

Overview of Influenza Surveillance in the United States

The Epidemiology and Prevention Branch in the Influenza Division at CDC collects, compiles and analyzes information on influenza activity year round in the United States and produces a weekly report from October through mid-May. The U.S. influenza surveillance system is a collaborative effort between CDC and its many partners in state and local health departments, public health and clinical laboratories, vital statistics offices, healthcare providers, clinics and emergency departments. Information in five categories is collected from nine different data sources that allow CDC to:

- Find out when and where influenza activity is occurring
- Track influenza-related illness
- Determine what influenza viruses are circulating
- Detect changes in influenza viruses
- Measure the impact influenza is having on deaths in the United States

Five Categories of Influenza Surveillance

1. Viral Surveillance — About 80 U.S. **World Health Organization (WHO) Collaborating Laboratories** and 70 **National Respiratory and Enteric Virus Surveillance System (NREVSS)**, located throughout the United States participate in virologic surveillance for influenza. All state public health laboratories participate as WHO collaborating laboratories along with some county public health laboratories and some large tertiary care or academic medical centers. Most NREVSS laboratories participating in influenza surveillance are hospital laboratories. The WHO and NREVSS collaborating laboratories report the total number of respiratory specimens tested and the number positive for influenza types A and B each week to CDC. Most of the U.S. WHO collaborating laboratories also report the influenza A subtype (H1 or H3) of the viruses they have isolated and the ages of the persons from whom the specimens were collected. The majority of NREVSS laboratories do not report the influenza A subtype. Reports from both sources are combined and the weekly total number of positive influenza tests, by virus type/subtype, and the percent of specimens testing positive for influenza are presented in the weekly influenza update, FluView. Some of the influenza viruses collected by U.S. WHO collaborating laboratories are sent to CDC for further characterization, including gene sequencing, antiviral resistance testing and antigenic determination. This information is presented in the antigenic characterization and antiviral resistance sections of the FluView report.

Surveillance for Novel Influenza A Viruses— In 2007, human infection with a novel influenza A virus became a nationally notifiable condition. Novel influenza A virus infections include all human infections with influenza A viruses that are different from currently circulating human influenza H1 and H3 viruses. These viruses include those that are subtyped as nonhuman in origin and those that are unsubtypeable with standard methods and reagents. Rapid reporting of human infections with novel influenza A viruses will facilitate prompt detection and characterization of influenza A viruses and accelerate the implementation of effective public health responses.

2. Outpatient Illness Surveillance — Information on patient visits to health care providers for influenza-like illness is collected through the US Outpatient Influenza-like Illness Surveillance Network (ILINet).

- The Outpatient Influenza-like Illness Surveillance Network (ILINet) consists of about 2,400 healthcare providers in 50 states reporting approximately 16 million patient visits each year. Each week, approximately 1,300 outpatient care sites around the country report data to CDC on the total number of patients seen and the number of those patients with influenza-like illness (ILI) by age group. For this system, ILI is defined as fever (temperature of 100°F [37.8°C] or greater) and a cough and/or a sore throat in the absence of a KNOWN cause other than influenza. Sites with electronic records use an equivalent definition as determined by the state public health authorities. The percentage of patient visits to healthcare providers for ILI reported each week is weighted on the basis of state population. This percentage is compared each week with the national baseline of 2.4%. The baseline is the mean percentage of patient visits for ILI during non-influenza

weeks for the previous three seasons plus two standard deviations. Due to wide variability in regional level data, it is not appropriate to apply the national baseline to regional data, therefore, region specific baselines are calculated.

Regional baselines for the 2008-09 influenza season are:

New England — 1.5%

Connecticut, Maine, Massachusetts, New Hampshire, Vermont, Rhode Island

Mid-Atlantic — 2.9%

New Jersey, New York City, Pennsylvania, Upstate New York

East North Central — 1.9%

Illinois, Indiana, Michigan, Ohio, Wisconsin

West North Central — 1.7%

Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota

South Atlantic — 2.2%

Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, Washington, D.C., West Virginia

East South Central — 2.5%

Alabama, Kentucky, Mississippi, Tennessee

West South Central — 4.8%

Arkansas, Louisiana, Oklahoma, Texas

Mountain — 1.5%

Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming

Pacific — 3.0%

Alaska, California, Hawaii, Oregon, Washington

3. Mortality Surveillance — Rapid tracking of influenza-associated deaths is done through two systems:

- **122 Cities Mortality Reporting System** — Each week, the vital statistics offices of 122 cities report the total number of death certificates received and the number of those for which pneumonia or influenza was listed as the underlying or contributing cause of death by age group. The percentage of all deaths due to pneumonia and influenza (P&I) are compared with a seasonal baseline and epidemic threshold value calculated for each week. The seasonal baseline of P&I deaths is calculated using a periodic regression model that incorporates a robust regression procedure applied to data from the previous five years. An increase of 1.645 standard deviations above the seasonal baseline of P&I deaths is considered the “epidemic threshold,” i.e., the point at which the observed proportion of deaths attributed to pneumonia or influenza was significantly higher than would be expected at that time of the year in the absence of substantial influenza-related mortality.
- **Surveillance for Influenza-associated Pediatric Mortality** — Influenza-associated deaths in children (persons less than 18 years) was added as nationally notifiable condition in 2004. Laboratory-confirmed influenza-associated deaths in children are reported through the Nationally Notifiable Disease Surveillance System.

4. Hospitalization Surveillance — Two systems monitor hospitalizations with laboratory confirmed influenza infections.

- **Emerging Infections Program (EIP)** — The EIP Influenza Project conducts surveillance for laboratory-confirmed influenza related hospitalizations in children (persons less than 18 years) and adults in 60 counties covering 12 metropolitan areas of 10 states (San Francisco CA, Denver CO, New Haven CT, Atlanta GA, Baltimore MD, Minneapolis/St. Paul MN, Albuquerque NM, Las Cruces, NM, Albany NY, Rochester NY, Portland OR, and Nashville TN). Cases are identified by reviewing hospital laboratory and admission databases and infection control logs for children and adults with a documented positive influenza test (viral culture, direct/indirect fluorescent antibody assay (DFA/IFA), reverse transcription-polymerase chain reaction (RT-PCR), or a commercial rapid antigen test) conducted as a part of routine patient care. EIP estimated hospitalization rates are reported every two weeks during the influenza season.
- **New Vaccine Surveillance Network (NVSN)** — The New Vaccine Surveillance Network (NVSN) provides population-based estimates of laboratory-confirmed influenza hospitalization rates for children less than 5 years old residing in three counties: Hamilton County OH, Davidson County TN, and Monroe County NY. Children admitted to NVSN hospitals with fever or respiratory symptoms are prospectively enrolled and respiratory samples are collected and tested by RT-PCR and viral culture. NVSN estimated rates are reported every two weeks during the influenza season.

5. 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. Pneumonia and influenza mortality is reported on a national level only. Outpatient illness and laboratory data are reported on a [national level and by influenza surveillance region](#).

The state and territorial epidemiologists' reports of influenza activity are the only state-level information reported. Both the EIP and NVSN data provide population-based, laboratory-confirmed estimates of influenza-related hospitalizations but are reported from limited geographic areas.

It is important to maintain a comprehensive system for influenza surveillance for several reasons:

- Influenza viruses are constantly changing which requires ongoing collection and characterization of the strains.
- Influenza strains can rapidly undergo changes leading to pandemics of influenza; surveillance of viruses will detect these changes.
- Vaccines must be administered annually and are updated regularly based on surveillance findings.
- Treatment for influenza is guided by laboratory surveillance for antiviral resistance.
- National responses to emerging pandemic strains are triggered by surveillance data.

- Varying segments of the population are affected by influenza and may require targeted interventions. These groups are determined through influenza surveillance.

It is important to remember the following about influenza surveillance in the United States:

- All influenza activity reporting by states and health-care providers is voluntary.
- The reported information answers the questions of where, when, and what influenza viruses are circulating. It can be used to determine if influenza activity is increasing or decreasing, but cannot be used to ascertain how many people have become ill with influenza during the influenza season.
- The system consists of nine complementary surveillance components in five categories. These components include reports from more than 150 laboratories, 2,400 outpatient care sites, vital statistics offices in 122 cities, research and health-care personnel at the NVSN and EIP sites, and influenza surveillance coordinators and state epidemiologists from all 50 state health departments, and the District of Columbia health department.
- Influenza surveillance data collection is based on a reporting week that starts on Sunday and ends on Saturday of each week. Each surveillance participant is requested to summarize weekly data and submit it to CDC by Tuesday afternoon of the following week. Those data are then downloaded, compiled, and analyzed at CDC. The report is distributed and posted on this Web site each Friday from October through mid-May.