

Annex 1. Pandemic Influenza Surveillance

Person responsible: Influenza Surveillance Coordinator

Back up: Infectious Disease Epidemiology Program Manager

Rationale: Pandemic influenza surveillance includes surveillance for influenza viruses (virologic surveillance) and surveillance for influenza-associated illness and deaths (disease surveillance).

The goals of virologic surveillance are to:

- Rapidly detect the introduction and early cases of a pandemic influenza virus in the United States.
- Track the virus' introduction into local areas.
- Monitor changes in the pandemic virus, including development of antiviral resistance.

The goals of disease surveillance are to:

- Serve as an early warning system to detect increases in influenza-like illness (ILI) in the community.
- Monitor the pandemic's impact on health (e.g., by tracking outpatient visits, hospitalizations, and deaths).
- Track trends in influenza disease activity and identify populations that are severely affected.

Assumptions:

- The state of Maine currently conducts year round influenza surveillance
- The data needs will change in a pandemic, depending on the severity of the pandemic
- The more electronic sources of data that exist, the less burden on our partners

Overview:

This Annex provides recommendations on surveillance for influenza to monitor the health impact of the disease. These recommendations include:

1. Disease surveillance during interpandemic influenza seasons
2. Virologic surveillance for novel strains of influenza
3. Preparedness planning for enhanced disease surveillance during a pandemic

In this Annex, the influenza surveillance recommendations are organized within the framework of the Maine Pandemic Levels / Periods. Generally, the recommendations for the Maine Inter-Pandemic and Maine Pandemic Alert Periods focus on routine virologic and disease surveillance. During the Maine Pandemic Period, the emphasis is on more individualized reporting and more frequent data needs.

Consider surveillance efforts by severity and transmissibility within the context of scalability as noted below:

	HTH Transmissibility (Illness Rate in the Pop)		
Pandemic Influenza Surveillance	Low Rare	Medium 5%-20%	High 20%-40%
	Pandemic Severity Index (Case Fatality Ratio)		
Activities	1 Low <0.1 CFR	2 and 3 Medium 0.1 - <1.0 CFR	4 and 5 High 1.0- =>2.0 CFR
Outpatient surveillance <ul style="list-style-type: none"> • ILINet – outpatient providers that report into the federal system • EARS – daily data feeds from Emergency rooms, urgent care clinics, and outpatient providers 	Weekly reporting	Consider daily reporting	Daily reporting
	Daily Review	Daily Review	Daily Review
Hospital Surveillance <ul style="list-style-type: none"> • Sentinel Hospitals – hospitals that report aggregate counts of admission due to pneumonia or influenza and total number of admissions • All Hospitals – reporting of lab confirmed influenza in hospitalized patients 	Weekly reporting	Consider daily reporting	Consider daily reporting
	Recommend	Recommend	Recommend
Mortality surveillance <ul style="list-style-type: none"> • EDRS – electronic death registry system 	Weekly report	Consider daily report	Daily report/ ad hoc reporting
Laboratory surveillance <ul style="list-style-type: none"> • HETL – Maine’s public health lab • Maine Reference Labs – ALI and NorDx 	Weekly report	Consider daily reporting	Daily report / ad hoc reporting
	Weekly aggregate report	Consider individual reporting	Individual reporting
General Surveillance <ul style="list-style-type: none"> • Case investigation • Outbreak surveillance 	Novel or antiviral resistant only	Consider investigating all pandemic cases	Consider limiting investigations to target groups
	Follow up on all outbreaks	Follow up on outbreaks as able	Follow up on outbreaks as able

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Maine Inter-Pandemic Period

Mitigation and Preparedness ME Level 0, I, II

1. Outpatient surveillance
 - a. ILINet
 - i. Enroll new ILINet sites
 - ii. Maintain at least 1 ILINet provider for every 100,000 residents
 - iii. Maintain at least 1 ILINet provider per county
 - iv. Monitor data submitted through federal system for completeness and accuracy
 - v. Validate electronic sources as much as possible to decrease reporting burden on partners
 - b. EARS
 - i. Enroll new sites into EARS (hospitals, outpatient facilities)
 - ii. Monitor data for completeness and accuracy
 - iii. Add new sources of data (pharmacy, EMS, etc.)
 - iv. Validate electronic exchanges for improved connectivity (ie HL7 messaging)
2. Hospital surveillance
 - a. Sentinel hospitals
 - i. Enroll new sentinel sites
 - ii. Maintain sentinels at the major hospitals in the state
 - iii. Validate electronic sources to decrease reporting burden on partners
 - b. All hospitals
 - i. Encourage reporting of all lab confirmed hospitalizations
 - ii. Validate electronic sources to decrease reporting burden on partners
3. Mortality surveillance
 - a. Electronic death registry system (EDRS)
 - i. Review weekly reports of deaths due to influenza or pneumonia
4. Laboratory surveillance
 - a. HETL
 - i. Perform weekly data extracts looking at number of positives tests, and number of samples tested

- ii. Review pyrosequencing data weekly for possible antiviral resistance
 - b. Maine Reference Labs
 - i. Review weekly aggregate data counts for number of positives and number of samples tested
 - ii. Facility submission of positive influenza A samples to HETL for pyrosequencing
- 5. General Surveillance
 - a. Case investigation
 - i. Investigate all cases of novel influenza, and cases of antiviral resistant influenza
 - b. Outbreak surveillance
 - i. Follow up on all influenza related outbreaks
- 6. Surveillance Report
 - a. The influenza surveillance coordinator will produce a weekly report incorporating all surveillance data and release the report electronically. This will continue during the influenza season.
- 7. State influenza activity assessments
 - a. The influenza surveillance coordinator will provide weekly assessments of the overall level of influenza activity (i.e. no activity, sporadic, local, regional, widespread) in the state during the influenza season.

Maine Pandemic Alert Period

Heightened Preparedness: On Standby ME Levels III, IV

1. Maintain all surveillance activities from Maine Inter-Pandemic Period
2. Recommend PCR testing for all persons ill with influenza like illness
 - a. Recommend all samples that are unable to be subtyped at reference labs be referred to HETL for typing
3. Consider investigating all pandemic related influenza cases

Maine Pandemic Period

Activate Response Plan ME Levels V, IV

1. Outpatient surveillance
 - a. ILINet

- i. Maintain all ILINet sites
 - ii. Consider requesting daily reporting using federal guidance and the current state situation to dictate the usefulness
 - b. EARS
 - i. Maintain all existing surveillance activities
- 2. Hospital surveillance
 - a. Sentinel hospitals
 - i. Consider requesting daily data feeds using federal guidance and the current state situation to dictate the usefulness
 - b. All hospitals
 - i. Request all lab confirmed influenza hospitalizations be reported (if pandemic is caused by a novel strain – this is required by law)
 - ii. Consider daily contact with hospitals to determine influenza burden
- 3. Mortality surveillance
 - i. EDRS
 - 1. Consider daily or ad hoc reports from EDRS as the situation warrants (i.e. if strain is causing high mortality)
 - 2. Consider daily contact with morgues, funeral homes, hospitals, nursing homes, EMS, home health agencies to monitor mortality if there is a back up with the electronic systems in place
- 4. Laboratory surveillance
 - a. HETL
 - i. Consider limiting testing using federal guidance and the current state situation
 - 1. Consider implementing submission forms in order to triage testing
 - 2. Consider limiting testing to state approved partners (i.e. ILINet, hospitals only)
 - 3. Consider limiting testing to the most commonly circulating strain (i.e. if pandemic is caused by an A/H1 – limit testing to only this strain)
 - ii. Consider daily or ad hoc reporting using federal guidance and the current state situation
 - b. Maine reference labs
 - i. Communicate state public health lab decisions with reference labs so they are aware of any limitations
 - ii. Coordinate submission of samples from reference lab to state lab for typing if necessary (i.e. if the strain is novel)
 - iii. Consider daily reporting
- 5. General Surveillance

- a. Case investigation
 - i. Consider investigating all pandemic related cases as able. If burden becomes too severe, consider limiting investigation to target groups
- b. Outbreak surveillance
 - i. Follow up on all influenza related outbreaks as able
- 6. Surveillance report
 - a. The influenza surveillance coordinator will continue to produce a weekly surveillance report as long as the information is useful. A daily report may be warranted, depending on the current state situation. Surveillance reports will likely continue year round during a pandemic situation.
- 7. State influenza activity assessments
 - a. The influenza surveillance coordinator will continue to provide weekly assessments of the overall level of influenza activity in the state. This will likely continue year round during a pandemic situation.

Maine Post Pandemic Recovery

Recovery Activities ME Levels VII

- 1. Outpatient surveillance
 - a. ILINet
 - i. Return to weekly reporting
 - ii. Continue to provide education to new ILINet providers in order to maintain their status
 - b. EARS
 - i. Maintain all existing surveillance activities
- 2. Hospital surveillance
 - a. Sentinel hospitals
 - i. Return to weekly reporting
 - ii. Continue to provide education to new sentinel sites in order to maintain their status
 - b. All hospitals
 - i. Encourage reporting of all lab confirmed hospitalizations
- 3. Mortality surveillance
 - a. EDRS
 - i. Return to weekly reporting

4. Laboratory surveillance
 - a. HETL
 - i. Remove limits on testing
 - ii. Return to weekly data extracts
 - b. Maine reference labs
 - i. Notify labs of any changes in state lab process (i.e. removing limits on testing)
 - ii. Return to weekly aggregate data counts
5. General surveillance
 - a. Case investigation
 - i. Return to only investigating novel cases, or cases with antiviral resistance
 - b. Outbreak surveillance
 - i. Return to following up on all influenza related outbreaks
6. Surveillance report
 - a. The influenza surveillance coordinator will produce a weekly report incorporating all surveillance data and release the report electronically. This will continue during the influenza season.
7. State influenza activity assessments
 - a. The influenza surveillance coordinator will provide weekly assessments of the overall level of influenza activity (i.e. no activity, sporadic, local, regional, widespread) in the state during the influenza season.

Annex 1. Pandemic Influenza Surveillance Summary Matrix

Service / Function:	Maine Inter-Pandemic Period: Awareness	Maine Pandemic Alert Period: Standby	Maine Pandemic Period: Activate Response Plan	Maine Post Pandemic Recovery Period
Influenza Surveillance	Mitigation/ Preparedness	Heightened Preparedness	Response	Recovery
	ME Level 0, I, II	ME Levels III, IV	ME Levels V, IV	ME Levels VII
ILINet	Enroll new ILINet sites, validate and monitor existing sites →	→	Consider daily reporting →	→ Return to weekly reporting, provide education to maintain new providers
EARS	Enroll new EARS sites, validate and monitor existing sites →	→	→	→ Provide education to maintain new sites
Sentinel hospitals	Enroll new sentinel hospitals, validate electronic sources of data →	→	Consider requesting daily reporting →	→ Return to weekly reporting, provide education to maintain new sentinel sites
All hospitals	Encourage reporting, validate electronic sources of data →	→	Consider daily contact to determine burden →	→
EDRS	Review weekly reports →	→	Consider daily or ad hoc reports, consider daily contact with morgues, funeral homes, hospitals, nursing homes, EMS and home health agencies →	→ Return to weekly reports
HETL Maine Reference Labs	Perform weekly data extracts, review pyrosequencing data →	Recommend PCR testing for persons with ILI →	Consider limiting or triaging testing, implementing submission forms, and limiting testing	→ Remove limits on testing, return to weekly reports

			to the most commonly circulating strain →	
Maine Reference Labs	Review weekly aggregate data counts, facility submission of positive samples for pyrosequencing	Recommend all samples that are unable to be subtyped be forwarded to HETL →	Communicate all HETL decisions, coordinate submission of samples to HETL, consider daily reporting →	→ Communicate all HETL changes, return to weekly reports
Case Investigation	Only investigate cases of novel, or antiviral resistant influenza →	Consider investigating all pandemic related influenza →	Consider limiting investigations to target groups	Return to investigating only cases of novel, or antiviral resistant influenza
Outbreak surveillance	Follow up on all influenza related outbreaks →	→	Follow up on all influenza related outbreaks as able →	→
Surveillance Report	Produce weekly report during influenza season →	→	Consider daily reporting →	→ Return to weekly reporting
State influenza assessments	Provide weekly assessment code →	→	→	→

Appendix to Annex 1. Surveillance

The following Appendices elaborate on influenza surveillance):

- I. Types of Influenza Surveillance
- II. Summary of Geographic Spread of Influenza
- III. Terms and Definitions

Appendix I. Types of Influenza Surveillance

1. Outpatient surveillance
 - a. ILINet: Outpatient ILI data are collected through the U.S. Outpatient Influenza-Like Illness Surveillance Network (ILINet), a collaborative effort between the federal Centers for Disease Control and Prevention (CDC), Maine CDC, and local health care providers. Health care providers are enrolled and report the total number of patients seen in their practices and the number of those patients seen for ILI by age group (0-4, 5-24, 25-49, 50-64, ≥ 65) on a weekly basis.
 - b. EARS: Maine emergency departments report daily de-identified emergency department visit data. The data is classified into syndromes based on chief complaint. The influenza-like illness (ILI) and fever syndromes are used to for routine influenza surveillance
2. Hospital surveillance
 - a. Sentinel hospitals: Inpatient surveillance for respiratory illness admissions is conducted in collaboration with Maine CDC and regional hospitals. Hospitals report the total number of patients admitted to the hospital and the total number of those patients admitted for pneumonia or influenza as an admitting diagnosis.
 - b. All hospitals: All hospitals are requested to report all lab confirmed hospitalizations. All hospitals are required to report pediatric deaths associated with influenza, and any infection with a novel strain of influenza
3. Mortality surveillance
 - a. EDRS: Each death in the state of Maine is required to be reported to the office of vital statistics. The system used to collect this information is the electronic death registry system (EDRS).
4. Laboratory surveillance
 - a. HETL: Maine CDC's Health and Environmental Testing Laboratory (HETL) works collaboratively with hospitals and private laboratories to collect specimens for respiratory virus testing and influenza positive isolate subtyping.
 - b. Maine reference labs: Each week, laboratories report the total number of positive isolates for influenza A (H1), A(H3), A(Undetermined), and influenza B that are laboratory-confirmed by culture or reverse-transcriptase polymerase chain reaction (RT-PCR).
5. Surveillance report: each week the influenza surveillance coordinator produces a report that summarizes all the surveillance data from the previous week
6. State influenza activity assessments: the influenza surveillance coordinator reports a weekly assessment of the overall level of influenza activity in the state. These assessments are used to compare the extent of influenza activity from state to state.

Appendix II. Summary of the Geographic Spread of Influenza

Summary of the Geographic Spread of Influenza — State health departments report the estimated level of spread of influenza activity in their states each week through the **State and Territorial Epidemiologists Reports**. States report influenza activity as no activity, sporadic, local, regional, or widespread. These levels are defined as follows:

- **No Activity:** No laboratory-confirmed cases of influenza and no reported increase in the number of cases of ILI.
- **Sporadic:** Small numbers of laboratory-confirmed influenza cases or a single laboratory-confirmed influenza outbreak has been reported, but there is no increase in cases of ILI.
- **Local:** Outbreaks of influenza or increases in ILI cases and recent laboratory-confirmed influenza in a single region of the state.
- **Regional:** Outbreaks of influenza or increases in ILI and recent laboratory confirmed influenza in at least two but less than half the regions of the state with recent laboratory evidence of influenza in those regions.
- **Widespread:** Outbreaks of influenza or increases in ILI cases and recent laboratory-confirmed influenza in at least half the regions of the state with recent laboratory evidence of influenza in the state.

Together, the five categories of influenza surveillance are designed to provide a national picture of influenza activity. Human infections with novel influenza A viruses, pneumonia and influenza mortality from the 122 Cities Mortality System, influenza-associated pediatric deaths and AHDRA are reported on a national level only. FluSurv-NET data provides population-based, laboratory-confirmed estimates of influenza-related hospitalizations but are reported from limited geographic areas. Outpatient influenza-like illness and laboratory data are reported on a national level and by influenza surveillance region. The state and territorial epidemiologists' reports of the geographic spread of influenza activity and the ILI activity indicator display state-level information.

Appendix III. Surveillance: Terms and Definitions

ILINet: U.S. Outpatient Influenza-Like Illness Surveillance Network

EARS: Early Aberration Reporting System

HETL: Health and Environmental Testing Laboratory

Pyrosequencing: A method of testing used to test for antiviral resistance

EDRS: Electronic Death Reporting System