010;59[RR08]:1-62 available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5908a1.htm?s_cid=rr5908a1_e).

C. Reservoirs

Reservoirs for influenza A viruses include humans, swine, poultry and other birds and mammals. Humans are the primary reservoir for influenza B.

D. Modes of Transmission

Influenza viruses spread person-to-person primarily through large-particle respiratory droplet transmission (e.g., when an infected person coughs or sneezes near a susceptible person). Transmission via large-particle droplets requires close proximity between source and recipient persons because droplets do not remain suspended in the air and generally travel only a short distance (<6 feet). Other possible routes of influenza transmission are mucosal contamination from hands touching contaminated surfaces and via droplet nuclei (also called “aerosol” transmission). The relative contribution of each type of transmission has not been defined but for aerosol transmission is thought to be small.

Avian influenza is transmitted from birds to humans directly or through environmental contamination. Only rare cases of person-to-person transmission of avian influenza have been reported and have involved close personal contact.

E. Incubation Period

The incubation period for influenza is typically 1–4 days, but can range from 1–7 days.

F. Period of Communicability

Viral shedding with influenza probably occurs from one day before to 5–10 days following illness onset although communicability decreases rapidly 24 hours after fever resolves (without fever reducing medication). Persons who continue to be ill longer than 7 days after illness onset should be considered potentially contagious until symptoms have resolved. Children, especially younger children, can shed virus for 10 or more days. Immunocompromised persons can shed virus for weeks or months.

G. Treatment

Antiviral medication should be initiated as early as possible for patients with suspected or confirmed influenza who: 1) have severe or progressive illness or 2) are at higher risk for influenza complications (see Section 2B). Antiviral treatment is most effective when started within 48 hours of illness onset. Therefore, treatment should not be delayed while laboratory results are pending.

Recommendations regarding antiviral medications of choice are available at: <http://www.cdc.gov/flu/professionals/antivirals/index.htm>.

Please note that resistance patterns can change within an influenza season. CDC's Flu View provides weekly data on antiviral resistance patterns for circulating strains and is available at: <http://www.cdc.gov/flu/weekly/>.

Additional therapy such as antibacterial agents should be used at the discretion of the clinicians based on the patient's clinical presentation. Etiologic agents of secondary bacterial pneumonia complicating influenza cases include bacteria such as *Staphylococcus aureus* (both methicillin-sensitive and methicillin-resistant) and *Streptococcus pneumoniae*. For antibacterial treatment of pneumonia, clinical guidance for community-acquired pneumonia should be followed and can be accessed on the American Thoracic Society website at: <http://www.thoracic.org/statements/index.php>.

3. CASE DEFINITIONS

A. Case Definition for Novel Influenza Infections (2010)

1. **Clinical Description:** An illness compatible with influenza virus infection (fever $>100^{\circ}$ F with cough or sore throat).
2. **Laboratory criteria for diagnosis:** 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 subtypes. Influenza H1 and H3 subtypes originating from a non-human species or from genetic reassortment between animal and human viruses are also novel subtypes. Novel subtypes will be detected with methods available for detection of currently circulating human influenza viruses at state public health laboratories (e.g., real-time reverse transcriptase polymerase chain reaction [RT-PCR]). Confirmation that an influenza A virus represents a novel virus will be performed by CDC's influenza laboratory
3. **Criteria for epidemiologic linkage:** The patient has had contact with one or more persons who either have or had the disease AND transmission of the agent by the usual modes of transmission is plausible

OR

a case may be considered epidemiologically linked to a laboratory-confirmed case if at least one case in the chain of transmission is laboratory confirmed.

4. Case Classification

Suspected: A case meeting the clinical criteria, pending laboratory confirmation. Any case of human infection with an influenza A virus that is different from currently circulating human influenza H1 and H3 viruses is classified as a suspected case until the confirmation process is complete.

Probable: A case meeting the clinical criteria and epidemiologically linked to a confirmed case, but for which no confirmatory laboratory testing for novel influenza virus infection has been performed.

Confirmed: A case of human infection with a novel influenza A virus confirmed by CDC's influenza laboratory. Once a novel virus has been identified by CDC, confirmation may be made by public health laboratories following CDC-approved

protocols for that specific strain, or by laboratories using an FDA-authorized test specific for detection of that novel influenza strain.

B. Case Definition for Laboratory-confirmed Influenza-associated Deaths (DOH)

1. *Confirmed*: A laboratory-confirmed influenza-associated death is defined as a death resulting directly or indirectly from a clinically compatible illness that was confirmed to be influenza by an appropriate laboratory test. There should be no period of complete recovery between the illness and death. Laboratory criteria for diagnosis include:
 - Influenza virus isolation in tissue cell culture from respiratory specimens;
 - Reverse-transcriptase polymerase chain reaction (RT-PCR) testing of respiratory specimens;
 - Immunofluorescent antibody staining (direct or indirect) of respiratory specimens;
 - Rapid influenza diagnostic testing of respiratory specimens;
 - Immunohistochemical (IHC) staining for influenza viral antigens in respiratory tract tissue from autopsy specimens;
 - Four-fold rise in influenza hemagglutination inhibition (HI) antibody titer in paired acute and convalescent sera.

4. DIAGNOSIS AND LABORATORY SERVICES

A. Diagnosis

Diagnostic laboratory tests for influenza include viral culture, serology, rapid antigen testing, polymerase chain reaction (PCR), and immunofluorescence assays.

Information regarding laboratory diagnosis of flu is available at:

<http://www.cdc.gov/flu/professionals/diagnosis/>.

B. Tests Available at Washington State Public Health Laboratories (PHL)

Testing is done at PHL primarily for surveillance purposes, including identifying a novel influenza virus. PHL can culture for influenza and performs an RT-PCR test to detect and subtype influenza in clinical specimens. Criteria for submitting specimens to PHL for influenza testing and/or subtyping are available at:

<http://www.doh.wa.gov/notify/other/speccollecttrans.pdf>.

Note that PHL require all clinical specimens have two patient identifiers, a name **and** a second identifier (e.g., date of birth) on both the specimen label and on the submission form. Due to laboratory accreditation standards, specimens will be rejected for testing if not properly identified. Also include specimen source and collection date.

C. Specimen Collection

Information on specimen collection, storing, and shipping is available at:

<http://www.doh.wa.gov/notify/other/speccollecttrans.pdf>.

Healthcare providers who wish to submit specimens to PHL for influenza testing should contact their local health jurisdiction for approval. Specimens need to be shipped with a completed PHL Virology Submission form which is available at:

<http://www.doh.wa.gov/EHSPHL/PHL/Forms/SerVirHIV.pdf>.

For information regarding collection and submission of specimens from deceased patients with suspected influenza infection see:

<http://www.doh.wa.gov/notify/other/mefluguide.pdf>.

5. ROUTINE CASE INVESTIGATION

The case investigation for laboratory-confirmed influenza-associated deaths involves reviewing medical records and completing the influenza case report form available at: <http://www.doh.wa.gov/notify/forms/influenza.pdf>.

A. Evaluate the Diagnosis

For **Novel Infections**: Use the full case report form to itemize risk factors and illness severity. Facilitate the transport of specimens to PHL for novel influenza testing. Information regarding testing patients for H5N1 avian influenza is available at: http://www.doh.wa.gov/notify/H5N1testing_clinicians.pdf.

For **Deaths**: Identify confirmatory laboratory testing results and request isolates be sent to Washington State Public Health Laboratories (PHL), if possible.

B. Identify Potential Sources of Infection

For **Novel Infections**: Inquire about recent travel or exposure to ill persons who have recently traveled, and about exposure to animals such as poultry and swine.

C. Identify Contacts

For **Novel Infections**: An investigation should be performed, including exposure identification and contact tracing. Consider consultation with Communicable Disease Epidemiology Section.

For **Deaths**: Identification of contacts is per local health jurisdiction discretion.

D. Environmental Evaluation

None unless laboratory exposure is suspected.

6. CONTROLLING FURTHER SPREAD

A. Infection Control Recommendations / Case Management

1. Hospitalized persons with confirmed or suspected influenza should be placed on droplet precautions for 7 days after illness onset or until 24 hours after the resolution of fever and respiratory symptoms, whichever is longer, while a patient is in a healthcare facility. In some cases, facilities may choose to apply droplet precautions for longer periods based on clinical judgment, such as in the case of young children or severely immunocompromised patients who may shed influenza virus for longer periods of time. (See: <http://www.cdc.gov/flu/professionals/infectioncontrol/healthcaresettings.htm>.)

More stringent infection control practices are recommended for patients suspected of having a novel influenza virus. Such patients should be placed in an airborne isolation room with 6 to 12 air changes per hour. Health care personnel should use contact precautions, wear a fit-tested respirator (N-95 or higher) when entering the room, and don eye protection when within 3 feet of the patient. These infection control measures should

be continued for 14 days after onset of symptoms or until either an alternative diagnosis is established or diagnostic test results indicate that the patient is not infected with a novel influenza virus. (See: <http://www.cdc.gov/flu/avian/professional/infect-control.htm>.)

2. Antiviral treatment is recommended for persons with severe or progressive influenza illness and for ill persons at increased risk of severe disease. (See section 2G above.)
3. Most persons with influenza will be cared for at home, not in a hospital. Educate patients to stay home until 24 hours after fever resolves (without fever reducing medications). If necessary to leave home to obtain health care, wear a facemask, if available and tolerable. While ill, follow infection control measures such as covering coughs and frequently cleansing hands. Persons taking antiviral medications should adhere to the same infection control practices. Those providing care to persons sick with influenza should protect themselves and others in the household from being exposed by taking steps to prevent transmission. (See: <http://www.cdc.gov/flu/homecare/index.htm>.)

B. Infection Control for Ill Health Care Workers

- A. Health care providers with influenza should be excluded from work until at least 24 hours after they no longer have a fever (without the use of fever-reducing medicines such as acetaminophen). Those with ongoing respiratory symptoms should be considered for evaluation by occupational health to determine appropriateness of contact with patients. Consider temporary reassignment or exclusion from work for 7 days from symptom onset or until the resolution of symptoms, whichever is longer, for health care providers returning to care for patients in a protected environment, such as hematopoietic stem cell transplant patients. (See: <http://www.cdc.gov/flu/professionals/infectioncontrol/healthcaresettings.htm>.)

C. Contact Management

Contact investigations for seasonal influenza cases can be performed at the discretion of the local health jurisdiction. Consult with Communicable Disease Epidemiology Section for managing contacts of suspect H5N1 avian or other novel influenza cases.

1. Symptomatic Contacts

Symptomatic contacts at high risk for influenza complications should contact their provider immediately to discuss the need for treatment. All contacts symptomatic with influenza-like illness should avoid work, school, child care, and other public settings until 24 hours after symptoms have resolved. For antiviral treatment see Section 2G.

2. Asymptomatic Contacts

Asymptomatic contacts at high risk for influenza complications or those at risk of transmitting infection to high risk persons should contact their provider immediately to discuss the need for chemoprophylaxis. In general, post-exposure chemoprophylaxis should not be started more than 48 hours after the last exposure. Inform asymptomatic contacts to stay home if they develop symptoms of early influenza-like illness.

D. Environmental Measures

Standard cleaning and disinfecting should be done for any potentially contaminated

surfaces where persons with influenza may have been present. In addition, surfaces touched often, such as doorknobs, refrigerator door handles, telephones, keyboards, and bathroom handles, should be cleaned and disinfected frequently in public areas during influenza season and in a household with a potentially communicable influenza case.

For additional information regarding environmental cleaning and disinfecting see:

<http://www.cdc.gov/flu/school/cleaning.htm> and

<http://www.flu.gov/professional/hospital/influenzaguidance.html>.

7. MANAGING SPECIAL SITUATIONS

A. CDC guidance is available for managing special situations in addition to those listed below. (See: <http://www.cdc.gov/flu/professionals/infectioncontrol/index.htm>.)

1. Child Care Settings

CDC guidance is available for preventing the spread of influenza in child care settings: <http://www.cdc.gov/flu/professionals/infectioncontrol/childcaresettings.htm>.

2. Institutions

CDC guidance is available for managing influenza outbreaks in institutions: <http://www.cdc.gov/flu/professionals/infectioncontrol/institutions.htm>.

3. Health Care Facilities

CDC guidance is available for managing influenza cases in health care settings: <http://www.cdc.gov/flu/professionals/infectioncontrol/healthcaresettings.htm>.

4. Homeless and Emergency Shelters

CDC guidance is available for managing 2009 H1N1 cases in homeless and emergency shelters: <http://www.cdc.gov/h1n1flu/guidance/emergencyselters.htm>.

8. ROUTINE PREVENTION

A. Vaccine Recommendations:

Routine vaccination is recommended for all persons 6 months and older. Annual vaccination is particularly important for persons at increased risk of complications and for persons in contact with those at high risk for complications including (http://www.cdc.gov/flu/professionals/acip/flu_vax1011.htm#box1):

- Children less than 5 year old, but particularly those under 2 years old
- Pregnant women
- People 50 years of age and older
- People of any age with certain chronic health conditions (such as asthma and other pulmonary disease, diabetes, hepatic disease, hematologic abnormalities, neurologic or neuromuscular abnormality, immunosuppressive disease or therapy, cancer in the past year, or cardiovascular disease)
- Persons who live in nursing homes and other long-term care facilities
- Children receiving long-term aspirin therapy

- American Indians/Alaska Natives
- People who are morbidly obese
- Household contacts of person at high risk for complications from influenza
- Household contacts and out-of-home caregivers of children <5 years old and adults ≥ 50 years old, but particularly contacts of children under 6 months of age
- Health care workers

B. Routine Prevention Recommendations

General respiratory hygiene measures are recommended at all times, and particularly during periods when respiratory viruses are circulating:

- Cover your nose and mouth with a tissue when you cough or sneeze. Throw the tissue in the trash after you use it and then clean your hands;
- Wash your hands with soap and water frequently, especially after you cough or sneeze. Alcohol-based hand cleaners are also effective;
- Try to avoid close contact with people ill with respiratory symptoms;
- If you get sick with respiratory symptoms, stay home the recommended period and limit contact with others to keep from infecting them;
- Avoid touching your eyes, nose or mouth;
- Don a mask when entering a healthcare facility if you are coughing or sneezing.

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UPDATES