

Pandemic Influenza Plan - Pandemic Influenza Surveillance

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INTRODUCTION

The rapidity with which the pandemic (H1N1) 2009 virus spread highlighted the need for timely and effective surveillance systems to detect emerging viruses with pandemic potential, and the need for data sharing and dissemination.

OBJECTIVES

- Early detection of cases of respiratory infections due to novel influenza virus or an avian influenza virus.
- Timely, complete and consistent reporting of influenza cases.
- Monitor changes in the circulating pandemic virus and other co-circulating respiratory viruses.
- Ongoing assessment of the morbidity and mortality in the affected communities.

PLANNING ASSUMPTIONS

- It is unlikely, but not impossible, that the first cases will arise in the United States or even in Missouri.
- The World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) will coordinate surveillance at the international and national level.
- The types and level of surveillance will depend on the global, regional, and local epidemiology of an influenza pandemic.
- Surveillance actions will differ if infections due to a novel influenza virus occur in the United States or in another country or if person-to person spread is slow, limited or widespread.
- The Missouri Department of Health and Senior Services (DHSS) will provide updated surveillance guidance to medical providers and local health departments on an ongoing basis and will ensure consistency with recommendations from the CDC and WHO.
- Influenza surveillance will need to be conducted throughout the year.
- As the pandemic progresses in Missouri, disease surveillance systems may be overwhelmed.
- Illness, disruption and death could result in significant reductions in the personnel available to perform these tasks at the very time the workload is greatest.
- Despite the potential barriers to the efficient operation of our surveillance systems, the information gathered by those systems will be of vital importance for informing the public about the progress of the pandemic and its health impact.
- As the pandemic progresses further in Missouri, surveillance activities will shift away from individual case identification and toward identifying impact on communities and defining overall pandemic trend in the state.
- Influenza surveillance needs to be a flexible system, so that it can adapt to the pertinent epidemiology of the novel viruses.
- Activities outlined below will be contingent on local, national and international pandemic influenza activity at the time and may change as a pandemic evolves.

Reporting rules for influenza in Missouri

The rules regarding the reporting of communicable diseases are set out in Title 19, Chapter 20 of the Missouri Code of State Regulations (19 CSR 20).

19 CSR 20-20.010 (29) defines an outbreak as “the occurrence in a community or region of an illness(es) similar in nature, clearly in excess of normal expectancy....”,

19 CSR 20-20.020 sets out the details of what shall be reported, by whom and under what circumstances.

- **Section 6** sets out those who are required to report by stating, “A physician, physician’s assistant, nurse, hospital, clinic, or other private or public institution providing diagnostic testing, screening or care to any person with any disease... shall make a case report to the local health authority or the Missouri Department of Health and Senior Services.”
- **Section 1, C** states that “Instances, clusters, or outbreaks of unusual, novel, and/or emerging diseases or findings not otherwise named in this rule, appearing to be naturally occurring, but posing a substantial risk to public health and/or social and economic stability due to their ease of dissemination or transmittal, associated mortality rates, or the need for special public health actions to control.” and shall be reported to the local health authority or to the Missouri Department of Health and Senior Services immediately upon knowledge or suspicion by telephone, facsimile or other rapid communication.
- **Section 2, A** states that “Influenza-associated mortality, influenza-associated public and/or private school closures, Novel Influenza A virus infections, human and outbreaks (including nosocomial) or epidemics of any illness, disease or condition that may be of public health concern shall be reported to the local health authority or to the Missouri Department of Health and Senior Services within 1 day of knowledge or suspicion by telephone, facsimile or other rapid communication.”
- **Section 4** states that laboratory confirmed influenza shall be reported on a weekly basis.
- **Section 7, C** states “Influenza, laboratory-confirmed reporting as required in section (4) of this rule shall include the patient’s age group (i.e., 0–4, 5–24, 25–64, and 65+ years) and serology/serotype (i.e., A, B, and unknown), the local health authority jurisdiction within which the cases occurred, and the date of report. Aggregate patient data shall be reported weekly.”

INFLUENZA SURVEILLANCE DURING THE PRE-PANDEMIC PERIOD

The public health goals of influenza disease surveillance are to serve as an early warning system and to detect increases in influenza-like illness (ILI) at the local level, to monitor the impact of influenza on health (e.g., by tracking outpatient visits, hospitalizations, and deaths), and to track trends in influenza disease activity and identify populations that are severely affected. During the **pre-pandemic period**, these goals are accomplished through the components of the national influenza surveillance system. The following components of influenza surveillance are functioning in Missouri.

Outpatient surveillance

ILI surveillance

The Sentinel Provider Network (SPN), with approximately 22 healthcare providers statewide, reports the number of weekly outpatient visits for ILI and submits specimens from a small subset of patients to the Missouri State Public Health Laboratory (MSPHL) for influenza virus testing. Routine frequency involves submission of 3 specimens during the start (October through

December), middle (January through March) and toward the end (April through May) of the standard influenza season, plus 3 specimens during the June through September “off season.”

Syndromic surveillance

Hospital Electronic Syndromic Surveillance (HESS) Reporting Rule (19 CSR 10-33.040) requires that 84 out of 120 hospitals with emergency departments report electronic data to DHSS specifically for syndromic surveillance. HESS is an automated system that captures about 90% of all emergency department visits in Missouri. These data are processed, analyzed, and viewable through the Missouri Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE) system. ESSENCE is a web-based automated surveillance tool developed by the Johns Hopkins University Applied Physics Lab. Software is maintained by Johns Hopkins University designed to analyze electronically submitted emergency department data for significant changes in the number of individuals presenting in identified syndrome groups. These aberrations are identified as “alerts” and are investigated as needed by state and local staff. Missouri ESSENCE is maintained on DHSS servers and is accessible to over 300 state and local public health authorities and hospital staff. ESSENCE is maintained and monitored daily by DHSS Bureau of Reportable Disease Informatics staff.

The same Emergency Department (ED) data are stripped of identifiers and transmitted via Rhapsody to the CDC for the National Syndromic Surveillance Program’s BioSense Platform. The BioSense Platform uses its own installation of ESSENCE to analyze the data from Missouri and many other State, Local and Federal jurisdictions. Unlike Missouri’s syndromic surveillance data, BioSense also includes data from Veterans Administration hospitals. ESSENCE and BioSense each have the ability to track influenza-like illness chief complaints in real time for ongoing surveillance any time of the year. Missouri ESSENCE ILI data are included in the weekly influenza surveillance reports produced by the influenza program at the DHSS Bureau of Communicable Disease Control and Prevention. ILI surveillance reports can also be customized for specific areas, age groups, and situations using ESSENCE. For example, the St. Louis County Department of Public Health produces its own weekly ILI report and includes ESSENCE findings for just St. Louis area patients along with other data unique to that area. Similar tracking is possible at the national level using data from Missouri and other jurisdictions that participate in BioSense.

Virologic surveillance

The MSPHL reports to CDC weekly throughout the year. Data reported are the number of respiratory specimens tested and the number positive for influenza by type, and also subtype. The percentage of specimens that are positive is also calculated. The MSPHL sends a subset of virus isolates to CDC each season for further analysis and characterization. In addition to providing information on when and where influenza activity is occurring, the data also identify which viruses are circulating.

Mortality surveillance

- Missouri participates in 122 Cities Mortality Reporting System. Vital statistics offices in 122 United States cities report pneumonia and influenza (P&I)-related deaths on a weekly basis. Kansas City, MO and St. Louis, MO are part of this system.
- DHSS participates in National Notifiable Disease Surveillance System (NNDSS). State health departments report influenza-associated pediatric mortality (18 years of age or younger), to CDC on a weekly basis.

Local Active Surveillance System (LASS)

- Participating local public health agencies (LPHAs) recruit a number of surveillance sites within their jurisdiction and then contact them each week to receive surveillance information.
- Number and type of sites is chosen by the LPHA to reflect the general population of their jurisdiction.
- Data is kept at the local level and analysis is done there. It is not routinely shared across jurisdictions, except in instances where regional (contract) epidemiologists collect it from all of the LPHAs in their area.
- The format and type of data collected is determined by each individual LPHA.

State-Level Assessments

State Epidemiologist provides weekly reports to the CDC on the overall influenza activity according to following levels:

Activity Level	Influenza-Like Illness (ILI) Activity/Outbreaks		Laboratory Data
No activity	Low	And	No lab-confirmed cases
Sporadic	Not increased	And	Isolated lab-confirmed cases
	OR		
Local	Not increased	And	Lab-confirmed outbreak in 1 institution
	OR		
Local	Increased ILI in one region; ILI activity in other regions is not increased	And	Recent (within the past 3 weeks) lab evidence of influenza in region with increased ILI
	OR		
Local	2 or more institutional outbreaks (ILI or lab-confirmed) in 1 region; ILI activity in other regions is not increased	And	Recent (within the past 3 weeks) lab evidence of influenza in region with the outbreaks; virus activity is no greater than sporadic in other regions
	OR		
Regional	Increased ILI in ≥ 2 but less than half of the regions	And	Recent (within the past 3 weeks) lab-confirmed influenza in the affected regions
	OR		
Regional	Institutional outbreaks (ILI or lab confirmed) in ≥ 2 and less than half of the regions	And	Recent (within the past 3 weeks) lab-confirmed influenza in the affected regions
	OR		
Widespread	Increased ILI and/or institutional outbreaks (ILI or lab-confirmed) in at least half of the regions	And	Recent (within the past 3 weeks) lab-confirmed influenza in the state

During influenza season, providing an exact case count or population-based rates of infection or illness are not feasible because many infected persons are asymptomatic or experience only mild illness and do not seek medical care. In those who present to the health care system, laboratory testing is rare if cases are less severe. Despite limitations, weekly data on outpatient visits for ILI, hospitalizations, and deaths allow DHSS to monitor regional disease trends and to compare the timing and intensity of the current season to that of previous seasons.

Cooperative Zoonotic Surveillance

The Missouri Council on Captive Wild and Exotic Animals provides an integrated response to cases or outbreaks of highly pathogenic avian influenza (or low pathogenic avian influenza of zoonotic concern) in poultry and wild birds as well as cases/outbreaks from strains of variant influenza in other species such as swine. Council membership includes the Missouri Departments of Agriculture, Health and Senior Services, Conservation, and Natural Resources as well as federal partners, primarily the United States Department of Agriculture [USDA], Animal and Plant Health Inspection Service (APHIS)/Veterinary Services, Animal Care Services, and Wildlife Services. Activities conducted by the Council help protect human life and reduce adverse social, economic, and mental health impacts that would result from an influenza pandemic.

Wild Bird Surveillance

The Missouri Departments of Conservation and Agriculture in collaboration with the USDA/APHIS/Wildlife Services conduct surveillance for avian influenza in wild birds in accordance with *Early Detection and Monitoring of Avian Influenzas of Significance in Wild Birds – A U.S. Interagency Strategic Plan*. See

https://www.aphis.usda.gov/animal_health/downloads/animal_diseases/ai/wild-bird-strategic-plan.pdf and https://www.usgs.gov/centers/nwhc/science/avian-influenza-surveillance?qt-science_center_objects=0#qt-science_center_objects.

Domestic Bird Surveillance

The Missouri Department of Agriculture and USDA/APHIS/Veterinary Services collaborate with the Missouri poultry industry to routinely test domestic poultry and to increase surveillance/testing during crises. Information pertaining to these programs is included in the Missouri Poultry Health and Improvement Plan at

<http://mda.mo.gov/animals/health/disease/poultry.php>.

For more information regarding zoonotic influenza surveillance, prevention, and response, contact the Office of Veterinary Public Health, 573-751-6113 or email dhss.ovph@health.mo.gov.

Influenza surveillance coordinator

The DHSS has a full-time influenza surveillance coordinator. The roles of the influenza coordinator include:

- Oversee all state influenza surveillance activities.
- Maintain and expand influenza SPN.
- Analyze year-round influenza surveillance.
- Maintain working relationships with the state public health laboratory and the CDC Influenza Branch.

INFLUENZA SURVEILLANCE DURING THE PANDEMIC PERIOD

Surveillance activities will be modified as pre-pandemic period transitions into the period of increased pandemic risk, and eventually to the pandemic period. Following is a list of enhanced influenza surveillance activities that could be initiated as needed throughout the evolving pandemic.

Enhanced Surveillance for Novel Influenza

Once a novel influenza virus with documented human cases are detected anywhere in the world, enhanced surveillance to ensure rapid recognition of the first cases and their contacts will be implemented. Specific recommendations regarding identification, treatment and public health control measures will depend on the epidemiology of the virus, clinical characteristics and location of cases inside the United States, or outside the United States, or in Missouri.

Outpatient Surveillance

- Implement provider novel influenza case reporting as necessary prior to the novel influenza strain being identified in Missouri.
- Cases and/or clusters to be investigated in order to determine attack rate and case fatality rate.
- Providers may be asked to report cases of pandemic influenza with an unusual clinical presentation and severity.
- Once in the pandemic period, it is not expected that provider individual case reporting will be a primary method for surveillance.
- Recruit additional sentinel surveillance providers, as either permanent participating providers or for short-term reporting on an as-needed basis.
- Expand ILI surveillance beyond typical seasonal influenza season.
- Analyze outpatient surveillance data daily.
- Increase the frequency of analysis of ESSENCE and other syndromic surveillance data.

Healthcare Facility Surveillance

- State and/or local health department staff will participate in CDC hospitalization surveillance initiatives, which may include specimen collection, virologic testing from a subset of patients, or clinico-epidemiological study of pandemic influenza.
- Consider statewide influenza hospitalization data reporting to determine hospitalization rate, case fatality rate, and other aspects of novel and pandemic influenza illness. Alternatively, consider sentinel hospitalization data from selected health care facilities if statewide reporting isn't feasible. Data collected and frequency of reporting can be adjusted as indicated to monitor the pandemic and ensure recommended surveillance and control measures are appropriate. It is anticipated that during widespread pandemic influenza activity, hospitalization data will be the primary surveillance method used to assess severity of illness.
- Consider expanding laboratory-confirmed influenza reporting by requiring laboratory testing of certain groups, such as all hospitalized patients, or all patients admitted to intensive care units, etc.

State-Level Assessments

- State Epidemiologists Report. Current influenza activity level throughout the state will continue to be assessed weekly but reported to the CDC year-round.
- Participate in national and international surveillance activities as indicated.

Mortality Surveillance

- Implement a reporting system for hospitals and nursing homes to report daily aggregate data on the number of suspected and confirmed influenza associated deaths and total number of deaths. It is anticipated that this electronic reporting system will be the primary method to collect daily data necessary to monitor the mortality of the pandemic.

- DHSS has converted from a paper-based to an electronic death certificate reporting system. The new system will allow reporting of any death with influenza or pneumonia listed as the underlying or contributing cause of death within one to two days of date of death.
- Provide mortality and case fatality rate data to CDC as needed to help guide national response measures. Case definitions and reporting procedures will be coordinated with the CDC.

Virologic Surveillance

- Increase number of specimens submitted for testing to the MSPHL.
- Provide testing beyond the influenza season, based on the actual or projected arrival of the pandemic virus in Missouri.

PANDEMIC RESPONSE LEVEL

When pandemic influenza is identified in the World, but not yet in the United States

- Using statewide and local Health Alert Networks (HANs) and the EMS system, mandated disease reporters (providers, laboratories and hospitals) will be notified of the current situation by a Health Alert. They will be reminded of the necessity for rapid testing and the need for accurate and rapid case reporting. Novel strains of influenza with pandemic potential should be reported immediately as defined by the reportable disease rule. Disease reporters will also be reminded of the limitations of rapid testing and that positives should be confirmed by advanced testing, such as polymerase chain reaction (PCR), whenever possible, especially as early cases in their geographical area are identified. Virus cultures should **not** be attempted from patients suspected of having pandemic influenza.
- Providers who are members of the sentinel surveillance system will be additionally asked to submit specimens on any cases that are of epidemiological interest, defined as those persons who recently traveled to regions where the pandemic strain of influenza is circulating or those with unusual and/or severe symptoms.
- Supplementary sentinel sites will be identified and readied for use when/if the pandemic reaches the Western Hemisphere.
- Guidelines for reporting detailed, supplementary information (above and beyond the information required by 19 CSR 20-20.020) will be distributed to all mandated disease reporters as part of the Health Alert. This change in reporting requirements can be made by the DHSS Director or their designee. A pandemic-specific Influenza Case Report form will be developed and included in the Health Alert, and downloadable copies will be posted on the DHSS website.
- Reporting requirements can be tailored to CDC requests for specific information and will be submitted daily via the National Electronic Disease Surveillance System (NEDSS), or as otherwise requested by CDC.

When pandemic influenza is identified in the United States (or anywhere in the Western Hemisphere)

- LPHAs, hospitals, medical examiners and other vital stakeholders will be notified of the current situation via the HAN. The information will be duplicated on the DHSS website and linked with prominent links on the first page. Additionally, the internal list server will be used to rapidly communicate information that is targeted specifically to the disease investigation staff in DHSS and LPHAs across the state.
- Mandated disease reporters (providers, laboratories and hospitals) will be notified of the current situation using statewide and local HANs and duplicated on the DHSS website. They

will be advised of the change in the reporting status for all types of influenza from weekly, aggregate reporting to immediate, detailed reporting of all diagnosed or suspected cases. They will be reminded of the necessity for rapid testing, and the need for accurate and rapid case reporting of this immediately reportable condition. They will also be reminded of the limitations of rapid testing and that positives should be confirmed by PCR, especially as early cases in their geographical area are identified. The Laboratory Preparedness Annex contains specific information regarding the submission of laboratory specimens. Virus cultures should **not** be attempted from patients suspected of having pandemic influenza.

- Providers who are members of the sentinel surveillance system will be asked to submit specimens on any cases that are of epidemiological interest, defined as those persons who recently traveled to regions where the pandemic strain of influenza is known to be circulating or those with unusual and/or severe symptoms.
- Supplementary sentinel sites may be activated.
- Existing surveillance systems will be analyzed at increased frequency.
- Electronic vital records submissions will be analyzed for the number and location of P&I related deaths.
- Active systems will be supplemented, if needed, by adding additional sites. LASS information will be consolidated by regional epidemiologists and forwarded to DHSS Senior Epidemiology Specialists, or their designees. That data will be consolidated and forwarded, if the DHSS Emergency Response Center (ERC) is activated, to the Field Investigations/Surveillance lead in the ERC, otherwise, to the Chief, Bureau of Communicable Disease Control and Prevention.
 - LPHAs and their active surveillance sites will be reminded of the surveillance definition for ILI. For the purposes of enhanced surveillance for influenza infections in humans ILI is defined as documented fever >100.4°F (38.0°C) **and** cough, sore throat or shortness of breath.
 - LASS information may also be expanded on an as needed basis, perhaps to sentinel hospitals, to include numbers of persons hospitalized with ILI or pandemic influenza, the number of hospitals with ILI/pandemic influenza patients, the number of those isolated or quarantined, and the number of deaths associated with ILI/pandemic influenza.
 - Statewide electronic death reporting system data will be evaluated on a regular basis for influenza deaths in the state.
- LPHAs will be provided with a standardized active surveillance spreadsheet upon which to aggregate their data for submission. This will facilitate aggregation of the data on a regional and statewide basis.
- If needed, a regional and local reporting system may be established to facilitate the flow of information to the ERC.

When pandemic influenza is identified in Missouri

- The first reported case(s) will be investigated immediately by LPHA disease investigation staff to learn the details and extent of the case(s). DHSS disease control staff will be available to support LPHA disease investigation staff during those first investigations. If necessary an Incident Command System (ICS) structure will be established.
- Continue case-specific (passive) and active surveillance as above until the occurrence of pandemic influenza is quantified as regional, based on the adaptation of the CDC guidelines for influenza activity as above.
- The Bureau of Communicable Disease Control and Prevention and the Office of Epidemiology will use collected data to make an estimate of the progress of the disease, and

make recommendations based on that information. Those activities may include, but are not limited to:

- Making recommendations regarding local isolation, quarantine or other prevention/intervention activities.
- Monitoring for antiviral resistance.
- Monitoring for adverse vaccine reactions.
- Analyzing case fatality rates, age groups affected and novel means of transmission.
- Monitoring and instituting recommendations from CDC for any additional surveillance activities that should be undertaken given the specific circumstances.
- Preparing reports for the Incident Commander as needed.
- As the extent of pandemic influenza increases from local to regional, surveillance activities should include monitoring the health care system for ability to cope with increased patient loads.
- Monitor the EMS system for indications of shortages and diversions in particular facilities or regions.
- Work with Missouri Hospital Association and other entities to identify and quantify local or regional shortages.
- Use the collected information to recommend redeployment of available resources to areas of greatest need.