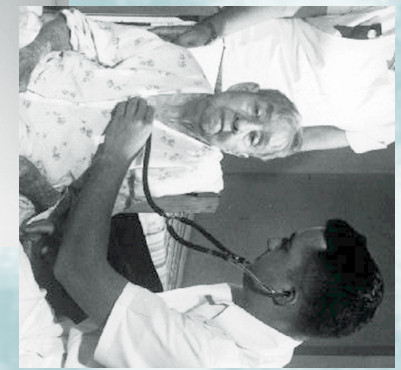
Detection & Control of

influenza outbreaks

in Acute Care Facilities



DEPARTMENT OF HEALTH & HUMAN SERVICES

CDC

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Detection & Control of

influenza outbreaks

in Acute Care Facilities

Jointly developed by the

National Center for Infectious Diseases
and The National Immunization Program

DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION

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UPDATE (December 2003)
For updated incidence and mortality data please visit:
www.cdc.gov/flu/keyfacts.htm

What is the impact of influenza and who is at risk?

Annual influenza epidemics cause infection in 10-20% of the population and result in an average of >110,000 hospitalizations and 20,000 deaths in the United States. Persons most susceptible to complications or death from influenza are

- persons ⩾65 years of age
- children <2 years of age
- persons of any age with certain medical conditions
- children receiving long-term aspirin therapy
- women who are in their second or third trimester of pregnancy during the influenza season (fall or winter)

Medical conditions include:

- heart or lung disease *(e.g., asthma, chronic obstructive pulmonary disease, congestive heart failure)*
- renal failure
- diabetes
- immune compromising illness *(e.g., HIV/AIDS, immuno-suppression from steroids or other medications that may compromise the immune system)*

Source: MMWR 2001;50 (RR-4):1-46

BOX 1

What are the symptoms of influenza?

Influenza is a respiratory illness characterized by the abrupt onset of

- fever
- chills
- headache
- myalgia, i.e., body aches

with accompanying

- fatigue
- cough
- sore throat
- nasal congestion

While the fever, body aches, and headache may typically last for three to five days, the cough and fatigue may last for more than two weeks. Some persons may not have typical influenza symptoms, but may only exhibit exacerbation of chronic medical conditions *(Box 1)*. Some children primarily may have fever, with nausea, vomiting or abdominal pain, and infants may have symptoms similar to a severe systemic bacterial infection.

What are the complications from influenza?

The most common complications are secondary bacterial pneumonia and worsening of chronic medical conditions. Influenza virus also can cause primary pneumonia, but this is much less common. Rarely, children taking aspirin can develop Reye's Syndrome if they get sick with influenza.

How is influenza transmitted?

Influenza is easily transmitted from person to person. The virus is spread primarily by the coughing and sneezing of infected persons or sometimes by direct contact, either with infected persons or a contaminated surface. Once influenza is introduced into a facility by infected healthcare personnel, patients, or visitors, it can quickly spread and cause illness in other hospitalized patients and healthcare personnel, especially among those who are unvaccinated. During an outbreak in a hospital ward or nursing home, as many as 70% of staff and patients may become infected.

What is the incubation period for influenza, and how long is a person contagious?

Infected persons start to develop symptoms 1-4 days after they are exposed. They may be able to spread influenza to other people from the day before getting symptoms through 5-7 days after symptoms start. Children may be contagious for 7 or more days.

How can influenza outbreaks in acute care facilities be prevented?

The most important means to prevent influenza from spreading in an acute care facility is influenza vaccination of both patients and healthcare personnel. The Advisory Committee on Immunization Practices *(Box 2)* recommends annual vaccination of all healthcare personnel against influenza. When influenza is introduced into an acute care facility, prompt recognition of influenza infection and initiation of infection control measures can limit the spread of disease.

About ACIP

CDC's Advisory Committee on Immunization Practices (ACIP) publishes recommendations and updated information about the control and prevention of influenza each year, including the use of influenza vaccine and antiviral agents. Annual ACIP recommendations and other information on influenza, including national influenza surveillance updates, can be found at the following CDC website:

http://www.cdc.gov/ncidod/diseases/flu/fluvirus.htm.

BOX 2

Why should acute care facilities conduct surveillance for influenza and influenza-like illness?

An active surveillance program can help acute care facilities identify outbreaks of influenza early and prevent influenza from spreading to patients and healthcare personnel, thereby decreasing influenza-related complications among patients and reducing work absenteeism. When the onset of influenza season in the community is identified, facility leaders should initiate measures to increase awareness and intensify efforts to diagnose and prevent influenza illness in both patients and healthcare personnel *(Boxes 3–5)*.

What is ILI?

Influenza-like illness (ILI) is defined as an elevated temperature (e.g., ⩾100° F or ⩾37.8° C) plus upper respiratory symptoms (e.g., cough or sore throat).

BOX 3

How should surveillance be conducted?

Surveillance can be conducted in a number of settings, including:

1. Inpatient surveillance

- Document incidence of reported influenza and influenza-like illness *(Box 3)*
- Develop case definitions for healthcare and community-acquired influenza
- Consider patients who develop influenza-like illness ⩾72 hours after facility admission as potential cases of healthcare-acquired influenza-like illness

- Initiate influenza testing when healthcare-acquired influenza is detected during surveillance, particularly when
  - one or more patients are identified with healthcare-acquired laboratory confirmed influenza
  - a cluster (e.g., ≥3) of patients with healthcare-acquired influenza-like illness are identified on the same floor or ward during a short (e.g., 48-72 hour) period
- Consider daily monitoring for influenza-like illness in selected settings, especially on wards with particularly vulnerable patients, such as intensive care units, oncology units, and other "sentinel" floors
- Evaluate whether infection control measures (e.g., droplet precautions) are properly instituted for influenza-positive patients, and investigate whether the infection was acquired in the community or while hospitalized

2. Emergency Department surveillance

- Consider influenza testing of patients being admitted from the emergency department who have influenza-like illness with no other identified pathogen
- Facilitate the timely initiation of droplet precautions through early suspicion and diagnosis among patients being admitted, to lessen the chance of influenza spreading to personnel or other patients

3. Employee surveillance

- Consider requiring that healthcare personnel with influenza-like illness go to employee health services for influenza testing
- Consider excluding healthcare personnel who test influenza-positive or have influenza-like illness from care of patients at high risk for influenza complications

4. Laboratory surveillance

- Establish regular contact between infection control and laboratory personnel regarding influenza-positive specimens
- Update clinical personnel regularly about the availability and use of diagnostic tests

Practical Suggestions for a Successful Influenza Surveillance Program

The level of surveillance implemented might vary significantly by hospital; facilities should tailor these suggestions as appropriate to the level of infection control support and capacity at their institution and to the vulnerability among the patient population. Efforts should begin with passive surveillance, and if confirmed cases of influenza are detected through passive surveillance, more active surveillance should be considered.

PASSIVE SURVEILLANCE

- Review microbiology laboratory reports for positive influenza cultures or rapid tests
- Improve quality of passive surveillance by educating nursing and medical staff in inpatient units, the emergency department, and employee health regarding
  - influenza activity in the community
  - availability and use of rapid influenza tests
  - importance of testing patients and personnel with influenza-like illness

ACTIVE SURVEILLANCE

- Test patients admitted through the Emergency Department with recent onset (e.g., ⩽4 days) of influenza-like illness
- Conduct surveillance for influenza-like illness in patients and personnel and keep an "influenza-like illness list" on patient care units and in employee health
  - instruct nurses to identify patients with influenza-like illness after every shift
  - forward information to infection control or other nursing personnel, and use it to target further testing and/or infection control measures
  - test patients and healthcare personnel with influenza-like illness

BOX 4

Overview of influenza surveillance

www.cdc.gov/flu/weekly/fluactivity.htm

CDC conducts surveillance for influenza in the United States each year from October through mid-May. Influenza surveillance on the national level is designed to

- Determine when influenza viruses are circulating, identify circulating strains, and detect changes in the viruses
- Monitor influenza-related illness
- Measure the impact of influenza on deaths

MONITORING COMMUNITY INFLUENZA SURVEILLANCE

Information regarding influenza surveillance is available through

CDC Voice Information System
INFLUENZA UPDATE
(888) 232-3228

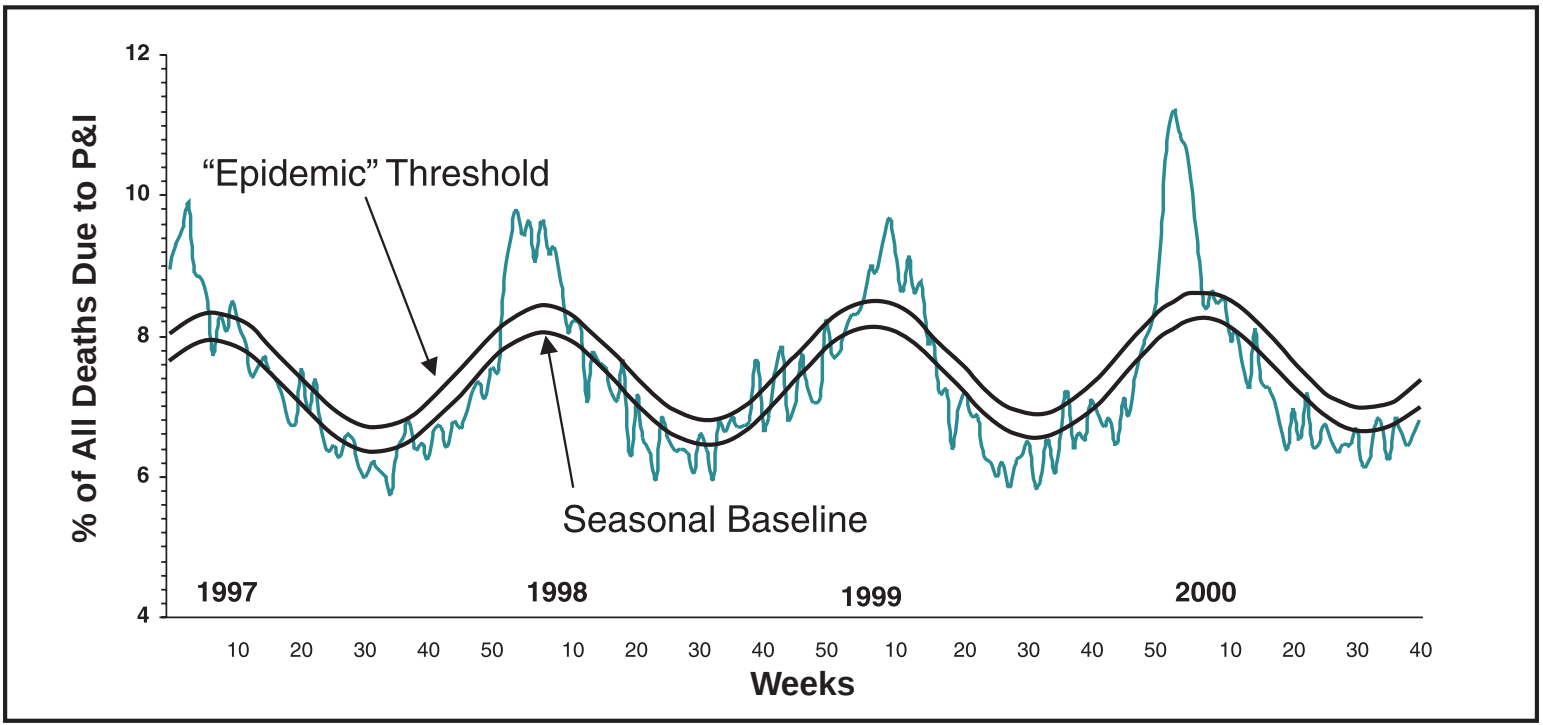
CDC Fax Information Service
(888) 232-3299

Website
http://www.cdc.gov/ncidod/diseases/flu/weekly.htm

From October through May, the information is updated at least every other week. In addition, periodic updates about influenza are published in CDC's *Morbidity and Mortality Weekly Report*. State and local health departments should be consulted for information about state or local influenza activity, and for reporting influenza outbreaks and receiving advice regarding outbreak control.

BOX 5

Pneumonia and Influenza Mortality for 122 U.S. Cities
January 1997 through August 2000



Each week, the vital statistics offices of 122 cities report the total number of death certificates filed and the number of those for which either pneumonia or influenza are identified.

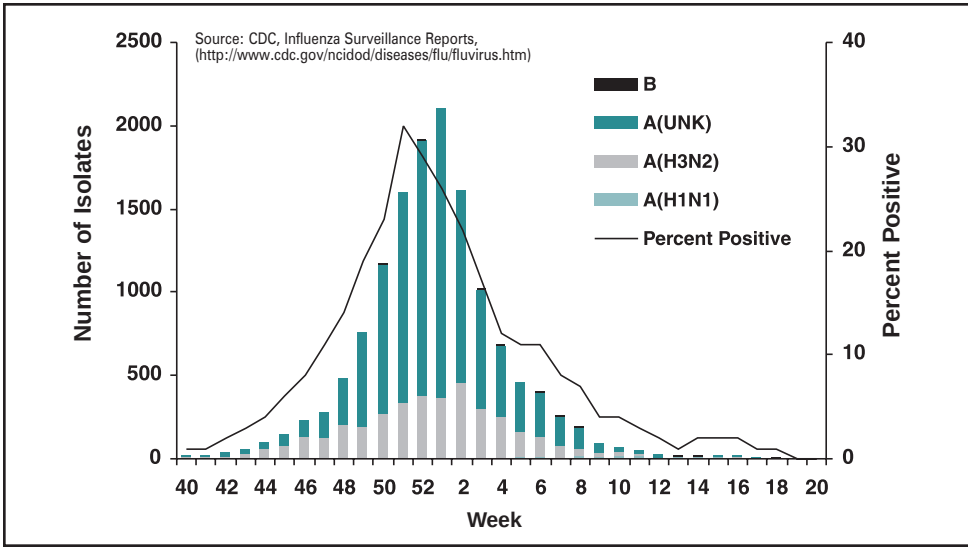
Source: CDC, Influenza Surveillance Reports, (http://www.cdc.gov/ncidod/diseases/flu/fluvirus.htm)

FIGURE 1

UPDATE(December 2003)
For updated surveillance data, please visit: www.cdc.gov/flu/weekly/fluactivity.htm

FIGURE 2

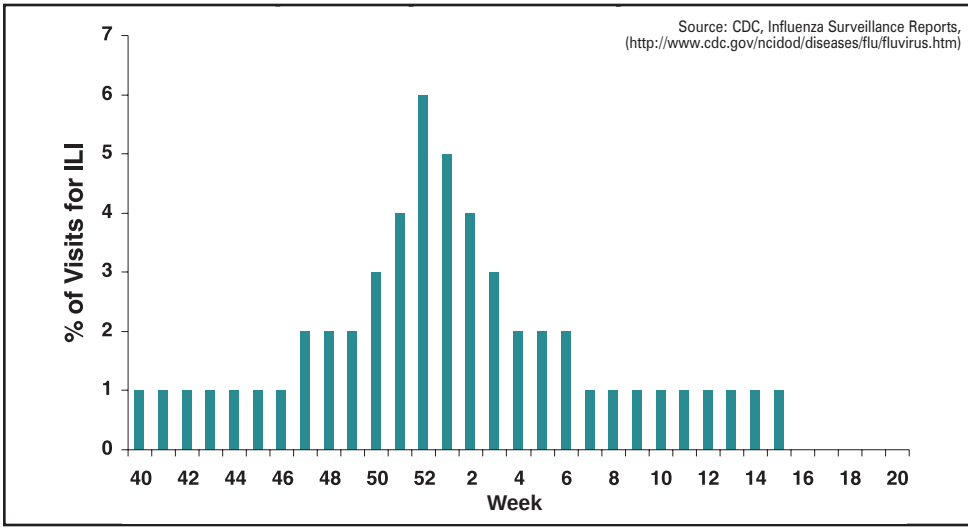
U.S. WHO and NREVSS
Collaborating Laboratory Reports, National Summary, 1999-2000



Approximately 75 World Health Organization collaborating virology laboratories and approximately 50 laboratories from the National Respiratory and Enteric Virus Surveillance System located throughout the United States report the total number of respiratory specimens tested, and the number positive for influenza by type and subtype, during the influenza season. These results help to determine the timing of influenza activity nationally.

FIGURE 3

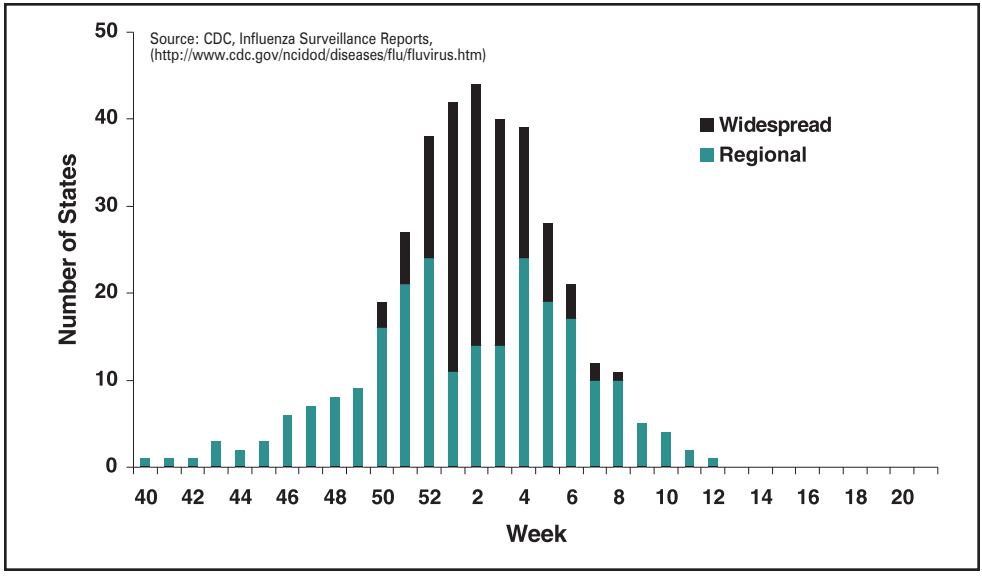
Morbidity Reports from U.S. Sentinel Physicians
National Summary, 1999-2000



Approximately 550 physicians around the country report each week the total number of patients seen and the number of those patients with influenza-like illness (ILI) by age group. Nationally, influenza morbidity as reported by U.S. sentinel physicians peaks when the maximal percentage of total patient visits are due to ILI.

FIGURE 4

Influenza Activity as Assessed by State and Territorial Epidemiologists, 1999-2000



State health departments report the estimated level of influenza activity in their state each week. When activity occurs, it is reported as sporadic, regional, or widespread. These levels are defined as follows:

Sporadic

Influenza cases, either laboratory-confirmed or influenza-like illness (ILI), are reported, but reports of outbreaks in places such as schools, nursing homes, and other institutional settings have not been received.

Regional

Outbreaks of either laboratory-confirmed influenza or ILI are occurring in geographic areas containing less than 50% of the state's population. A geographic area could be a city, county, or district.

Widespread

Outbreaks of either laboratory-confirmed influenza or ILI are occurring in geographic areas representing more than 50% of the state's population. Peak influenza activity occurs when the highest number of states report either regional or widespread influenza activity.

UPDATE(December 2003)
For updated surveillance data, please visit: www.cdc.gov/flu/weekly/fluactivity.htm

When should surveillance be conducted?

Acute care facilities should conduct surveillance for acute care facility-acquired influenza or influenza-like illness, particularly during the influenza season (from October through April in North America). However, sporadic cases of influenza can occur at any time of the year *(Figures 1–4)*.

The WHO network of collaborating centers for influenza

The World Health Organization (WHO) network of collaborating centers for influenza is a surveillance system that has provided important information on strains of influenza since its inception in 1947. This network helps to monitor influenza activity in all regions of the world. The network now consists of 110 national influenza centers in 83 countries, and 4 WHO collaborating centers in Atlanta, GA, USA; London, UK; Tokyo, Japan; and Melbourne, Australia.

WHO has developed a web-based database called FluNet on which data from centers in the influenza network are entered. The data consists of weekly reports of influenza activity in each location and includes the numbers of influenza-positive specimens detected. There is a cumulative seasonal summary included in the database, providing a description of recent and current influenza activity around the world. The data are geographically referenced at the country level, and charts, maps and tables are available for view on the FluNet website. The database dates from 1997, and it includes data from countries on all continents.

Source: WHO FluNet, http://oms.b3e.jussieu.fr/flunet

BOX 6

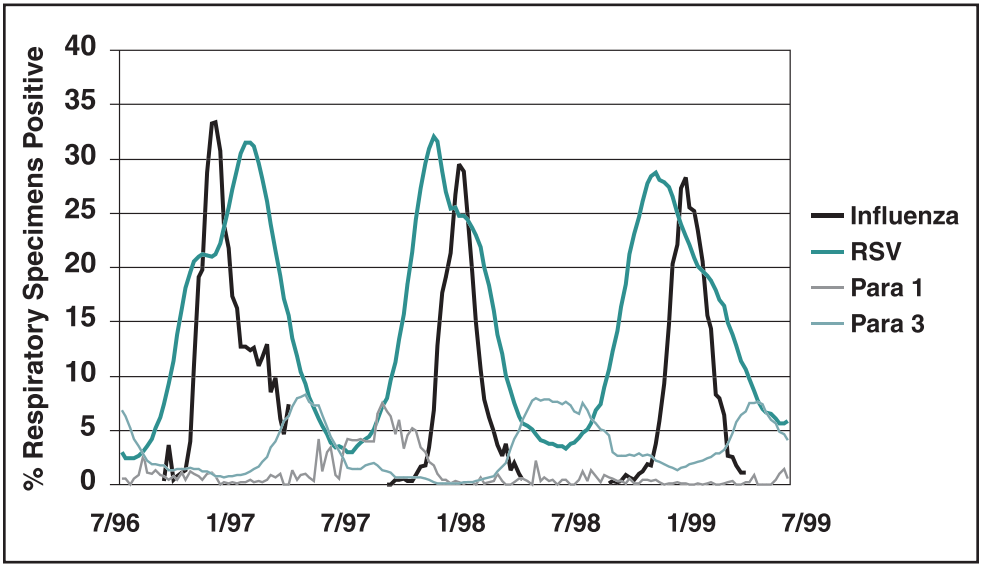
http://oms.b3e.jussieu.fr/flunet

Why is laboratory testing for influenza important?

Influenza is very difficult to differentiate from other pathogens on the basis of clinical symptoms alone. Other pathogens that can cause similar symptoms include, but are not limited to, *Mycoplasma pneumoniae*, adenovirus, respiratory syncytial virus (RSV), rhinovirus, parainfluenza viruses, and *Legionella* spp. Many pathogens, including influenza, RSV, and parainfluenza, cause outbreaks in a seasonal pattern *(Figure 5)*.

FIGURE 5

Etiology of Influenza-like Illness (ILI)
Seasonal occurrence of influenza, RSV, and parainfluenza types 1 and 3
United States, 1996-1999*



*Influenza data collected only from October–May each year through WHO Collaborating Laboratories Surveillance System. RSV and parainfluenza data collected continuously through National Respiratory Enteric Viruses Surveillance System. The relative contribution of influenza may not be to scale compared with other viruses included in the graph.

Source: CDC, unpublished data

When should influenza testing be done?

Based on facility surveillance, infection control personnel should establish threshold levels *(Box 7)* of influenza or influenza-like illness *(Box 3)* at which influenza testing and outbreak control measures should be initiated. Physicians may use a lower threshold for testing individuals at high risk for influenza-related complications. Droplet precautions should be initiated pending laboratory confirmation of influenza.

Threshold level for influenza is reached when

- One or more patients are identified with healthcare-acquired **laboratory confirmed** influenza *or*
- A cluster (e.g., ⩾3) of patients with healthcare-acquired **clinically suspected** (i.e., influenza-like illness) influenza is identified on the same floor or ward during a short (e.g., 48-72 hour) period

BOX 7

UPDATE(December 2003)
For updated laboratory testing information, please visit:
www.cdc.gov/flu/professionals/labdiagnosis.htm

What laboratory tests can be used to confirm the diagnosis of influenza?

Appropriate patient samples to collect for laboratory testing can include a nasopharyngeal or throat swab, nasal wash, or nasal aspirates, depending on which rapid test is used *(Table 1)*. Samples should be collected within the first 4 days of illness. Rapid influenza tests provide results within 24 hours; viral culture provides results in 3-10 days. Most of the rapid tests are >70% sensitive for detecting influenza and >90% specific. Because as many as 30% of samples that would be positive for influenza by viral culture may give a negative rapid test result, negative rapid tests should be followed by viral culture in a sub-sample of the swabs collected. Viral culture can also identify other causes of influenza-like illness when influenza is not the cause.

Serum samples can be tested for influenza antibody to diagnose acute infections. Two samples should be collected per person: one sample within the first week of illness and a second sample 2-4 weeks later. If antibody levels increase from the first to the second sample, influenza infection likely occurred. Because of the length of time needed for a diagnosis of influenza by serologic testing, other diagnostic testing should be used for rapid detection of possible outbreaks.

UPDATE(December 2003)
For updated laboratory testing information, please visit:
www.cdc.gov/flu/professionals/labdiagnosis.htm

Laboratory Diagnostic Procedures for Influenza[1]

PROCEDURE	INFLUENZA TYPES DETECTED	ACCEPTABLE SPECIMENS	TIME FOR RESULTS	POINT-OF-CARE MARKET
Viral Culture	A and B	• NP Swab[2] • Throat Swab • Nasal Wash • Bronchial Wash • Nasal Aspirate • Sputum	5-10 Days[3]	No
Immuno-fluorescence	A and B	• NP Swab[2] • Nasal Wash • Bronchial Wash • Nasal Aspirate • Sputum	2-4 Hours	No
Influenza A Enzyme Immuno-Assay (EIA)	A and B	• NP Swab[2] • Throat Swab • Nasal Wash • Bronchial Wash	2 Hours	No
Directigen A (Becton-Dickinson)	A	• NP Swab[2] • Throat Swab • Nasal Wash • Nasal Aspirate	<30 Minutes	Yes
Directigen Flu A and B (Becton-Dickinson)	A and B	• NP Swab[2] • Throat Swab • Nasal Wash • Nasal Aspirate • Bronchial Wash	<30 Minutes	Yes
FLU OIA (Biostar)	A and B[4]	• NP Swab[2] • Throat Swab • Nasal Aspirate • Sputum	<30 Minutes	Yes
Quick Vue (Quidel)	A and B[4]	• NP Swab[2] • Nasal Wash • Nasal Aspirate	<30 Minutes	Yes
Zstat Flu (ZymeTx)	A and B[4]	• Throat Swab	<30 Minutes	Yes
RT-PCR	A and B	• NP Swab[2] • Throat Swab • Nasal Wash • Bronchial Wash • Nasal Aspirate • Sputum	1-2 Days	No
Serology	A and B	• Paired Acute and Convalescent Serum Samples[5]	>2 Weeks	No

1 List may not include all test kits approved by the U.S. Food and Drug Administration as of September 1, 2001

2 NP = nasopharyngeal

3 Shell vial culture, if available, may reduce time for results to 2 days

4 Does not distinguish between influenza A and B types

5 A fourfold or greater rise in antibody titer from the acute- (collected within the 1st week of illness) to the convalescent-phase (collected 2-4 weeks after the acute sample) samples is indicative of recent infection.

See product package inserts for further information

TABLE 1

UPDATE (December 2003)
For updated antiviral therapy information, please visit:
www.cdc.gov/flu/professionals/antiviralback.htm

What control measures should be used for influenza or influenza-like illness?

- Cohort those with influenza or influenza-like illness *(Box 3)* on a ward designated to accept patients with suspected or confirmed influenza *(Box 8)*
- Initiate droplet precautions for persons with influenza-like illness or confirmed influenza infection, including wearing masks when within 3 feet of the patient, wearing gowns if clothing is likely to be soiled by body fluids, and practicing hand hygiene before and after patient contact
- Offer influenza vaccine to patients and healthcare personnel who have not been vaccinated
- Consider offering influenza antiviral medications *(Table 2)* for treatment of ill patients and healthcare personnel and for prophylaxis of exposed patients, unvaccinated personnel, and those vaccinated <2 weeks before exposure
- Monitor personnel for influenza-like illness and restrict ill personnel from patient care
- Restrict visitors with influenza-like illness
- Continue to monitor for healthcare-acquired influenza and for patients being admitted to the facility who have influenza infection

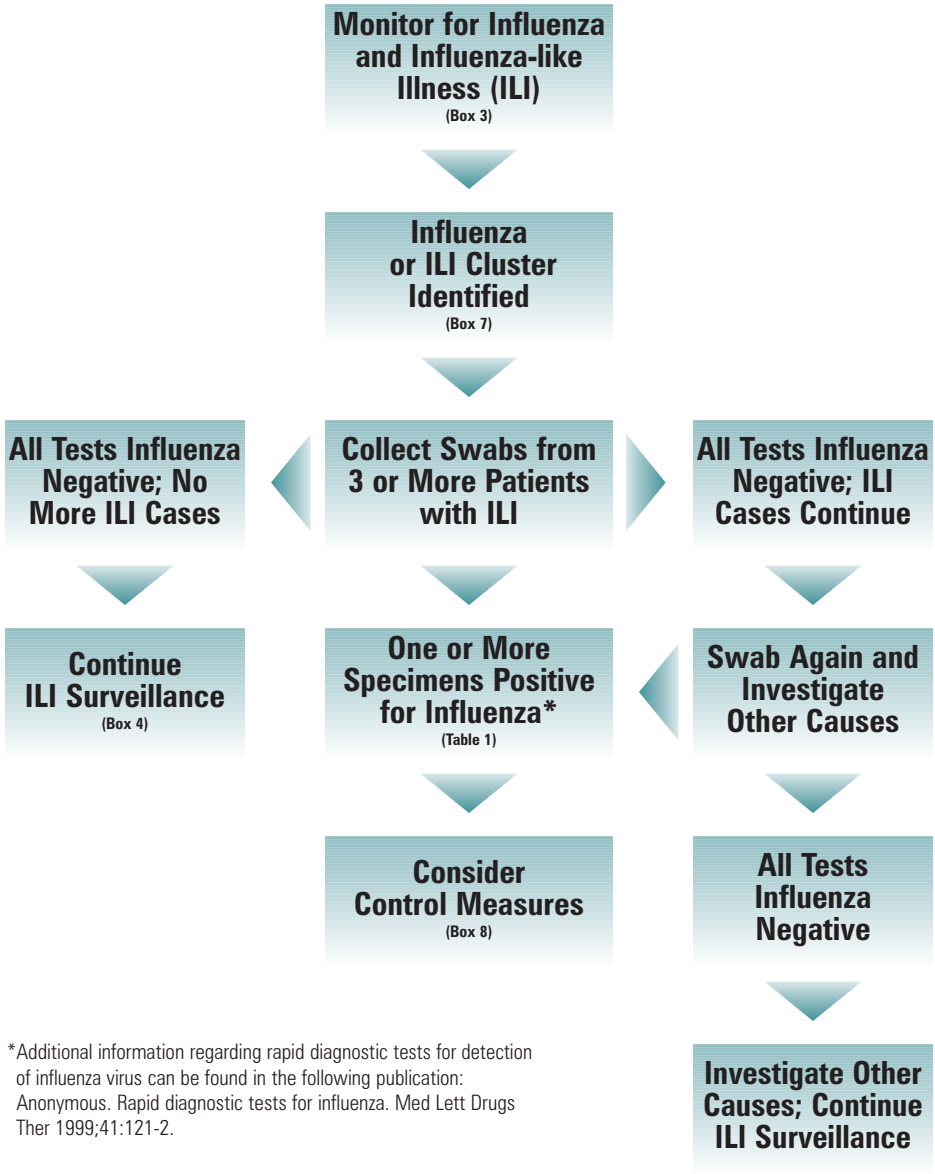
See Figure 6 and Box 9 for more information on control measures for influenza outbreaks.

Summary Control Measures to Consider for Influenza in Acute Care Facilities

- Cohort patients with suspected or laboratory-confirmed influenza on a designated ward and place on droplet precautions
- Vaccinate unvaccinated staff and patients
- Restrict movement of staff between wards
- Limit visitors with respiratory illness
- Limit new non-influenza-like illness admissions to designated cohort ward
- Restrict ill staff from patient care
- Treat influenza cases with antiviral medications
- Offer prophylaxis to exposed non-ill patients and unvaccinated staff with antiviral medications

BOX 8

Flow Chart for Surveillance and Control of Influenza in Acute Care Facilities



*Additional information regarding rapid diagnostic tests for detection of influenza virus can be found in the following publication: Anonymous. Rapid diagnostic tests for influenza. Med Lett Drugs Ther 1999;41:121-2.

FIGURE 6

Practical Suggestions for Cohorting Patients with Influenza or Influenza-like Illness During Influenza Outbreaks

Cohorting patients can be difficult to accomplish in many hospitals, and institutions must individualize plans for cohorting based on the availability of local resources (personnel, facility design, etc.). The following is a suggested hierarchical approach:

- When possible, place patients with documented or suspected influenza in a private room
- When the number of patients with influenza exceeds the available private rooms, try to place influenza cases together in multi-bed rooms or wards
- When patients with and without influenza must be placed in a room together, try to avoid including uninfected patients most susceptible to influenza complications *(Box 1)**
- When multiple influenza cases are admitted, minimize the number of staff having contact with infected patients by assigning all influenza patients to a single or small group of healthcare personnel
- When numerous cases are identified, consider placing all patients with documented or suspected influenza in one designated unit or ward, i.e., an influenza cohort, and assign vaccinated nursing personnel to work in the designated influenza cohort unit

*Acute care facilities should use droplet precautions to reduce transmission of influenza in patients sharing a room. Droplet precautions call for a distance of at least three feet between patients, preferably separated by a physical barrier (e.g., curtain).

BOX 9

UPDATE (December 2003)
For updated antiviral therapy information, please visit:
www.cdc.gov/flu/professionals/antiviralback.htm

TABLE 2

Comparison of Influenza Antiviral Drugs for Adults*

AGENT	INFLUENZA VIRUS AFFECTED	ADMINISTRATION	PRIMARY SIDE EFFECTS	DOSE	
				TREATMENT	PROPHYLAXIS
Amantadine§	Influenza A	Oral	Central nervous system/ Gastrointestinal	100 mg twice daily†	100 mg twice daily†
Rimantadine¶	Influenza A	Oral	Central nervous system/ Gastrointestinal	100 mg twice daily†	100 mg twice daily†
Zanamivir	Influenza A and B	Oral inhalation	Respiratory	100 mg twice daily	NA⁂
Oseltamivir	Influenza A and B	Oral	Gastrointestinal	75 mg twice daily‡	75 mg once daily†

* The indications/dosing and side effects listed were current as of August 2001. For more current information, please consult the package inserts. For information on use and dosing in children, consult package inserts and ACIP recommendations.

§ Consult drug package insert for dosage recommendations for administering amantadine to persons with creatinine clearance ≤50 ml/min.

† A reduction in dosage may be indicated for persons >65 years of age; consult drug package insert for dosing recommendations in this age group.

¶ A reduction in dosage is recommended for persons with severe hepatic or renal dysfunction; consult drug package insert for further dosage recommendations.

‡ A reduction in dosage is recommended for persons with creatinine clearance <30 ml/min.; consult drug package insert for further dosage recommendations.

⁂ Zanamavir is not currently approved for prophylaxis; the FDA application for this indication was pending at time of publication.

What can acute care facilities do to prepare for possible influenza outbreaks?

- Make sure that all healthcare personnel receive influenza vaccination by

IMPROVING ACCESS TO VACCINE e.g., using a mobile cart to vaccinate healthcare personnel in their work areas, at conferences, in lunchrooms, or in other meeting areas *(Box 10)*.

ANNUALLY PROVIDING REPORTS of vaccination levels by employee unit. Information should be disseminated to personnel and their supervisors and may be used to foster a spirit of competition. Set target vaccination goals and publicize running vaccination totals throughout the facility during vaccination periods. Nominal awards may be beneficial in improving coverage and should be considered. Recognition should be given to employee units with high coverage levels.

ADDRESSING REMINDERS from the employee health department to all healthcare personnel and their supervisors. The reminders should include a list of places and times that vaccination will be offered.

EDUCATING PERSONNEL ANNUALLY about the risks of influenza to their patients, themselves, and their families, and about the benefits of vaccination. Personnel should receive data about the impact of influenza, if known, in their facility. Ideally, vaccination should be offered at the end of such education sessions.

- Offer vaccine to unvaccinated patients before they are discharged
- Have a written policy concerning influenza outbreak management and ensure that key healthcare personnel, especially nurses, are aware of it
- Disseminate information to physicians about influenza testing and use of influenza antiviral medication
- Institute surveillance for influenza-like illness *(Box 3)* among healthcare personnel and patients

Strategies to improve healthcare personnel vaccination rates

In 1996 and 1997, a survey conducted in hospitals participating in the National Surveillance System for Healthcare Personnel (NaSH) found that only 28% of healthcare personnel were vaccinated against influenza. Physicians were most likely to be vaccinated; nurses were less likely to be vaccinated than personnel in housekeeping or phlebotomists, despite nurses' frequent close contact with patients at high risk for developing complications from influenza.

One NaSH facility, noting low nurse vaccination rates [BOX 10a], developed a campaign targeted at nurses [BOX 10b]. As a result, the influenza vaccination rate in this facility increased dramatically, both overall and especially among nurses [BOX 10c]. Nationally, influenza vaccination in healthcare personnel is alarmingly low compared with other groups for whom vaccination is recommended, even in personnel who are at high risk for developing complications from influenza [BOX 10d]. A targeted campaign with active intervention can be particularly effective in increasing the percentage of healthcare personnel who are vaccinated.

Source: CDC, unpublished data

BOX 10

Influenza vaccination percentage by occupation, Facility A — BOX 10a

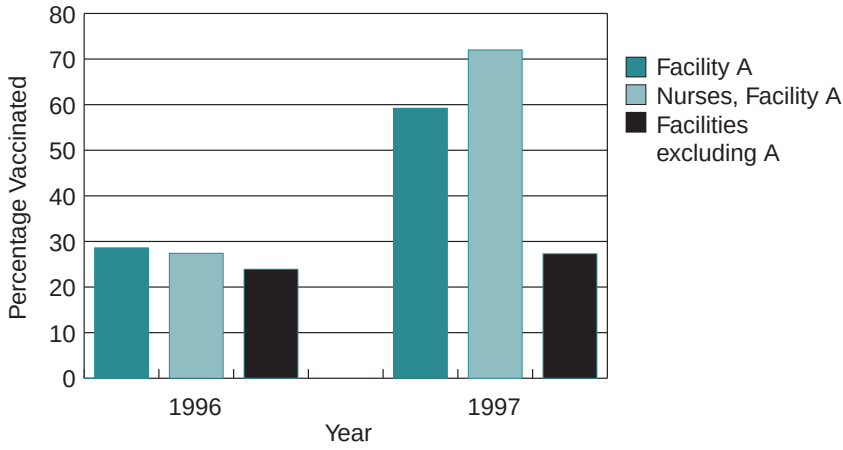
- Physician/Physician Assistant 39.7%
- Housekeeping 30.2%
- Phlebotomists 27.2%
- Nursing 26.3%
- Transport/Services 25.9%
- Technicians (respiratory, X-ray) 23.1%
- Clerical 21.4%

Strategies used to successfully improve influenza vaccination, Facility A — BOX 10b

- Intensive education
- Mobile vaccine carts in work areas
- Employee reminders
- Local health department campaign
- Targeted intervention
  - specific occupations, e.g., nursing
  - personnel caring for specific populations

Healthcare personnel influenza vaccination by year and occupation, Facility A vs other NaSH facilities

BOX 10c



Self-reported influenza vaccination of U.S. adults in 1996-97

BOX 10d

Source: 1997 National Health Interview Survey

	% Vaccinated
All adults ⩾65 yrs. of age	**63%**
Healthcare personnel with high risk (aged 18-64 yrs.)*	**38%**
All healthcare workers**	**34%**

*One or more high-risk medical conditions including diabetes, current cancer treatment, or chronic heart, lung, or kidney disease.

**Healthcare workers included persons currently employed in healthcare occupations, regardless of setting, and persons currently employed in healthcare settings without a healthcare occupation.

Walker FJ, Singleton JA, Lu PJ, Strikas RA. Influenza Vaccination of Healthcare Workers in the United States, 1989-97 [Abstract]. Infection Control and Hospital Epidemiology 2000:21:113.

BOX 10, CONT.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or
www.cdc.gov/ncidod/diseases/flu/fluvirus.htm
or
www.cdc.gov/nip/flu

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