

Pandemic Influenza Plan - Pandemic Influenza Surveillance

For more information contact John Bos at John.Bos@health.mo.gov or 417.895.6945, or Dr. George Turabelidze at George.Turabelidze@health.mo.gov or 314.877.2826.

INTRODUCTION

The rapidity with which the pandemic influenza A (H1N1) 2009 virus and SARS-CoV-2 viruses spread highlight 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 or variant influenza viruses or the zoonotic transmission of an avian influenza virus.
- Timely, complete and consistent reporting of influenza cases and other data that support influenza surveillance.
- 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 pandemic influenza virus occur in the United States versus another country.
- Surveillance actions will differ depending on the level of person-to person spread (e.g., slow, limited, 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 is 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 public health partners and 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 community impact and defining overall pandemic trends in the state.
- Influenza surveillance needs to be flexible to adapt to the pertinent epidemiology of pandemic influenza 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.”

19 CSR 20-20-080 (3) Isolates or specimens from an Influenza Virus-associated mortality must be submitted to the Missouri State Public Health Laboratory for laboratory confirmation.

INFLUENZA SURVEILLANCE DURING THE PRE-PANDEMIC PERIOD

The public health goals of influenza disease surveillance are to find out when and where influenza activity is occurring; determine what influenza viruses are circulating; detect changes in influenza viruses; and measure the impact influenza is having on illness, hospitalizations, and deaths.

During the **pre-pandemic period**, these goals are accomplished through the components of local, state, and national influenza surveillance efforts. The following components of influenza surveillance are functioning in Missouri.

Outpatient surveillance

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 designed to analyze and monitor electronically submitted emergency department data for patients presenting with influenza-like illness (ILI). Increases or aberrations in ILI reports identified as “alerts” 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. The ESSENCE data can be customized for specific geographic areas, age groups, and situations in Missouri. The DHSS Bureau of Health Care Analysis and Data Dissemination is responsible for maintaining and monitoring the ESSENCE data, as well as calculating the baseline activity rate each season. Missouri ESSENCE ILI Emergency Department data are included in the weekly influenza surveillance dashboard produced by the DHSS Bureau of Communicable Disease Control and Prevention (BCDCP). The dashboard is publicly available online during CDC weeks 40 to 20 and is published year-round.

The ESSENCE data are deidentified and transmitted to the CDC for the National Syndromic Surveillance Program’s BioSense Platform and the U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet). The BioSense Platform uses its own installation of ESSENCE to analyze the data from Missouri and other state, local and federal jurisdictions. A subset of the ILI data is also used by CDC to produce the Outpatient Respiratory Illness Activity Map that is available each week on the CDC FluView report.

Virologic surveillance

The BCDCP works in collaboration with the Missouri State Public Health Laboratory (MSPHL) to obtain respiratory specimens for virologic surveillance and to coordinate testing for respiratory outbreaks, influenza-associated deaths, and for influenza A specimens that are unsubtypeable on tests designed to provide an influenza subtyping result. The MSPHL uses real-Time RT-PCR assays and virus culture tests to confirm influenza and to determine the type and subtype (for influenza A) or lineage (for influenza B). The MSPHL reports their laboratory findings in aggregate to the CDC each week. The aggregated influenza data reported to CDC includes the number of respiratory specimens tested, number of specimens positive for influenza by type and subtype/lineage. The percentage of specimens that are positive is also calculated. A subset of the specimens are subsequently submitted to CDC for additional antigenetic characterization including whole genome sequencing (WGS) to determine the specific clade and sequence type, estimated vaccine efficacy, and antiviral susceptibility.

Mortality surveillance

The DHSS Bureau of Health Care Analysis and Data Dissemination works with the DHSS Bureau of Vital Records to provide data on influenza-associated mortalities from Missouri’s vital statistics death certificate data. Decedents with influenza listed as a cause or contributor to death are classified as an influenza-associated mortality. Influenza-associated death totals are then tracked and presented cumulatively from the start of the influenza season. Not all deaths are reported within a week of death therefore data for earlier weeks are continually revised as new and updated death certificate data are received.

DHSS also participates in the National Notifiable Disease Surveillance System (NNDSS) and reports influenza-associated pediatric mortality (18 years of age or younger) to CDC via the CDC's Secure Access Management Services Influenza Reporting Systems.

Wastewater Testing

The DHSS Bureau of Environmental Epidemiology (BEE) and the Missouri Department of Natural Resources (DNR) work with municipalities and community partners to conduct testing of wastewater for seasonal influenza. Weekly samples are collected from wastewater entering wastewater treatment plants or other sewer-shed access points such as manholes from geographically diverse locations across the state. The wastewater data is analyzed and provided year-round for internal and limited external use. Sewer-shed surveillance data cannot tell us the number of individuals currently infected with influenza nor can it determine the source of an influenza A virus (e.g., it could come from a human or from an animal or an animal product, like milk from an infected cow). However, as data are collected and trends are identified, wastewater surveillance may be helpful to track the progression of the virus in communities and inform public health strategies. Efforts to monitor influenza A virus activity using wastewater data are likely to evolve as the methodologies and interpretation are evaluated and refined.

State-Level Assessments

The BCDCP provides a weekly confirmation to CDC on the overall state-level ILI activity indicator according to following ILI activity levels: Minimal, Low, Moderate, High, Very High. There are three subcategories within each level. During influenza season, providing exact case counts or population-based rates of infection/illness is 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 cases, 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 available on the MDA Poultry Health Program website available at <https://agriculture.mo.gov/animals/health/poultry/#:~:text=The%20NPIP%20is%20a%20state,needs%20of%20the%20poultry%20industry>.

For more information regarding zoonotic influenza surveillance, prevention, and response, contact the BCDCP Zoonotic Diseases Program at 573-751-6113.

Influenza Surveillance Coordinator

The DHSS BCDCP has a full-time influenza and vaccine-preventable disease surveillance coordinator. The roles of the coordinator include:

- Oversee all state influenza surveillance activities.
- Maintain and analyze year-round influenza surveillance data.
- Update and publish the weekly influenza surveillance dashboard.
- Continuously collaborate with internal and external public health partners, including but not limited the MSPL, the CDC Influenza Division, and other state influenza surveillance coordinators.

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. The following is a list of enhanced influenza surveillance activities that could be initiated as needed throughout the evolving pandemic.

Enhanced Surveillance for Novel Influenza

The BCDCP will continue to monitor national and international surveillance data pertaining to novel or variant influenza viruses. As human infections with novel or variant influenza viruses are detected and determined to be a public health threat, BCDCP will work in collaboration with the DHSS State Epidemiologist and CDC to prepare for implementation of enhanced surveillance efforts. The BCDCP will collaborate with state and local public health partners to enhance influenza surveillance to ensure rapid recognition of the first cases and implement appropriate monitoring of close contacts. Specific recommendations regarding identification, treatment and public health control measures will depend on the epidemiology of the virus, clinical characteristics and location of cases.

Outpatient Surveillance

- Implement provider novel influenza case reporting as necessary prior to the pandemic influenza strain being identified in Missouri.
- Investigate cases and/or clusters of influenza to determine attack rate and case fatality rate.
- Providers may be asked to report cases of influenza with an unusual clinical presentation and severity.

- During the pandemic period, individual case reporting may not be the primary method for surveillance.
- Recruit additional sentinel surveillance providers, for short-term reporting on an as-needed basis.
- 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 routine specimen submissions to MSPHL, virologic testing from a subset of patients, or clinical and 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

- The state-level ILI activity indicator level issued by CDC is reviewed and confirmed by the BCDCP Influenza Coordinator on a weekly basis year-round. Participate in national and international surveillance activities as indicated.

Mortality Surveillance

- Continue to use Missouri's vital statistics death certificate data to monitor mortality trends associated with the pandemic influenza virus. Implement or utilize additional electronic reporting systems as needed for hospitals and long-term care facilities to report daily aggregate data on the number of suspected and confirmed influenza associated deaths and total number of deaths.
- Increase the frequency of influenza-associated mortality data reporting from weekly to daily.
- 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 and coordinate testing of specimens associated with outbreaks and deaths for further virus characterization.
- Increase testing beyond the influenza season (e.g., during the summer months), based on the actual or projected arrival of the pandemic virus in Missouri.

Wastewater Surveillance

- Implement any recommended methodologies to influenza A virus wastewater data testing and analysis as advised by the National Wastewater Surveillance System (NWSS).

- Promptly follow up with municipalities and treatment facilities in areas where influenza A virus levels in wastewater are high; work with relevant partners to better understand the factors that could be contributing to these levels.

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 and clinical laboratories 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 circulating or those with unusual and/or severe symptoms.
- 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)

- Missouri's local public health agencies (LPHA), 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 supplemented with prominent links on the first page. Additionally, the internal list serve will be used to rapidly communicate information that is targeted specifically to the disease investigation staff within DHSS and the LPHAs across the state.
- Mandated disease reporters (providers, laboratories and hospitals) will be notified of the current situation using statewide and local HANs that will also be 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, as warranted. The necessity for appropriate diagnostic testing, and the need for accurate and rapid case reporting of this immediately reportable condition will be emphasized. The notification will also include reminders on 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 and clinical laboratories 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 frequency, locations, and ages of influenza-associated deaths; analysis will occur daily instead of weekly.
- Wastewater testing and analysis may require updated methodologies as advised by the NWSS.
- If needed, a regional and local reporting system may be established to facilitate the flow of information to the Missouri Emergency Response Center (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). The DHSS staff will work closely with LPHAs 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 DHSS will use collected data to analyze the progress of the disease, inform the public and public health partners, as well as make recommendations based on that information. Those activities may include, but are not limited to:
 - Making recommendations regarding local isolation, quarantine or other disease control and 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.
- Wastewater testing and analysis may require updated methodologies as advised by the NWSS. Following up with relevant partners when influenza A virus levels in wastewater are high to determine factors that could be contributing to the increases.
- 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.