Influenza Surveillance and Response Protocol

Note: Guidance for managing seasonal / avian / pandemic influenza changes rapidly. Please make certain you are operating from the most current guidelines.

- ***Seasonal influenza:*** *In addition to these guidelines, please use MMWR, 2008; 57(July 17, 2008) throughout the season for detailed recommendations on seasonal influenza.* These guidelines are for providers, laboratories and local health departments. For state-level health department responsibilities, see Appendix 3.
- ***Avian influenza:*** See Appendix 1.
- ***Pandemic influenza****:* See Appendix 2.
- ***State Infectious Disease Epidemiology Program (IDEP) Responsibilities for Influenza Surveillance and Response***; See Appendix 3.
- ***References***; See Appendix 4.

Provider Responsibilities

1. Educate patients to practice cough etiquette. Free patient education materials can be obtained from: http://www.cdc.gov/flu/protect/covercough.htm

2. Assure that health care personnel with direct patient contact have adequate occupational health precautions in place:
   a. They should be offered seasonal influenza vaccine on an annual basis.
   b. They should use a surgical mask (standard and droplet precautions) when evaluating patients with febrile respiratory illness.

3. Year round, on a weekly basis, report total visits for influenza-like illness to your local health department in accordance with guidelines from your local health department. Influenza-like illness is defined as:
   i. Fever. 100° F (36°C) *and*
   ii. Cough or sore throat without another identified cause.

4. Immediately report any of the following by phone to the local health department as a potential outbreak or unusual occurrence:

   a. Pediatric death: A death from influenza in a person age 18 and under. Complete the provider (yellow) section of the WVEDSS Influenza-Associated Pediatric Deaths Case Report Form, and attach a copy of the laboratory slip confirming the diagnosis of influenza. Refer the completed report to the local health department.

   b. Suspect influenza outbreaks: Examples include nursing home and school outbreaks. Laboratory testing during outbreaks can be arranged free-of-charge by contacting the Infectious Disease Epidemiology Program (IDEP) (800-423-1271) or the local health

department. After taking specimens for culture, patients should be started on antiviral prophylaxis in accordance with CDC guidelines (MMWR, July 17, 2008, vol 57).

c. Suspect or confirmed avian or novel influenza: Contact the local health department immediately. See also Appendix 1.

Laboratory Responsibilities

1. Year-round, report the following information to IDEP (Fax: 1-304-558-8736) by close of business Monday for the previous week (Sunday to Saturday):
   a. Total specimens cultured for influenza A and B; AND
   b. Total specimens positive (by culture) for influenza A or B, by type and subtype as available.

   Contact IDEP for questions at (800)-423-1271 or (304)-558-5358.

2. Subtyping of selected seasonal influenza specimens is available through Office of Laboratory Services (OLS) free-of-charge. A sample of early, mid and late season isolates are welcome; as are isolates from influenza outbreaks. Contact the OLS Influenza Laboratory at 304-558-3530.

3. Report any of the following immediately to the local health department:
   a. Influenza outbreaks
   b. Confirmed or suspected cases of avian influenza (See Appendix 1).

Public Health Action

1. Educate local providers and laboratories about reporting requirements (above). Transmit health alerts to local providers when requested by the state public health agency.

2. Take steps to protect employee health, as follows:
   a. Seasonal influenza vaccination is offered to employees on an annual basis; and
   b. Surgical masks should be available to personnel for case and outbreak investigation. Gowns and gloves should be available, if contact with respiratory secretions is likely.

3. Transmit total ILI for the previous week for the county by fax (304-558-8736) no later than Monday every week (throughout the year) to the West Virginia Infectious Disease Epidemiology Program (IDEP).

4. If you do not already have a sentinel provider, recruit one sentinel provider or laboratory per county for influenza season; no later than November 1, annually. Report this information to the

West Virginia Department of Health and Human Resources Influenza Surveillance Coordinator to complete the enrollment process. Successful provider recruitment and retention requires:

a. Identifying providers who may be interested in participating. Think broadly. Clinics, physician assistants, nurse practitioners, university health centers, family practice residency programs, and many others make good sentinel providers.
b. Make a personal recruiting visit. (Suggestion: ask your regional epidemiologist to help).
c. Explain influenza surveillance using a recruitment package, including:
    i. A letter from the local health department;
    ii. Information on the CDC influenza surveillance system;
    iii. WVDHHR information sheets;
    iv. Enrollment form; and
    v. Virology collection instructions.
d. Identify and communicate with a point of contact (POC) in the sentinel provider office.
e. Send the completed enrollment form to DHHR. (Fax to the attention of the Influenza Surveillance Coordinator at 304-558-8736.) You will receive the virology collection kit by return mail.
f. Deliver the kit to the POC in the sentinel provider office.
g. Keep the lines of communication open. Work with the Influenza Coordinator to evaluate and improve sentinel provider reporting.

5. Notify IDEP immediately when any of the following is reported:

    a. Pediatric Death: a death from laboratory-confirmed influenza in a person aged 18 or younger. Deaths should be investigated using the WVEDSS Pediatric Flu Death Investigation form.

    b. Outbreak: Especially in high-risk populations, anticipate that you may be asked to investigate influenza outbreaks as follows:
        i. Work with providers to obtain approximately 8 to 10 culture samples for rapid testing and viral isolation at the West Virginia Office of Laboratory Services *prior to initiation of antiviral agents*.
        ii. Obtain a description of symptoms.
        iii. For nursing home outbreaks, refer to the influenza outbreak toolkit.
        iv. In some cases, more detailed epidemiological investigation is needed. Consult IDEP.

    c. Suspected or confirmed avian/novel influenza: Contact IDEP urgently for assistance with the investigation. See Appendix 1.

Disease Prevention Objective

1. To reduce hospitalization and mortality from influenza by encouraging widespread use of the influenza vaccine among high-risk groups.

Disease Control Objectives

1. Consistent with current MMWR guidelines, after influenza is identified in the community, reduce further hospitalization and death from influenza by educating providers to:
   a. Offer the influenza vaccine immediately to high-risk persons who have not yet received the vaccine AND cover those individuals with an appropriate antiviral agent until two weeks after immunization is complete (up to 6 weeks in children < 9 years of age receiving the vaccine for the first time); OR
   b. Providers may also cover selected high-risk individuals who cannot receive influenza vaccine with an appropriate antiviral agent for the duration of influenza season or during peak influenza season.

2. Consistent with current MMWR guidelines, after an influenza outbreak is identified in a nursing home, reduce further hospitalization and death from influenza by educating providers to: offer antiviral prophylaxis to residents and staff and institute appropriate isolation measures.

Disease Surveillance Objectives

1. To identify the earliest case of influenza A in the state (county) and report/feedback data as available.

2. To estimate the duration of influenza season from start to finish and report/feedback data as available during the season.

3. To identify institutional and community-based outbreaks of influenza and report/feedback information on circulating strains as available during the season.

4. To determine if early season, outbreak, and late season strains are vaccine-strain or non-vaccine-strain and report/feedback information as available during the season.

5. To contribute to the global (WHO) effort to identify appropriate strains of influenza vaccine to formulate vaccine composition recommendations for the coming year.

6. To identify enhanced surveillance techniques to supplement and improve information on influenza in West Virginia.

Public Health Significance

Epidemics of influenza occur every winter and are responsible for an estimated 36,000 deaths and 226,000 hospitalizations per year in the United States. This phenomenon, occurring every year in northern climates during the winter months is referred to as 'seasonal influenza.' Most vulnerable to hospitalization or death from seasonal influenza are the very young, the very old, and persons with chronic conditions. In elderly populations, influenza vaccine is effective in preventing hospitalization and death; however it may not prevent influenza-like illness.

Influenza A and B are the two "types" of influenza that are capable of causing epidemic disease. Influenza A is further categorized into "subtypes" based on the two surface antigens: hemagglutinin (H) and neuraminidase (N). Due to "antigenic drift" (small mutations in the genes coding for the antigenic structure of the virus), the virus is continually able to evade the human immune response, and the composition of the vaccine must change every year to match circulating influenza virus strains and provide optimal protection. Antigenic shift is a far more drastic change in antigenic structure, and represents emergence of a completely new subtype, which is likely to result in pandemic influenza with large numbers of deaths. During a pandemic, it is estimated that the death rate increases by 10 to 50-fold.

Thus, virologic surveillance is a very important part of seasonal or pandemic influenza surveillance, and is routinely used by the public health community to answer the following questions:

1. Are *early season isolates* vaccine strain? This is an important question to answer because it is the earliest indicator that the circulating strains are covered in the current vaccine.

2. Are *outbreak isolates* vaccine strain? Again, it is important to know if outbreak strains are covered by the vaccine because immunization is a critical part of outbreak control. In addition, outbreak strains are used to formulate recommendations for the composition of influenza vaccine during the coming year.

3. Are *late season isolates* similar in antigenic structure to last year? Late season isolates are considered in the design of the next season's influenza vaccine.

4. Are reports of influenza-like illness (ILI) due to influenza? In West Virginia, influenza-like illness is reportable, and the data usually show a seasonal upsurge in the number of cases every year usually sometime between December and March. Laboratory confirmation of this phenomenon adds to the credibility of the ILI data.

5. Have unusual or novel influenza strains arrived in our state? These strains may require special attention from public health authorities if they are highly transmissible or associated with severe morbidity or mortality.

6. Are circulating strains developing resistance to antiviral agents? Selected isolates from states are sent to CDC, where antiviral resistance testing can be performed. CDC will release national results together with guidelines for providers on appropriate use of antiviral agents.

In West Virginia, virologic surveillance is conducted through the sentinel physician system and through sentinel laboratories. Some of these laboratories submit specimens to the West Virginia Office of Laboratory Services, which confirms isolation and subtypes isolates of influenza A.

Rapid turnaround of influenza data is important so that providers know when influenza season begins and when it is over. Certain high-risk patients may be offered prophylaxis for the duration of influenza season.

Clinical Description

Seasonal influenza is an acute illness characterized by fever, chills, sweats, headache, arthralgia, myalgia, prostration, coryza, sore throat, and cough. Symptoms are generally self-limited within two to seven days, though cough may be prolonged. Influenza occurs as widespread community outbreaks on an annual basis during the winter months. In addition to increased utilization of medical services, indirect costs of this annual epidemic include those related to increased absenteeism and lost of work productivity.

Elderly patients are at highest risk for influenza-related complications. These include viral or bacterial pneumonia or exacerbation of chronic underlying disease (e.g., bronchitis, emphysema, cardiac disease, etc.). Patients with cardiac disease are at significantly increased risk of death from influenza. Young children age 0-1 years are hospitalized at rates comparable to elderly (age ≥ 65) persons; however the elderly are most at-risk for death from influenza. Pregnant women are also at increased risk of death from influenza relative to non-pregnant women.

Seasonal influenza can be treated with antiviral agents. Amantadine and rimantadine have been effective against influenza A; until the 2005-2006 season, when CDC reported widespread resistance to these drugs. Oseltamivir and zanamivir are effective against influenza A and B. When administered within 2 days of onset of illness, these agents reduce the duration of illness by approximately one day. No data is available on reduction in complications. Oseltamivir is 70-80% effective in preventing illness when administered appropriately as chemoprophylaxis.

Etiologic Agent

There are three types of influenza viruses: types A, B, and C. Influenza A includes three subtypes (H1N1, H3N2, and H2N3) that have caused pandemic disease. Influenza B has caused local and regional outbreaks. Influenza C is a cause of smaller outbreaks and sporadic cases.

Influenza viruses are classified as follows:

Type**/**Geographic Site of Isolation**/**Culture Number**/**Year of Isolation**(**Subtype**)**

The following are classification examples:

A/Beijing/262/95(H1N1)   A/Sydney/5/97(H3N2)   B/Yamanashi/166/98

Reservoir

In nature, wild birds are the reservoir for influenza viruses. Humans are the primary reservoir for human infection. Birds and swine are thought to be a source of new human subtypes that arise through genetic reassortment. These new subtypes may then be responsible for pandemic disease.

Mode of Transmission

Droplet spread, predominantly during coughing or sneezing by the infected person. Direct or indirect contact with nasopharyngeal secretions. To date, all human-to-human transmission of avian influenza has occurred through intimate contact without the use of precautions.

Incubation Period

The incubation period for seasonal influenza is one to four days, with an average of two days.

Infectious Period

Persons are most infectious for 24 hours prior to onset of symptoms and during the most symptomatic period: three to five days after clinical onset in adults, and up to three weeks after onset in young children. Prolonged shedding can occur in immunocompromised persons.

Outbreak Recognition

Outbreaks are commonly recognized based on clinical and epidemiological features. Community outbreaks are commonly first recognized as increased school absenteeism. Outbreaks in closed naïve populations may have attack rates approaching 50%. Investigation of these outbreaks may give important clues about emerging strains of influenza.

The definition of a nursing home outbreak is controversial and all of the following definitions have been offered: 10% of residents with ILI; one resident with confirmed influenza A; and 3 or more cases of ILI on a single nursing unit within a 3-day period. Rapid testing for influenza can guide outbreak response in long-term-care facilities where timely provision of antiviral treatment can control disease. Laboratory confirmation/investigation of outbreaks is important in high-risk settings such as nursing homes or hospitals, or early or late in influenza season, or anytime that unusual clinical or epidemiological features are noted. Health departments should have the most recent MMWR recommendations readily available to share with providers during influenza season.

Goals of Outbreak Investigation

1. Identify outbreaks that merit specific control measures, such as outbreaks in nursing homes where antiviral prophylaxis is recommended.
2. Identify outbreaks as a means of characterizing the level of influenza activity in the state.
3. Identify unusual influenza strains causing outbreaks.
4. Test / practice emergency response, including outbreak investigation skills and notification.

Management of Influenza Outbreaks in Selected Settings

1. Schools: Outbreaks of seasonal influenza in schools are very common. A limited investigation is generally recommended:

   a. Obtain a description of symptoms from the school nurse or other appropriate school official.

   b. Obtain laboratory samples from 8-10 students if possible. Characterization of outbreak isolates is critical to virologic surveillance.

   c. Report the proportion of students absent.

   d. Report the information to IDEP (800-423-1271). Information is used to determine influenza activity which is reported weekly to the Centers for Disease Control and Prevention.

2. Nursing homes: Outbreaks of influenza are also very common in nursing homes. Investigation should focus on confirming the diagnosis and implementing control measures:

a. Follow the "Guidelines for Suspected Influenza Outbreaks in Nursing Homes" available at: http://www.wvdhhr.org/idep/a-z/a-z-influenza.asp Key steps include:

    i. Obtain 8- 10 samples for rapid testing and culture.

    ii. If rapid results are positive, begin antiviral prophylaxis and other control measures.

3. Other settings: Consult IDEP.

CASE DEFINITIONS

Case Definition for Influenza-like Illness (ILI)

For surveillance purposes, ILI is defined as fever $\geq$ 100º F (37.8º C) *and* cough or sore throat without another identified cause.

Case Definition for Pediatric Death Due to Influenza ('Influenza-Associated Pediatric Mortality')

Case Definition

An influenza-associated death is defined for surveillance purposes as a death resulting from a clinically compatible illness that was confirmed to be influenza by an appropriate laboratory or rapid diagnostic test. There should be no period of complete recovery between the illness and death. Influenza-associated deaths in all persons aged < 18 years should be reported.

A death should not be reported if:
1. There is no laboratory confirmation of influenza virus infection.
2. The influenza illness is followed by full recovery to baseline health status prior to death.
3. The death occurs in a person 18 years or older.
4. After review and consultation there is an alternative agreed upon cause of death.

Laboratory criteria for diagnosis

Laboratory testing for influenza virus infection may be done on pre-or post-mortem clinical specimens, and include identification of influenza A or B virus infections by a positive result by at least one of the following:
- 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 specimen;
- 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 injhibition (HI) antibody titer in paired acute and convalescent sera.

Case classification

Confirmed – a death meeting the clinical case definition that is laboratory confirmed.

Laboratory or rapid diagnostic test confirmation is required as part of the case definition; therefore, all reported deaths will be classified as confirmed.

Comment

*Serologic testing for influenza is available in a limited number of laboratories , and should only be considered as evidence of recent infection if a four-fold rise in influenza (HI) antibody titer is demonstrated in paired sera. Single serum samples are not interpretable.

Laboratory Diagnosis of Influenza

At no cost, the Office of Laboratory Services offers rapid antigen testing and culture confirmation for seasonal influenza A and B on nasopharyngeal swab samples. PCR testing is available for both seasonal influenza and circulating avian strains. Results are shared by fax or phone. Testing is limited to physicians and laboratories participating in sentinel surveillance, and health departments engaged in outbreak investigation. Consult the Infectious Disease Epidemiology Program at (304) 558-5358 if testing is needed in special situations.

Preventive Interventions

A live-attenuated vaccine and an inactivated vaccine are available to prevent influenza. Recommendations for use are found in MMWR, 2008; 57 (July 17, 2008), and are also detailed in the current provider information sheet.

In addition to influenza vaccine, neuraminidase inhibitors may be used to prevent influenza. Oseltamivir is licensed in individuals age 1 year and older for prevention of influenza A and B, and can be used for prophylaxis of high-risk individuals who receive the vaccine after the start of

influenza season. Similarly, Zanamivir is licensed for chemoprophylaxis in persons aged 5 years and older. Prophylaxis must be continued for two weeks after completion of immunization (two weeks after immunization in adults and for up to six weeks in children receiving the two-dose regimen, i.e. four weeks after the first dose followed by two weeks after the second dose). Oseltamivir and Zanamivir can also be used alone for prophylaxis of those few high-risk individuals who cannot receive influenza vaccine.

Surveillance Indicators

1. Proportion of MMWR weeks for which reporting of total ILI is available (county level).
2. Proportion of counties with a sentinel provider (state level).
3. Number of outbreaks identified and proportion of outbreaks with culture confirmation (state level).
4. Time to report of influenza outbreaks (from local health department to state health department).
5. Time to report a suspect avian / novel influenza patient (from local health department to state health department).

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