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South Dakota influenza epidemiology and laboratory surveillance: 2010-2011

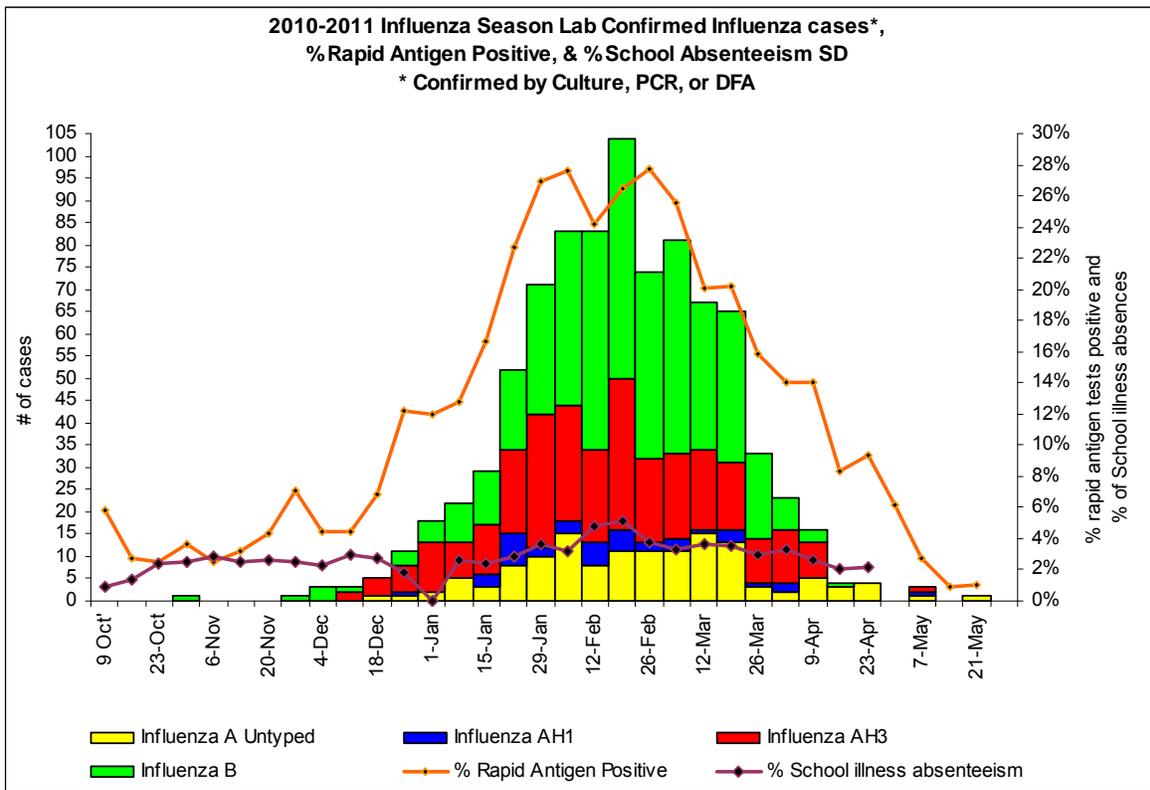
by Vickie Horan, Influenza Surveillance Coordinator, Department of Health

The South Dakota Department of Health (SD DOH) and SD Public Health Laboratory (SDPHL) conduct surveillance for influenza year-round, intensifying activities October through May. The components of South Dakota's influenza surveillance program for the 2010-2011 season included 66 laboratory sentinel sites; 21 Influenza Like Illness Network (ILINet) providers; viral culture and PCR testing (SDPHL); DFA testing (Pine Ridge, Rapid City Regional, and Sanford Laboratories); reporting of aggregate rapid antigen results; confirmed influenza, influenza hospitalizations and deaths, and institutional outbreaks. During the influenza season, weekly summary reports are posted on the SD DOH website at doh.sd.gov/Flu/.

A total of 860 confirmed influenza cases, A(H3N2) 274 (32%), A(H1N1) 40 (5%), A-not subtyped 133 (15%) and 412 (48%) influenza B, were reported to SD DOH. Additionally, 33,799 rapid antigen influenza tests were accomplished with 6,893 positive (20%), 3,219 (10%) positive for influenza A and 3,674 (11%) positive for influenza B. Other viral respiratory pathogen reports included 119 adenovirus, 218 hMPV, 4 parainfluenza-1, 30 parainfluenza-2, 203 parainfluenza-3, 18 parainfluenza-4, and 315 respiratory syncytial virus. (See page 2.)

The 2010-2011 influenza viruses had a substantial impact on all age groups. The median age of confirmed influenza cases was 14 years with an age range of 3 weeks to 97 years.

The first confirmed case of influenza was reported the last week of October 2010 and the last case reported mid-May 2011. The predominant virus in South Dakota was influenza B. The peak of the season was mid-February 2011 with AH1N1, AH3N2 and Influenza B viruses co-circulating.



Source: South Dakota Department of Health, Office of Disease Prevention

There were 290 individuals reported hospitalized during the 2010-2011 influenza season. The first hospitalization was identified mid-October 2010 and the last was reported mid May. Hospitalizations peaked mid-March. For patients who were hospitalized with influenza, the age range was 1 month to 95 years with a median age of 49 years.

Twenty individuals died due to influenza and its complications during the 2010-2011 season. Gender breakdown was 40% male and 60% female. The median age was 87 years, with an age range of 1 - 105 years. 80% of the influenza-associated deaths were White, 15% were American Indian, and 5% were Asian.

Age Distribution of Reported Influenza Cases, South Dakota, 3 Oct 2010-31 Jul 2011 Influenza Season			
Lab Confirmed Influenza Cases (by DFA, PCR, or culture)		Influenza Associated Hospitalizations	Influenza Associated Deaths
Age Group	# Cases (%)	# Hosp (%)	# Deaths
0-4 yr	226 (26%)	75 (26%)	1
5-24 yr	329 (38%)	39 (13%)	3
25-49 yr	136 (16%)	33 (11%)	1
50-64 yr	60 (7%)	34 (12%)	1
>64 yr	109 (13%)	109 (38%)	14
Total	860	290	20

National Influenza Surveillance Data for the 2010-2011 Influenza Season.

In comparison the last three seasons, the 2010-2011 influenza season was less severe than both the pandemic year (2009-2010) and the 2007-2008 season, but more severe than the 2008-2009 influenza season, as determined by the percentage of deaths resulting from pneumonia or influenza, the number of influenza-associated pediatric deaths reported, adult and pediatric

hospitalization rates, and the percentage of visits to outpatient clinics for influenza-like illness (ILI).

Flu seasons are unpredictable in a number of ways, including when they begin, how severe they are, how long they last, which viruses will spread, and whether the viruses in the vaccine match flu viruses that are circulating. During the 2010-2011 influenza season, the most commonly reported viruses were influenza A(H3N2), but 2009 influenza A (H1N1) viruses and influenza B viruses circulated as well. The 2010-2011 influenza season had a substantial health effect on every age group.

During the 2010-2011 influenza season, overall influenza activity peaked in early February. Flu seasons most often peaks in January or February in the United States.

The weekly percentage of outpatient visits for influenza-like illness (ILI), as reported by the U.S. Outpatient ILI Surveillance Network (ILINet), peaked in mid-February 2011 at 4.6%. This is comparable to the peaks seen in the two seasons prior to the 2009 H1N1 pandemic, which ranged from 3.5% to 6.0% and occurred in mid-to-late February 2011. During the pandemic year, ILI peaked in late October at 7.7%. The number of states reporting widespread or regional influenza activity peaked at 49 at the end of February 2011 and decreased to zero by the middle of April.

The influenza vaccine for the 2010-2011 influenza season was considered to be a good match. Almost all of the 2,494 influenza viruses submitted to CDC for antigenic characterization were found to be similar to the components of the 2010-2011 influenza vaccine. Of the viruses tested, 99.8% of the influenza A (H1N1) viruses, 96.8% of the influenza A (H3N2) viruses, and 94% of the influenza B viruses were similar to the components of the 2010-2011 season's vaccine.

CDC routinely collects viruses through a domestic and global surveillance system to monitor for changes in influenza viruses and to check for antiviral resistance. By the end of the 2010-2011 season, almost all (99.1%) of the 2009 A(H1N1) influenza viruses tested for antiviral resistance were susceptible to oseltamivir (Tamiflu), and 99.8% of the A(H3N2) viruses tested were susceptible to Tamiflu. All of the influenza B viruses tested were susceptible to Tamiflu. All virus types and subtypes were susceptible to Zanamivir (Relenza) by the end of the 2010-2011 season.

There were five reports of human infections with swine origin influenza A (H3N2) viruses that occurred during the 2010-2011 influenza season. These cases were identified in Minnesota, Pennsylvania, and Wisconsin. No epidemiologic links between these cases have been identified and the viruses from all five cases have genetic differences indicating different sources of infection. All five patients have fully recovered from their illnesses.

CDC publishes a weekly influenza summary at: <http://www.cdc.gov/flu/weekly/>

Prevention and Control of Influenza ACIP 2011-2012

For the 2011-2012 influenza season, the early release of the *Prevention and Control of Influenza, Recommendations of the Advisory Committee on Immunization Practices (ACIP), 2011* was printed in the CDC Morbidity and Mortality Weekly Report, August 18, 2011, Vol. 60 (<http://www.cdc.gov/mmwr/pdf/wk/mm60e0818.pdf?source=govdelivery>). It is also reprinted in this South Dakota Public Health Bulletin beginning on page 10. For issues related to influenza vaccination that are not addressed in the early release, refer to the 2010 ACIP statement on prevention and control of influenza with vaccines (<http://www.cdc.gov/mmwr/pdf/rr/rr59e0729.pdf>).

Summary of Influenza Vaccination Recommendations

- All persons aged ≥ 6 months should be vaccinated annually.
- Protection of persons at higher risk for influenza-related complications should continue to be a focus of vaccination efforts as providers and programs transition to routine vaccination of all persons aged ≥ 6 months.
- When vaccine supply is limited, vaccination efforts should focus on delivering vaccination to persons who:
 - are aged 6 months–4 years (59 months);
 - are aged ≥ 50 years;
 - have chronic pulmonary (including asthma), cardiovascular (except hypertension), renal, hepatic, neurologic, hematologic, or metabolic disorders (including diabetes mellitus);
 - are immunosuppressed (including immunosuppression caused by medications or by HIV);
 - are or will be pregnant during the influenza season;
 - are aged 6 months–18 years and receiving long-term aspirin therapy and who therefore might be at risk for experiencing Reye syndrome after influenza virus infection;
 - are residents of nursing homes and other chronic-care facilities;
 - are American Indians/Alaska Natives;
 - are morbidly obese (body-mass index ≥ 40);
 - are health-care personnel;
 - are household contacts and caregivers of children aged < 5 years and adults aged ≥ 50 years, with particular emphasis on vaccinating contacts of children aged < 6 months; and
 - are household contacts and caregivers of persons with medical conditions that put them at higher risk for severe complications from influenza.

Centers for Disease Control and Prevention, Prevention and Control of Influenza with Vaccines. Recommendations of the ADVISORY Committee on Immunization Practices (ACIP), 2010. MMWR 59/RR-8 <http://www.cdc.gov/mmwr/pdf/rr/rr5908.pdf>

Changes in Reporting Requirements for Latent TB Infection (LTBI)

Effective 8-2-2011, the South Dakota Department of Health will only require reporting of patients with latent TB infection who have at least one of the following TB risk factors:

REPORTABLE TB RISK FACTORS

- ✚ Foreign-born persons who entered the US within last 5 years
- ✚ Persons evaluated for tumor necrosis factor-alpha therapy
- ✚ Immunosuppressive therapies (i.e. high dose steroids)

- ✚ Radiographic evidence of prior TB
- ✚ Children less than 5 years of age
- ✚ Close contact to infectious TB
- ✚ HIV infection
- ✚ Diabetes
- ✚ Renal dialysis
- ✚ Silicosis
- ✚ Organ transplant
- ✚ Head and neck cancers
- ✚ Leukemia
- ✚ Hodgkin's disease

Due to this change, **only the above patients will be eligible for Department of Health nurse case management and medication.** Health care providers are asked to report only patients with LTBI who meet this new reporting requirement by mailing or faxing the form entitled "*Latent Tuberculosis Infection (LTBI) Report Form*" to the TB Control Program (reporting instructions are on the form). Patients who do not meet this criteria should be referred to their private health care provider for evaluation and treatment at their own expense.

All patients currently being managed by Department of Health staff will be allowed to finish their prescribed course of treatment regardless of their risk factor status. The department's "*Medical Evaluation and Treatment for Latent TB Infection*" form can assist clinicians in completing the evaluation process for patients reported with latent TB infection.

For questions regarding the revised reporting requirements or to order the forms, **please call the TB Control Program at 1-800-592-1861 or (605) 773-3737.**

Find the Department of Health Reportable Disease poster and instructions for how and when to report these diseases and conditions at <http://doh.sd.gov/Disease/Report.aspx>.

LATENT TUBERCULOSIS INFECTION (LTBI) REPORT FORM

SOUTH DAKOTA DEPARTMENT OF HEALTH



REPORTABLE TB RISK FACTORS (check all that apply)

- | | |
|--|--|
| <input type="checkbox"/> Foreign-born persons who entered the US within last 5 years | <input type="checkbox"/> Diabetes |
| <input type="checkbox"/> Persons evaluated for tumor necrosis factor-alpha therapy | <input type="checkbox"/> Renal dialysis |
| <input type="checkbox"/> Immunosuppressive therapies (i.e. high dose steroids) | <input type="checkbox"/> Silicosis |
| <input type="checkbox"/> Radiographic evidence of prior TB | <input type="checkbox"/> Organ transplant |
| <input type="checkbox"/> Children less than 5 years of age | <input type="checkbox"/> Head and neck cancers |
| <input type="checkbox"/> Close contact to infectious TB | <input type="checkbox"/> Leukemia |
| <input type="checkbox"/> HIV infection | <input type="checkbox"/> Hodgkin's disease |

Please only report patients with latent TB infection who have at least one of the above risk factors.

Report by telephone: 1-800-592-1804 (confidential answering machine)

Report by fax: (605) 773-5509 (confidential fax)

Report by mail: South Dakota Department of Health

Tuberculosis Control Program

615 East 4th Street

Pierre, SD 57501

Questions may be directed to the TB Control Program at 1-800-592-1861 or (605) 773-3737.

I. PATIENT DEMOGRAPHICS

Last Name _____ First Name _____
 Address _____ Date of Birth _____ Age _____
 City _____ State _____ Zip Code _____ County _____
 Home phone _____ Work phone _____ Cell phone _____
 Employer _____ Telephone # _____ Occupation _____

Sex: Male Female
Race: White Native American Black Asian
Ethnicity: Hispanic Non-Hispanic

Foreign Born: No Yes If yes, country of birth _____ Date of entry into US _____

(Required if foreign-born)

Clinic Name _____ Telephone # _____ Medicaid eligible: No Yes
 Physician _____ Fax # _____ If yes, Medicaid # _____

II. TB SCREENING INFORMATION

Select the TB screening test that was used to diagnose latent TB infection.

TB skin test IGRA (Interferon Gamma Release Assay)

Date of TB skin test _____ Date of blood collection _____

Result: _____ mm Result: Positive Negative Indeterminate

Check One: Reactor Converter If convertor, date of last negative test <2 years ago _____ mm
 Contact If contact, name of TB case that exposed patient _____

III. CHEST X-RAY INFORMATION

Date of the chest X-ray _____ Results _____

IV. TREATMENT INFORMATION

Treatment for LTBI to be started? Yes No Date started _____

If yes, therapy prescribed: INH _____ mg daily or twice weekly for _____ months
 Rifampin _____ mg daily for _____ months
 Vitamin B-6 _____ mg daily or twice weekly for _____ months
 Other _____

Medication provider: Dept. of Health (name & location) _____
 Other agency/facility (name & location) _____
 Telephone number _____ Contact Person _____

CONSIDERATIONS FOR PATIENTS STARTING TREATMENT FOR LATENT TB INFECTION (LTBI)

The following information is provided as a summary of current guidelines and should not be used as a substitute for reading the below document and other current recommendations.

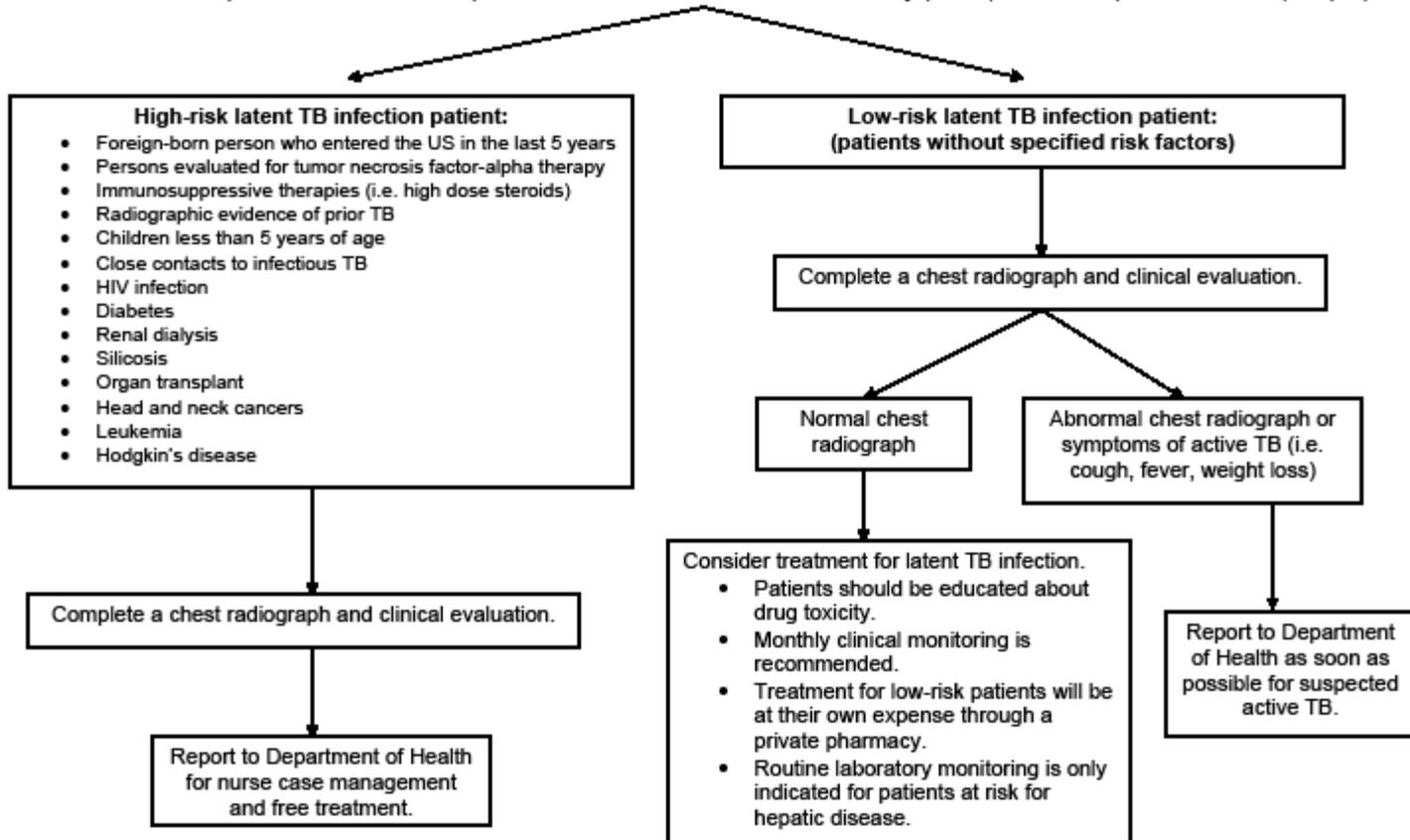
Targeted Tuberculin Testing and Treatment of Latent Tuberculosis Infection, 2000

<http://www.cdc.gov/mmwr/PDF/rr/rr4906.pdf>

- **Recommended Therapy:** The recommended regimen is Isoniazid (INH) daily for 9 months.
Adults: 5 mg/kg daily (300 mg maximum dose)
Children: 10-20 mg/kg daily (300 mg maximum dose)
Pyridoxine (Vitamin B-6) is recommended with INH in patients who are pregnant or breast feeding and in those with nutritional deficiencies or illnesses which predispose them to neuropathy such as diabetes, alcoholism and HIV infection. Pyridoxine is also recommended for use with INH in exclusively breastfed infants.
- **Alternative Therapy:** For patients who cannot tolerate INH, an alternative regimen is Rifampin daily for 4 months for adults and 6 months for children. The dosage is as follows:
Adults: 10 mg/kg daily (600 mg maximum dose)
Children: 10-20 mg/kg daily (600 mg maximum dose)
- **Adverse reactions: INH:** rash, hepatic enzyme elevation, hepatitis, peripheral neuropathy, mild central nervous system effects, drug interactions (i.e. Dilantin). **Rifampin:** rash, hepatitis, fever, thrombocytopenia, flu-like symptoms, orange-colored body fluids, drug interactions (i.e. oral contraceptives).
- **Clinical monitoring:** Clinical monitoring is indicated for all patients. This includes education of patients about the symptoms that can result as adverse effects of the drug being prescribed and the need for prompt cessation of treatment and clinical evaluation should symptoms occur. These symptoms include any of the following: unexplained anorexia, nausea, vomiting, dark urine, icterus, rash, persistent paresthesias of the hands and feet, persistent fatigue, weakness or fever lasting 3 or more days, abdominal tenderness, easy bruising or bleeding and arthralgia. Clinical monitoring begins at the first visit and should be repeated at each monthly visit. At monthly visits, patients should be instructed to interrupt therapy and contact their providers immediately upon the onset of such symptoms or any unexplained illness occurring during treatment.
- **Pretreatment laboratory evaluation:** Baseline laboratory testing is not routinely indicated for all patients at the start of treatment for LTBI. Patients whose initial evaluation suggests a liver disorder should have a baseline hepatic measurements of serum AST (SGOT) or ALT (SGPT) and bilirubin. Baseline testing is also indicated for patients infected with HIV, pregnant women and those in the immediate postpartum period (i.e. within 3 months of delivery), persons with a history of liver disease, persons who use alcohol regularly and others who are at risk for chronic liver disease. Testing should be considered on an individual basis. Active hepatitis and end-stage liver disease are relative contraindications to the use of isoniazid for treatment of LTBI.
- **Laboratory monitoring during treatment:** Routine laboratory monitoring during treatment of LTBI is indicated for patients whose baseline liver function tests are abnormal and for other persons at risk for hepatic disease. Laboratory testing should also be used to evaluate possible adverse effects that occur during treatment. Some experts recommend that isoniazid be withheld if a patient's transaminase level exceeds 3 times the upper limit of normal if associated with symptoms and five times the upper limit of normal if the patient is asymptomatic.
- **Completion of therapy:** Completion of therapy is based on the total number of doses administered, not on duration of therapy alone.
INH: The 9 months daily regimen of INH should consist of 270 doses administered within 12 months time. The 6 month daily regimen of INH should consist of 180 doses administered within 9 months time. Children should complete a minimum of 9 months.
Rifampin: The regimen of daily Rifampin alone should consist of at least 120 doses administered within 6 months. Children should complete a minimum of 6 months.

MEDICAL EVALUATION AND TREATMENT FOR LATENT TB INFECTION (LTBI)

Patients with a positive TB skin test or positive Interferon Gamma Release Assay (IGRA) blood test (i.e. Quantiferon, T-spot).



Treatment Guidelines:

For additional information regarding the testing, evaluation and treatment recommendations for latent TB infection, please reference the 2000 CDC document "Targeted Tuberculin Testing and Treatment of Latent TB Infection" available at the following link: <http://www.cdc.gov/mmwr/PDF/rr/r4906.pdf>

South Dakota Department of Health – Infectious Disease Surveillance

Selected Morbidity Report, 1 January – 31 July 2011

(provisional numbers) see <http://doh.sd.gov/ID/site.aspx>

	Disease	2011 year- to-date	5-year median	Percent change
Vaccine-Preventable Diseases	Diphtheria	0	0	n/a
	Tetanus	0	0	n/a
	Pertussis	4	17	-76%
	Poliomyelitis	0	0	n/a
	Measles	0	0	n/a
	Mumps	0	2	n/a
	Rubella	0	0	n/a
	<i>Haemophilus influenzae</i> type b	1	0	n/a
Sexually Transmitted Infections and Blood-borne Diseases	HIV infection	9	18	-50%
	Hepatitis B, acute	0	0	0%
	Chlamydia	1,864	1,635	14%
	Gonorrhea	304	200	52%
	Syphilis, early	0	2	n/a
Tuberculosis	Tuberculosis	7	7	0%
Invasive Bacterial Diseases	Meningococcal, invasive	2	2	n/a
	Invasive Group A <i>Streptococcus</i>	18	15	20%
Enteric Diseases	<i>E. coli</i> , Shiga toxin-producing	23	19	21%
	Campylobacteriosis	200	184	9%
	Salmonellosis	88	86	2%
	Shigellosis	4	75	-95%
	Giardiasis	37	47	-21%
	Cryptosporidiosis	88	62	42%
	Hepatitis A	2	2	n/a
Vector-borne Diseases	Animal Rabies	23	22	5%
	Tularemia	2	7	-71%
	Rocky Mountain Spotted Fever	0	0	n/a
	Malaria (imported)	0	0	n/a
	Hantavirus Pulmonary Syndrome	1	0	n/a
	Lyme disease	0	0	0%
	West Nile Virus disease	1	14	-93%
Other Diseases	Legionellosis	1	3	-66%
	<i>Streptococcus pneumoniae</i> , drug-resistant	0	0	n/a
	Additionally, the following were reported: Chicken Pox (19); Erlichiosis (1); Hepatitis B, chronic (19); Hepatitis C, chronic (92); MRSA, invasive (51), Strep B, invasive (12)			

Communicable diseases are obligatorily reportable by physicians, hospitals, laboratories, and institutions.

The **Reportable Diseases List** is found at <http://doh.sd.gov/Disease/report.aspx> or upon request.

Diseases are reportable by telephone, mail, fax, website or courier.

Telephone: 605-773-3737 or 800-592-1861 for communicable disease staff person during normal business hours, or 800-592-1804 confidential answering device. **After hours** Category I diseases, call 605-773-3737 or 800-592-1861. **Fax:** 605-773-5509.

Mail in a sealed envelope addressed to the DOH, Office of Disease Prevention, 615 E. 4th Street, Pierre, SD 57501, marked "Confidential Medical Report". **Secure website:** <http://sd.gov/diseasereport/>.

3,200 copies of this Bulletin were printed by the Department of Health at a cost of \$0.00 per copy.

Prevention and Control of Influenza with Vaccines: Recommendations of the Advisory Committee on Immunization Practices (ACIP), 2011

This document provides updated guidance for the use of influenza vaccines in the United States for the 2011–12 influenza season. In 2010, the Advisory Committee on Immunization Practices (ACIP) first recommended annual influenza vaccination for all persons aged ≥ 6 months in the United States (1,2). Vaccination of all persons aged ≥ 6 months continues to be recommended. Information is presented in this report regarding vaccine strains for the 2011–12 influenza season, the vaccination schedule for children aged 6 months through 8 years, and considerations regarding vaccination of persons with egg allergy. Availability of a new Food and Drug Administration (FDA)–approved intradermally administered influenza vaccine formulation for adults aged 18 through 64 years is reported. For issues related to influenza vaccination that are not addressed in this update, refer to the 2010 ACIP statement on prevention and control of influenza with vaccines and associated updates (1,2).

Methodology for the formulation of the ACIP annual influenza statement has been described previously (1). The ACIP Influenza Work Group meets every 2–4 weeks throughout the year. Work Group membership includes several voting members of the ACIP, as well as representatives from ACIP Liaison Organizations. Meetings are held by teleconference and include discussion of influenza-related issues, such as vaccine effectiveness and safety, coverage in groups recommended for vaccination, feasibility, cost-effectiveness, and anticipated vaccine supply. Presentations are requested from invited experts, and published and unpublished data are discussed. CDC's Influenza Division provides influenza surveillance and antiviral resistance data, and the Immunization Safety Office and Immunization Services Division provide information on vaccine safety and distribution and coverage, respectively.

Vaccine Strains for the 2011–12 Influenza Season

The 2011–12 U.S. seasonal influenza vaccine virus strains are identical to those contained in the 2010–11 vaccine. These include A/California/7/2009 (H1N1)-like, A/Perth/16/2009 (H3N2)-like, and B/Brisbane/60/2008-like antigens. The influenza A (H1N1) vaccine virus strain is derived from a 2009 pandemic influenza A (H1N1) virus (3).

Recommendations for Vaccination

Routine annual influenza vaccination is recommended for all persons aged ≥ 6 months (1). To permit time for production of protective antibody levels (4,5), vaccination should optimally occur before onset of influenza activity in the community, and providers should offer vaccination as soon as vaccine is available. Vaccination also should continue to be offered throughout the influenza season.

Although influenza vaccine strains for the 2011–12 season are unchanged from those of 2010–11, annual vaccination is recommended even for those who received the vaccine for the previous season. Although in one study of children vaccinated against A/Hong Kong/68 (H3N2) virus, vaccine efficacy remained high against this strain 3 years later, the estimated efficacy of vaccine decreased over the seasons studied (6). Moreover, several studies have demonstrated that postvaccination antibody titers decline over the course of a year (7–10). Thus, annual vaccination is recommended for optimal protection against influenza.

Vaccine Doses for Children Aged 6 Months Through 8 Years

Children aged 6 months through 8 years require 2 doses of influenza vaccine (administered a minimum of 4 weeks apart) during their first season of vaccination to optimize immune

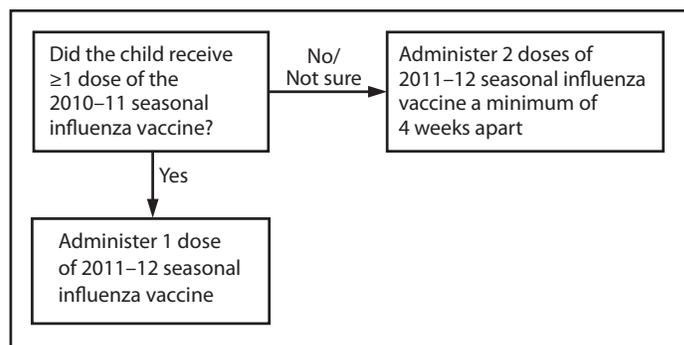


response. In a study of children aged 5 through 8 years who received trivalent inactivated vaccine (TIV) for the first time, the proportion of children with protective antibody responses was significantly higher after 2 doses than after 1 dose (11).

The importance of vaccine priming might depend more on the similarity of the antigenic composition between the priming and second dose than the temporal interval between doses. From the 2003–04 to 2004–05 influenza seasons, the A(H1N1) virus antigen remained unchanged; however, the A(H3N2) virus antigen changed to a drifted strain, and the B virus antigen changed more substantially to a different lineage. In a study conducted over those two seasons, influenza-vaccine naïve children aged 6 through 23 months who received 1 dose of TIV in the spring of their first year of vaccination followed by a second dose in the fall were less likely to have protective antibody responses to the A(H3N2) and B virus antigens when compared with children who received 2 doses of identical vaccine in the fall (12). Response to the unchanged A(H1N1) virus antigen was comparable between the groups. In another study conducted over the same two seasons, unprimed children aged 10 through 24 months who received 1 dose of TIV during the fall of each season had similar responses to the unchanged A(H1N1) virus antigen as well as to the drifted A(H3N2) virus antigen when compared with children aged 6 through 24 months who received 2 doses of the same TIV during the latter season; however, the first group had significantly lower response to the B virus antigen (13). During two seasons in which all influenza vaccine virus antigens were identical, unprimed children aged 6 through 23 months had similar responses when they received 1 dose in the spring followed by a second dose in the fall, as compared with 2 doses received 1 month apart in the fall (14). Studies of inactivated monovalent pandemic 2009 (H1N1) vaccine in children aged <9 years also have demonstrated improved response to this antigen when 2 doses are administered (15–17).

Vaccination providers should note that, in previous seasons, children aged 6 months through 8 years who received only 1 dose of influenza vaccine in their first year of vaccination required 2 doses the following season. However, because the 2011–12 vaccine strains are unchanged from the 2010–11 season, children in this age group who received at least 1 dose of the 2010–11 seasonal vaccine will require only 1 dose of the 2011–12 vaccine. Children in this age group who did not receive at least 1 dose of the 2010–11 seasonal influenza vaccine, or for whom it is not certain whether the 2010–11 seasonal vaccine was received, should receive 2 doses of the 2011–12 seasonal influenza vaccine (Figure 1). Recommendations regarding the number of doses for this age group might change for the 2012–13 season if vaccine antigens change.

FIGURE 1. Influenza vaccine dosing algorithm for children aged 6 months through 8 years — Advisory Committee on Immunization Practices (ACIP), 2011–12 influenza season



Available Vaccine Products and Indications

Multiple influenza vaccines are expected to be available during the 2011–12 season (Table). All contain the same antigenic composition. Package inserts should be consulted for information regarding additional components of various vaccine formulations.

TIV preparations, with the exception of Fluzone Intradermal (Sanofi Pasteur), should be administered intramuscularly. For adults and older children, the deltoid is the preferred site. Infants and younger children should be vaccinated in the anterolateral thigh. Specific guidance regarding site and needle length can be found in the ACIP's *General Recommendations on Immunization* (18).

A new intradermally administered TIV preparation, Fluzone Intradermal, was licensed in May 2011. This vaccine is indicated for persons aged 18 through 64 years and contains less antigen than intramuscular TIV preparations (9 µg rather than 15 µg of each strain per dose) in a smaller volume (0.1 mL rather than 0.5 mL). The vaccine is administered intradermally via a single-dose, prefilled microinjection syringe. The preferred site for administration is over the deltoid muscle (19). The most common adverse reactions include injection-site erythema, induration, swelling, pain, and pruritus. With the exception of pain, these reactions occurred more frequently than with intramuscular vaccine, but generally resolved within 3–7 days. This vaccine is an alternative to other TIV preparations for those in the indicated age range, with no preferential recommendation.

As during the 2010–11 season, a vaccine containing 60 µg of hemagglutinin per vaccine strain (rather than 15 µg per strain as in other intramuscular TIV preparations), Fluzone High-Dose (Sanofi Pasteur), is available as an alternative TIV for persons aged ≥65 years. No preference is indicated for this TIV versus other TIV preparations (1).

The intranasally administered live attenuated influenza vaccine (LAIV), FluMist (MedImmune) is indicated for

TABLE. Influenza vaccine information, by age group — United States, 2011–12 influenza season*

Vaccine	Trade name	Manufacturer	Presentation	Mercury content ($\mu\text{g Hg}/0.5\text{ mL dose}$)	Ovalbumin content ($\mu\text{g}/0.5\text{ mL dose}$)	Age group	No. of doses	Route
TIV	Fluzone	Sanofi Pasteur	0.25 mL prefilled syringe	0.0	— [†]	6–35 mos	1 or 2 [§]	IM [¶]
			0.5 mL prefilled syringe	0.0	— [†]	≥ 36 mos	1 or 2 [§]	IM [¶]
			0.5 mL vial	0.0	— [†]	≥ 36 mos	1 or 2 [§]	IM [¶]
			5.0 mL multidose vial	25.0	— [†]	≥ 6 mos	1 or 2 [§]	IM [¶]
TIV	Fluvirin	Novartis Vaccines	0.5 mL prefilled syringe	≤ 1	≤ 1	≥ 4 yrs	1 or 2 [§]	IM [¶]
			5.0 mL multidose vial	25.0	≤ 1			
TIV	Fluarix	GlaxoSmithKline	0.5 mL prefilled syringe	0	≤ 0.05	≥ 3 yrs	1 or 2 [§]	IM [¶]
TIV	FluLaval	ID Biomedical Corporation of Quebec (distributed by GlaxoSmithKline)	5.0 mL multidose vial	25.0	≤ 1	≥ 18 yrs	1	IM [¶]
TIV	Afluria	CSL Biotherapies (distributed by Merck)	0.5 mL prefilled syringe	0.0	≤ 1	≥ 9 yrs**	1	IM [¶]
			5.0 mL multidose vial	24.5	≤ 1			
TIV High-Dose ^{††}	Fluzone High-Dose	Sanofi Pasteur	0.5 mL prefilled syringe	0.0	— [†]	≥ 65 yrs	1	IM [¶]
TIV Intradermal	Fluzone Intradermal	Sanofi Pasteur	0.1 mL prefilled microinjection system	0.0	— [†]	18–64 yrs	1	ID
LAIV	FluMist ^{§§}	MedImmune	0.2 mL prefilled intranasal sprayer	0.0	— ^{¶¶}	2–49 yrs***	1 or 2 [§]	IN

Abbreviations: TIV = trivalent inactivated vaccine; LAIV = live attenuated influenza vaccine; IM = intramuscular; ID = intradermal; IN = intranasal.

* Vaccination providers should check Food and Drug Administration–approved prescribing information for 2011–12 influenza vaccines for the most updated information.

[†] Information not included in package insert but is available upon request from the manufacturer, Sanofi Pasteur, by telephone, 1-800-822-2463, or e-mail, MIS.Emails@sanofipasteur.com.

[§] Children aged 6 months through 8 years who did not receive seasonal influenza vaccine during the 2010–11 influenza season should receive 2 doses at least 4 weeks apart for the 2011–12 season. Those children aged 6 months through 8 years who received ≥ 1 dose of the 2010–11 seasonal vaccine require 1 dose for the 2011–12 season.

[¶] For adults and older children, the recommended site of vaccination is the deltoid muscle. The preferred site for infants and young children is the anterolateral aspect of the thigh.

** Age indication per package insert is ≥ 5 years; however, the Advisory Committee on Immunization Practices recommends Afluria not be used in children aged 6 months through 8 years because of increased reports of febrile reactions in this age group. If no other age-appropriate, licensed inactivated seasonal influenza vaccine is available for a child aged 5–8 years who has a medical condition that increases the child's risk for influenza complications, Afluria can be used; however, providers should discuss with the parents or caregivers the benefits and risks of influenza vaccination with Afluria before administering this vaccine. Afluria may be used in persons aged ≥ 9 years.

^{††} TIV high-dose: A 0.5-mL dose contains 60 μg each of A/California/7/2009 (H1N1)-like, A/Perth/16/2009 (H3N2)-like, and B/Brisbane/60/2008-like antigens.

^{§§} FluMist is shipped refrigerated and stored in the refrigerator at 35°F–46°F (2°C–8°C) after arrival in the vaccination clinic. The dose is 0.2 mL divided equally between each nostril. Health-care providers should consult the medical record, when available, to identify children aged 2–4 years with asthma or recurrent wheezing that might indicate asthma. In addition, to identify children who might be at greater risk for asthma and possibly at increased risk for wheezing after receiving LAIV, parents or caregivers of children aged 2–4 years should be asked: "In the past 12 months, has a health-care provider ever told you that your child had wheezing or asthma?" Children whose parents or caregivers answer "yes" to this question and children who have asthma or who had a wheezing episode noted in the medical record within the past 12 months should not receive FluMist.

^{¶¶} Insufficient data available for use of LAIV in egg-allergic persons.

*** FluMist is indicated for healthy, nonpregnant persons aged 2–49 years.

healthy, nonpregnant persons aged 2 through 49 years. Within the indicated groups specified for each vaccine in the package inserts, no preference is indicated for LAIV versus TIV (1).

Vaccination of Persons Reporting Allergy to Eggs

Allergy to eggs must be distinguished from allergy to influenza vaccine. Severe allergic and anaphylactic reactions can occur in response to a number of influenza vaccine components, but such reactions are rare. A review of reports to the Vaccine Adverse Events Reporting System (VAERS) of

adverse events in adults noted four reports of death caused by anaphylaxis following influenza vaccine during 1990–2005; the vaccine components potentially responsible for these reactions were not reported (20). A prior severe allergic reaction to influenza vaccine, regardless of the component suspected to be responsible for the reaction, is a contraindication to receipt of influenza vaccine.

All currently available influenza vaccines are prepared by inoculation of virus into chicken eggs. Hypersensitivity to eggs has been listed as a contraindication to receipt of

influenza vaccine on most package inserts. However, several recent studies have documented safe receipt of TIV in persons with egg allergy (21–29), and recent revisions of some TIV package inserts note that only a severe allergic reaction (e.g., anaphylaxis) to egg protein is a contraindication. In general, these studies include relatively fewer persons reporting a history of anaphylactic reaction to egg, compared with less severe reactions. Several documents providing guidance on use of influenza vaccine in persons with egg allergy have been published recently (30–32).

The quantity of egg protein in vaccine is expressed as the concentration of ovalbumin per dose or unit volume. Among studies in which the ovalbumin content of the administered vaccine was reported, up to 1.4 µg/mL (0.7 µg/0.5 mL dose) was tolerated without serious reactions (22,23,25–29); however, a safe maximum threshold of ovalbumin, below which no anaphylactic reactions would be expected, is not known.

Although ovalbumin content is not required to be disclosed on package inserts for vaccines used in the United States, manufacturers either report maximum albumin content in the package inserts or will provide this information on request. Ovalbumin concentration can vary from season to season and from lot to lot for a given vaccine. Independent assessments of ovalbumin content of commercially available vaccines have noted lower concentrations than those listed on package inserts (33,34).

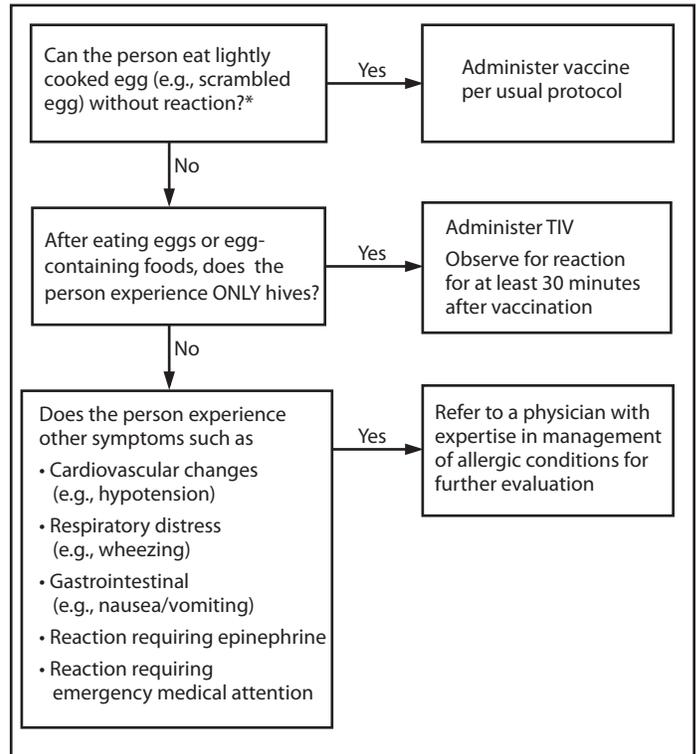
In several studies evaluating influenza vaccine in persons with egg allergy, additional safety measures have been taken, such as skin prick testing with vaccine (21–24,26,28,29) and administering the vaccine in 2 doses (e.g., 10% of the dose initially, followed by the remaining 90% if no reaction has occurred during a 30-minute observation period) (22,24–29). Skin prick testing with vaccine was poorly predictive of allergic reactions in these studies (22–24,26). In general, administration of both full doses and split doses have been well-tolerated without serious reactions, although systemic reactions (e.g., wheezing, eczema exacerbation, and hives on face/chest) were observed with the initial 10% dose among six (3.5%) of 171 participants in one study (24).

Recommendations Regarding Persons with Egg Allergy

Each of the following recommendations applies when considering influenza vaccination of persons who have or report a history of egg allergy.

1. Persons who have experienced only hives following exposure to egg should receive influenza vaccine with the following additional measures (Figure 2):
 - a) Because studies published to date involved use of TIV, TIV rather than LAIV should be used.

FIGURE 2. Recommendations regarding influenza vaccination for persons who report allergy to eggs — Advisory Committee on Immunization Practices (ACIP), 2011–12 influenza season



* Persons with egg allergy might tolerate egg in baked products (e.g., bread or cake). Tolerance to egg-containing foods does not exclude the possibility of egg allergy.

- b) Vaccine should be administered by a health-care provider who is familiar with the potential manifestations of egg allergy.
- c) Vaccine recipients should be observed for at least 30 minutes for signs of a reaction following administration of each vaccine dose.

Other measures, such as dividing and administering the vaccine by a two-step approach and skin testing with vaccine, are not necessary.

2. Persons who report having had reactions to egg involving angioedema, respiratory distress, lightheadedness, or recurrent emesis, or persons who required epinephrine or other emergency medical intervention, particularly those that occurred immediately or within minutes to hours after egg exposure are more likely to have a serious systemic or anaphylactic reaction upon reexposure to egg proteins. Before receipt of vaccine, such persons should be referred to a physician with expertise in the management of allergic conditions for further risk assessment (Figure 2).

3. All vaccines should be administered in settings in which personnel and equipment for rapid recognition and treatment of anaphylaxis are available. ACIP recommends that all vaccination providers be familiar with the office emergency plan (18).
4. Some persons who report allergy to egg might not be egg allergic. Those who are able to eat lightly cooked egg (e.g., scrambled eggs) without reaction are unlikely to be allergic. Conversely, egg-allergic persons might tolerate egg in baked products (e.g., bread or cake); tolerance to egg-containing foods does not exclude the possibility of egg allergy (35). Egg allergy can be confirmed by a consistent medical history of adverse reactions to eggs and egg-containing foods, plus skin and/or blood testing for immunoglobulin E antibodies to egg proteins.
5. A previous severe allergic reaction to influenza vaccine, regardless of the component suspected to be responsible for the reaction, is a contraindication to receipt of influenza vaccine.

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* Roster available at <http://www.cdc.gov/vaccines/recs/acip/members-archive.htm>.

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