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Deaths and Severe Adverse Events Associated with Anesthesia-Assisted Rapid Opioid Detoxification — New York City, 2012

During August–September 2012, the New York City Department of Health and Mental Hygiene (DOHMH) was notified by the New York City Poison Control Center regarding three patients who experienced serious adverse events after anesthesia-assisted rapid opiate detoxification (AAROD) at a local outpatient clinic. All three patients required hospitalization, and one subsequently died. DOHMH issued an order requiring that the clinic cease performing AAROD pending an investigation and searched for additional cases of AAROD-related serious adverse events at the clinic and elsewhere in New York City for the period September 2011 to September 2012. That search found no serious adverse events at clinics other than the one implicated. Of the 75 patients who underwent AAROD at the implicated clinic during January–September 2012, two died, and five others experienced serious adverse events requiring hospitalization. As a result of the findings, the New York State Department of Health, the New York Office of Alcoholism and Substance Abuse Services, and DOHMH jointly issued a Health Alert informing New York health-care providers of AAROD-associated serious adverse events and recommending that they avoid use of AAROD in favor of evidence-based options for opioid dependence treatment.

Health Department Investigation

AAROD procedures performed in the New York City clinic included 1) administration of medications (e.g., clonidine, antiemetics, and antidiarrheal agents) that blunt withdrawal symptoms, 2) intubation and induction of general anesthesia, 3) precipitation of opioid withdrawal by intravenous infusion of high doses of the opioid antagonist naloxone or intramuscular injection of naltrexone, 4) maintenance of anesthesia until withdrawal symptoms were presumed to have subsided, and 5) extubation and monitoring during an overnight recovery. Median duration of anesthesia was 8.3 hours (range: 3.1–15.0 hours); median duration of opioid antagonist infusion was 3.9 hours (range: 2.1–14.0 hours). Median naloxone dose was 80 mg (range: 2–315 mg); median naltrexone dose was 133 mg (range: 25–300 mg). For patients with serious adverse events, the median naloxone dose was 80 mg (range: 4–88 mg) and median naltrexone dose was 150 mg (range: 0–150 mg). All patients were monitored overnight after the procedure.

A serious AAROD-associated adverse event was defined as hospitalization for any cause or death <72 hours after undergoing AAROD in New York City during September 1, 2011–September 5, 2012. DOHMH staff conducted two visits to the clinic. All four clinic staff members were interviewed, and medical records for all patients who underwent AAROD while the clinic was operational were reviewed.

INSIDE

Continuing Education examination available at http://www.cdc.gov/mmwr/cme/conted_info.html#weekly.

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Records of emergency medical services calls to the clinic were obtained from the New York City Fire Department. Hospital records for all patients who were found to have made emergency department visits or been admitted to a hospital were reviewed. The practice's patient list was matched to mortality records by patient name and date of birth in New York City and the patients' usual states of residence. New York City's Poison Control Center toxicology database was searched for serious adverse events from other New York City health-care facilities.

No emergency medical services calls to the practice were reported other than those initially reported by the Poison Control Center. The mortality records and toxicology database searches yielded no additional AAROD-related serious adverse events from the implicated clinic or elsewhere. From the clinic's opening in January 26, 2012, until September 4, 2012, a total of 75 patients underwent AAROD; 62 (83%) were men (median age: 37 years; range: 20–63 years). Patient comorbidities included psychiatric disorders (55%), chronic medical conditions (23%), and polysubstance use (35%). In addition to the three adverse events reported, four additional adverse events, including one additional death, were identified during medical record review. All seven patients were men (median age: 31 years; range: 24–52 years), Four were prescription opioid users; two used both prescription opioids and heroin, and one used heroin alone. Four patients had psychiatric comorbidities, and two were polysubstance users. None of the patients had a documented chronic medical condition.

Case Reports

Case 1. On April 14, 2012, a man aged 52 years underwent AAROD. The next evening he experienced vomiting and weakness and was admitted to the hospital with a temperature of 104°F (40°C) and a white blood cell count of 26 x 10^3 cells/μL (normal range: 3.9–10.7 x 10^3 cells/μL). He was treated empirically for sepsis and discharged on April 18.

Case 2. On April 16, 2012, a man aged 23 years with a history of depression and panic attacks underwent AAROD; during the recovery period he experienced two panic attacks and was administered benzodiazepines. The next day he was admitted for inpatient stabilization after displaying violent behavior and expressing suicidal thoughts. He was discharged on April 25 with stable mental status.

Case 3. On June 3, 2012, a man aged 30 years underwent AAROD. On extubation, he was unable to speak or follow commands. Eight hours after extubation, he was transported from the clinic to an emergency department, where he was found to have pulmonary edema. He was admitted to the intensive care unit and intubated after an episode of emesis with aspiration. He was treated for aspiration pneumonia,

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extubated on June 6, and discharged on June 11 with normal mental status.

Case 4. On July 20, 2012, a man aged 46 years with a history of heroin, cocaine, and alcohol abuse underwent AAROD. Urine toxicology on that day revealed trace amounts of cocaine. He was discharged on July 21. He was found dead by his wife at approximately 10 a.m. on July 22 after leaving the bedroom at approximately 4 a.m. and telling his wife that he was going to take something for abdominal pain. Autopsy results indicated pulmonary edema and cardiomegaly.

Case 5. On August 19, 2012, a man aged 31 years underwent AAROD. The next day he experienced diarrhea, weakness, and blurry vision. On hospital admission he had hypokalemia (2.9 mEq/L [normal range: 3.5–5.0 mEq/L]) and elevated creatine kinase concentrations (1,346 U/L [normal range: 30–170 U/L]). He was treated for rhabdomyolysis and electrolyte abnormalities and discharged on August 22.

Case 6. On August 23, 2012, a man aged 51 years underwent AAROD. Approximately 10 hours after extubation, while being monitored at the clinic, he experienced cardiac arrest with ventricular fibrillation. He was resuscitated and transferred to a hospital. At the hospital, his serum potassium was 2.6 mEq/L (normal range: 3.5–5.0 mEq/L). Computed tomography revealed cerebral edema. He experienced brainstem herniation and was pronounced dead on September 1. Autopsy revealed anoxic encephalopathy and marked coronary atherosclerosis; the cause of death was "hypokalemia and cardiac arrhythmia following anesthesia-assisted rapid opiate detoxification."

Case 7. On September 4, 2012, a man aged 26 years underwent AAROD. Approximately 30 minutes after naloxone infusion was initiated, he experienced cardiac arrest. He was resuscitated and transported to a hospital. His hospital course was complicated by necrotizing fasciitis of the right arm, for which he underwent surgical debridement before discharge on September 25.

Reported by

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What is already known on this topic?

Anesthesia-assisted rapid opiate detoxification (AAROD) does not reduce subjective opioid withdrawal symptom scores more than traditional opioid detoxification modalities, but has been associated with a high risk for severe adverse events, including death.

What is added by this report?

Of 75 patients who underwent AAROD at a New York City clinic during January–September 2012, two died and five others experienced serious adverse events requiring hospitalization.

What are the implications for public health practice?

To reduce the morbidity and mortality associated with opioid dependence, evidence-based approaches (e.g., medication-assisted treatment) should be used for its management.

Editorial Note

Opioid abuse and dependence is a serious public health problem in the United States. During 1999–2008, emergency department visits, overdose deaths, and substance abuse treatment admissions related to prescription opioids increased substantially (*1*). Opioid dependence is a chronic and relapsing illness. Evidence-based treatment options include medication-assisted treatment (MAT) with long-acting opioid agonists (e.g., methadone or buprenorphine), maintenance treatment with opioid antagonists (e.g., naltrexone), or counseling and behavioral interventions (*2,3–5*). Treatment goals include long-term abstinence or reduction in illicit and nonmedical drug use. MAT is considered first-line treatment among the evidence-based options listed previously and, compared with other treatments, is associated with lower mortality, improved treatment retention, and decreased incidence of comorbid illnesses, including human immunodeficiency virus infection (*2*). However, MAT treatment capacity is insufficient to meet demand in the United States, and patients frequently are placed on waiting lists (*6*).

Opioid detoxification refers to the discontinuation of opioid use under medical supervision and includes prescribing or administering medications to decrease withdrawal symptoms. Standard detoxification methods include administering gradually reduced doses of long-acting opioid agonists during a 3–21 day period or discontinuing opioids and administering nonopioid medications to block withdrawal symptoms. These methods ameliorate withdrawal symptoms and carry <1% risk for serious adverse events (*3,4*). The effect of detoxification on long-term abstinence is negligible without the addition of longer term evidence-based substance abuse treatment (*5*). Medically supervised opioid detoxification, however, when closely associated with substance abuse treatment programs, can provide an entry point to care.

AAROD was developed during the 1980s with the goal of reducing the discomfort of withdrawal and thereby encouraging patients to enter substance abuse treatment. However, AAROD and standard opioid detoxification do not differ in subjective withdrawal symptom scores or in achievement of short-term abstinence (*7*). Few long-term studies of AAROD exist, but published data indicate that AAROD does not improve 12-month abstinence rates, compared with standard detoxification (*7*). Furthermore, AAROD is associated with a substantial rate of serious adverse events in the research setting, 8.6% in one study (*8*).

Government agencies and professional societies,* including the American Society of Addiction Medicine, have recommended against using AAROD in clinical settings (*9*). There is insufficient knowledge regarding how widely AAROD is used in the United States and the frequency of AAROD-associated adverse events in community practice settings. At least seven deaths occurred following AAROD among 2,350 procedures performed in one practice during 1995–1999.†

The New York City clinic investigation revealed that AAROD was performed on 75 patients during January–September 2012 and was associated with two deaths and five additional adverse events requiring hospitalization, a serious adverse event rate of 9.3%. No standard protocol exists for AAROD; however, the clinic's practice was consistent with AAROD use described elsewhere (*7*). All events occurred after and in close temporal proximity to AAROD. Although a common mechanism linking these events to AAROD is not evident, the events are consistent with previously proposed mechanisms of AAROD-associated adverse events, including electrolyte disturbance, catecholamine release, altered cardiopulmonary functioning, acute lung injury, and other physiologic effects associated with administration of high doses of opioid antagonists under general anesthesia (*10*). Given the ongoing epidemic of prescription opioid dependence, further increases in the demand for substance use disorder services are to be expected. AAROD has substantial risks, including a risk for death, and little to no evidence to support its use. Safe, evidence-based treatments of opioid dependence (e.g., MAT) exist and are preferred (*2*).

* Additional information available at http://www.nice.org.uk/cg052.

† Additional information available at http://njlaw.rutgers.edu/collections/oal/final/bds10905-99_2.pdf.

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Influenza Vaccination Coverage Among Health-Care Personnel — United States, 2012–13 Influenza Season

Routine influenza vaccination of health-care personnel (HCP) every influenza season can reduce influenza-related illness and its potentially serious consequences among HCP and their patients (*1–5*). To protect HCP and their patients, the Advisory Committee on Immunization Practices (ACIP) recommends that all HCP be vaccinated against influenza during each influenza season (*5*). To estimate influenza vaccination coverage among HCP during the 2012–13 season, CDC conducted an opt-in Internet panel survey of 1,944 self-selected HCP during April 1–16, 2013. This report summarizes the results of that survey, which found that, overall, 72.0% of HCP reported having had an influenza vaccination for the 2012–13 season, an increase from 66.9% vaccination coverage during the 2011–12 season (*6*). By occupation type, coverage was 92.3% among physicians, 89.1% among pharmacists, 88.5% among nurse practitioners/physician assistants, and 84.8% among nurses. By occupational setting, vaccination coverage was highest among hospital-based HCP (83.1%) and was lowest among HCP at long-term care facilities (LTCF) (58.9%). Vaccination coverage was higher for HCP in occupational settings offering vaccination on-site at no cost for one (75.7%) or multiple (86.2%) days compared with HCP in occupational settings not offering vaccination on-site at no cost (55.3%). Widespread implementation of comprehensive influenza vaccination strategies that focus on improving access to vaccination services is needed to improve HCP vaccination coverage. Influenza vaccination of HCP in all health-care settings might be increased by providing 1) HCP with information on vaccination benefits and risks for themselves and their patients, 2) vaccinations in the workplace at convenient locations and times, and 3) influenza vaccinations at no cost (*7,8*).

To provide end-of-season estimates of influenza vaccination coverage among HCP before the 2013–14 influenza season, CDC conducted an opt-in Internet panel survey during April 1–16, 2013.* Two opt-in Internet panel source populations were recruited for the survey through e-mails and website messages. HCP were eligible for the survey if they reported any patient contact. Professional HCP (physicians, nurse practitioners, physician's assistants, nurses, dentists, pharmacists, allied health professionals, technicians, and technologists) were recruited from the current membership roster of Medscape, a medical website managed by WebMD Health Professional Network. Persons in other HCP occupations (e.g., assistants, aides, administrators, clerical support workers, janitors, food service workers, and housekeepers) were recruited for a health survey from SurveySpot, a general population Internet panel operated by Survey Sampling International that provides its members with online survey opportunities in exchange for nominal incentives.† Among the 2,099 HCP who entered the two panel survey sites and completed the screening questions, 2,005 (95.5%) completed the survey. Of the 1,944 participants whose responses indicated that they worked in a health-care setting or were likely to have contact with patients, 1,469 (75.6%) were professional HCP and 475 (24.4%) were other HCP.§

Survey items included demographic characteristics, occupation type, occupational setting, self-reported influenza vaccination, and employer vaccination policies (vaccination requirements, vaccination available at no cost, and promotion of vaccination [including recognition, rewards, compensation, and free or subsidized vaccination]). Based on responses to the questionnaire, occupation type for HCP from both opt-in Internet panel sources were divided into six groups for this analysis: physicians, nurse practitioners/physician assistants, nurses, pharmacists, other clinical HCP, and nonclinical HCP. Occupational settings for HCP from both opt-in Internet panel sources were divided into four groups for this analysis: hospital, ambulatory/physician office, LTCF, and other clinical setting.¶ Sampling weights were calculated based on each occupation type by age, sex, race/ethnicity, occupational setting, and census region to represent the U.S. population of HCP. Vaccination coverage estimates from opt-in Internet panel surveys completed in 2010–11, 2011–12, and 2012–13 were compared to assess trends over time (*6,9*). Because the study sample was based on HCP from opt-in Internet panels rather than probability samples, no statistical tests were performed.** Differences were noted when there was a difference of ≥5 percentage points between any values being compared. Data from

* Comparable National Health Interview Survey data for this population will not be available until July 2014.

† Additional information available at http://www.surveysampling.com.

§ A survey response rate requires specification of the denominator at each stage of sampling. During recruitment of an online opt-in survey sample, such as the Internet panel described in this report, these numbers are not available; therefore, the response rate cannot be calculated. Instead, the survey completion rate is provided.

¶ Ambulatory/physician office included physician's offices, medical clinics, and other ambulatory care settings. LTCF included nursing homes, home health agencies, assisted living settings, or other LTCF. Other clinical setting included dental offices or clinics, pharmacies, laboratories, public health settings, medical, nursing, or other health-care education settings, emergency medical services settings, or other settings where clinical care or related services were provided to patients.

** Additional information available at http://www.aapor.org/opt_in_surveys_and_margin_of_error1.htm.

the 2012–13 influenza season opt-in Internet panel survey were compared with data from comparable opt-in Internet panel surveys conducted during the 2010–11 and 2011–12 influenza seasons.

Overall, 72.0% of HCP reported having had an influenza vaccination for the 2012–13 season, an increase from 63.5% and 66.9% reported in similar opt-in Internet surveys in the 2010–11 and 2011–12 seasons, respectively (Table, Figure 1). Increases were seen within all occupational settings over the three seasons, except for vaccination coverage in LTCF, which was highest (64.4%) during the 2010–11 season, decreased during the 2011–12 (52.0%), and then increased during the 2012–13 season (58.9%) (Table, Figure 2). By occupation type, vaccination coverage was 92.3% among physicians, 89.1% among pharmacists, 88.5% among nurse practitioners/physician assistants, 84.8% among nurses, 68.6% among other clinical personnel, and 64.8% among nonclinical personnel (Table). Vaccination coverage was 83.1% among HCP working

TABLE. Percentage of health-care personnel (HCP)* who received influenza vaccination, by occupational setting, occupation type, vaccine availability, and requirements status — Internet panel survey, United States, 2010–11, 2011–12, and 2012–13 influenza seasons

Characteristic	2010–11			2011–12			2012–13		
	Sample size	Weighted %†	Weighted % vaccinated	Sample size	Weighted %†	Weighted % vaccinated	Sample size	Weighted %†	Weighted % vaccinated
Overall	**1,931**	**(100.0)**	**(63.5)**	**2,348**	**(100.0)**	**(66.9)**	**1,944**	**(100.0)**	**(72.0)**
Occupation type, by occupational setting									
Physician	430	(4.0)	(84.2)	418	(5.1)	(85.6)	322	(5.6)	(92.3)
Hospital	47	(14.0)	(81.3)	247	(54.7)	(86.7)	209	(59.5)	(93.2)
Ambulatory care/ physician office§	359	(79.0)	(86.2)	311	(76.7)	(86.2)	221	(71.1)	(91.6)
Long-term care facility	—¶	—¶	—¶	—¶	—¶	—¶	—¶	—¶	—¶
Other clinical setting**	—¶	—¶	—¶	—¶	—¶	—¶	—¶	—¶	—¶
Nurse practitioner/ Physician assistant	72	(3.8)	(82.6)	151	(1.4)	(81.5)	131	(1.6)	(88.5)
Hospital	—¶	—¶	—¶	69	(47.2)	(84.1)	50	(37.9)	(88.0)
Ambulatory care/ physician office§	49	(62.0)	(88.4)	103	(69.9)	(83.5)	94	(75.0)	(92.6)
Long-term care facility	—¶	—¶	—¶	—¶	—¶	—¶	—¶	—¶	—¶
Other clinical setting**	—¶	—¶	—¶	—¶	—¶	—¶	—¶	—¶	—¶
Nurse	255	(22.2)	(69.8)	373	(24.4)	(77.3)	202	(22.8)	(84.8)
Hospital	151	(67.5)	(75.4)	252	(59.7)	(78.0)	121	(56.6)	(86.5)
Ambulatory care/ physician office§	37	(15.5)	(74.2)	91	(34.6)	(74.4)	48	(28.9)	(79.9)
Long-term care facility	—¶	—¶	—¶	54	(7.3)	(71.4)	32	(8.9)	(85.4)
Other clinical setting**	39	(2.7)	(54.7)	—¶	—¶	—¶	—¶	—¶	—¶
Pharmacist††	—††	—††	—††	—††	—††	—††	92	(0.6)	(89.1)
Hospital	—††	—††	—††	—††	—††	—††	44	(52.4)	(97.7)
Ambulatory care/ physician office§	—††	—††	—††	—††	—††	—††	—¶	—¶	—¶
Long-term care facility	—††	—††	—††	—††	—††	—††	—¶	—¶	—¶
Other clinical setting**	—††	—††	—††	—††	—††	—††	61	(65.9)	(88.5)
Other clinical personnel§§	776	(40.0)	(60.3)	980	(40.5)	(64.8)	722	(41.9)	(68.6)
Hospital	243	(38.7)	(71.0)	441	(33.4)	(79.5)	345	(36.2)	(80.6)
Ambulatory care/ physician office§	118	(10.4)	(47.1)	157	(20.5)	(73.4)	177	(28.0)	(77.4)
Long-term care facility	120	(19.2)	(63.4)	208	(26.5)	(48.3)	195	(31.2)	(55.3)
Other clinical setting**	295	(31.7)	(53.8)	241	(24.6)	(66.1)	82	(14.7)	(75.0)
Nonclinical personnel ¶¶	398	(30.0)	(60.0)	426	(28.5)	(59.3)	449	(27.2)	(64.8)
Hospital	163	(45.5)	(66.2)	178	(49.2)	(71.7)	177	(41.9)	(79.5)
Ambulatory care/ physician office§	95	(17.7)	(52.2)	85	(34.8)	(53.9)	79	(35.6)	(58.6)
Long-term care facility	57	(17.1)	(74.5)	155	(13.5)	(54.4)	165	(11.4)	(60.8)
Other clinical setting**	83	(19.7)	(47.9)	—¶	—¶	—¶	46	(15.3)	(56.7)
Occupational setting* **									
Hospital	617	(45.5)	(71.1)	1,187	(45.6)	(76.9)	961	(43.9)	(83.1)
Ambulatory care/ physician office§	658	(18.5)	(61.5)	747	(31.6)	(67.5)	636	(33.3)	(72.9)
Long-term care facility	220	(14.7)	(64.4)	455	(16.7)	(52.0)	427	(18.6)	(58.9)
Other clinical setting**	436	(21.3)	(52.4)	277	(12.7)	(61.5)	237	(15.3)	(73.2)

See table footnotes on page 783.

TABLE. (*Continued*) Percentage of health-care personnel (HCP)* who received influenza vaccination, by occupational setting, occupation type, vaccine availability, and requirements status — Internet panel survey, United States, 2010–11, 2011–12, and 2012–13 influenza seasons

Characteristic	2010–11			2011–12			2012–13		
	Sample size	Weighted %†	Weighted % vaccinated	Sample size	Weighted %†	Weighted % vaccinated	Sample size	Weighted %†	Weighted % vaccinated
Influenza vaccination requirement and promotion (2012–13 season definition), by occupational setting									
Required	230	(20.0)	(98.1)	496	(29.6)	(93.7)	549	(30.0)	(96.5)
Hospital	121	(68.7)	(98.1)	362	(61.4)	(95.2)	388	(62.3)	(95.1)
Ambulatory care/ physician office§	76	(15.8)	(96.2)	153	(33.1)	(95.5)	191	(31.9)	(99.8)
Long-term care facility	—¶	—¶	—¶	45	(9.5)	(86.1)	61	(13.0)	(95.8)
Other clinical setting**	—¶	—¶	—¶	—¶	—¶	—¶	38	(7.4)	(100.0)
No requirement, but vaccination promotion†††	320	(17.5)	(64.8)	390	(18.3)	(75.4)	901	(45.9)	(76.9)
Hospital	141	(50.3)	(62.0)	255	(53.3)	(75.4)	456	(44.6)	(78.1)
Ambulatory care/ physician office§	88	(14.3)	(60.2)	106	(27.7)	(70.0)	273	(32.8)	(80.1)
Long-term care facility	31	(16.9)	(71.9)	62	(18.9)	(77.7)	183	(16.1)	(67.0)
Other clinical setting**	60	(18.4)	(71.8)	30	(9.6)	(95.0)	134	(19.5)	(85.7)
No requirement or promotion	1,373	(62.4)	(56.7)	1,450	(52.1)	(55.2)	487	(24.1)	(50.4)
Hospital	352	(36.7)	(64.2)	566	(34.6)	(65.0)	115	(19.4)	(67.7)
Ambulatory care/ physician office§	490	(20.4)	(56.5)	486	(32.4)	(57.0)	170	(36.2)	(50.4)
Long-term care facility	173	(15.6)	(58.2)	343	(19.0)	(41.4)	179	(30.5)	(45.0)
Other clinical setting**	358	(27.2)	(48.4)	225	(18.9)	(56.5)	65	(17.3)	(50.2)
Influenza vaccination availability at no cost, by occupational setting									
>1 day§§§	1,304	(75.6)	(74.8)	1,355	(59.6)	(78.4)	1,079	(54.1)	(86.2)
Hospital	551	(56.4)	(75.8)	899	(58.6)	(80.1)	702	(58.0)	(87.5)
Ambulatory care/ physician office§	457	(19.6)	(74.5)	432	(31.1)	(78.8)	332	(33.4)	(88.8)
Long-term care facility	131	(12.9)	(74.5)	143	(8.1)	(62.7)	145	(10.1)	(79.4)
Other clinical setting**	165	(11.1)	(71.2)	99	(9.6)	(88.4)	107	(11.5)	(86.9)
1 day§§§	75	(3.9)	(52.1)	297	(15.0)	(67.7)	304	(14.2)	(75.7)
Hospital	—¶	—¶	—¶	134	(36.9)	(69.6)	126	(40.7)	(76.3)
Ambulatory care/ physician office§	—¶	—¶	—¶	105	(34.1)	(64.9)	117	(32.8)	(84.6)
Long-term care facility	—¶	—¶	—¶	53	(19.1)	(59.1)	76	(22.8)	(63.0)
Other clinical setting**	—¶	—¶	—¶	44	(17.0)	(90.5)	34	(13.5)	(87.6)
Not available¶¶¶	543	(20.5)	(41.7)	682	(25.4)	(48.4)	561	(31.6)	(55.3)
Hospital	43	(10.3)	(40.8)	151	(22.1)	(66.8)	133	(21.2)	(71.7)
Ambulatory care/ physician office§	180	(13.1)	(30.0)	209	(32.1)	(51.3)	187	(33.5)	(53.3)
Long-term care facility	71	(20.4)	(52.1)	252	(32.5)	(43.2)	206	(31.3)	(50.5)
Other clinical setting**	249	(56.1)	(42.7)	131	(18.1)	(39.8)	96	(22.6)	(62.0)

* Persons who work in a place where clinical care or related services was provided to patients, or whose work involves face-to-face contact with patients, or who were ever in the same room as patients.

† Weights were calculated based on each occupation type, by age, sex, race/ethnicity, occupational setting, and census region, to represent the U.S. population of HCP. Overall occupation type, occupational setting (main heading), requirement, and vaccination availability are presented as weighted estimates of the total sample. Where the groups are stratified by occupational setting, the weighted estimates are presented for each subgroup within the group. The totals for the subgroups will not equal 100% because HCP could specify working in more than one occupational setting.

§ Ambulatory care (physician's office, medical clinic, and other ambulatory care setting).

¶ Estimate suppressed because sample size was <30.

** Respondents who only reported working in a dentist office or dental clinic; pharmacy; laboratory; public health setting; medical, nursing, or other health-care education setting; emergency medical services setting; or other setting where clinical care or related services were provided to patients.

†† Data on pharmacists only available for 2012–13 season, individual data on pharmacists not collected in prior seasons.

§§ Allied health professional, technician, technologist, assistant, or aide.

¶¶ Administrative support staff or manager and nonclinical support staff (e.g., food service workers, housekeeping staff, maintenance staff, janitors, and laundry workers).

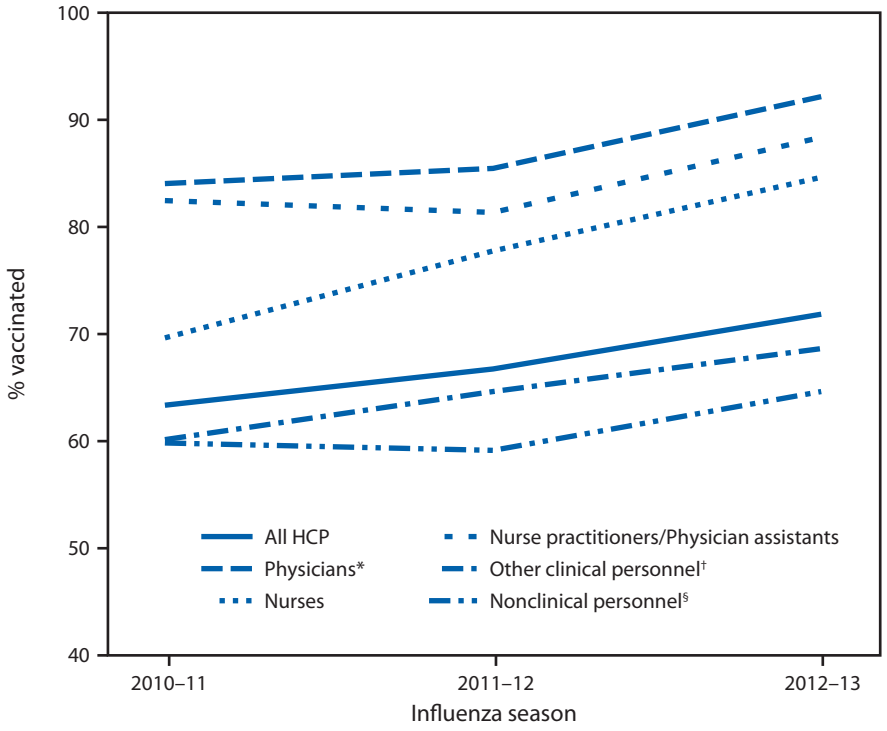
*** Respondents were able to select more than one work setting.

††† Influenza vaccination was promoted among employees through public identification of vaccinated persons, financial incentives or rewards to groups of employees, competition between units or care areas, free or subsidized cost of vaccination, reminder, publicizing of the number or percent of employees receiving vaccination, and special events.

§§§ Question only asked of those reporting influenza vaccinations offered on-site during this influenza season.

¶¶¶ Influenza vaccinations not offered on-site during the influenza season or offered on-site but not available at no cost to employees.

FIGURE 1. Percentage of health-care personnel (HCP) who received influenza vaccination, by occupation type — Internet panel survey, United States, 2010–11, 2011–12, and 2012–13 influenza seasons



* Included dentists in 2010–11 season.
† All seasons include pharmacists, allied health professionals, technicians, technologists, assistants, or aides. Dentists were added starting from the 2011–12 season.
§ Administrative support staff or manager, and nonclinical support staff (e.g., food service workers, housekeeping staff, maintenance staff, janitors and laundry workers).

What is already known on this topic?

To help reduce influenza-related morbidity and mortality that occurs in health-care settings, the Advisory Committee on Immunization Practices recommends annual influenza vaccination for all health-care personnel (HCP). Estimates of overall HCP vaccination coverage were 63.5% for the 2010–2011 season and 66.9% for the 2011–12 season.

What is added by this report?

For the 2012–13 season, influenza vaccination coverage among HCP was assessed using an opt-in Internet panel survey of 1,944 self-selected HCP. Overall coverage was 72.0%. Only two HCP groups had vaccination coverage >90%: HCP in facilities with a vaccination requirement had vaccination coverage of 96.5%, and among the individual occupational groups, physicians had vaccination coverage of 92.3%. Vaccination coverage among HCP in long-term care facilities was lower than in other occupational settings. Offering vaccination at no cost on multiple days was associated with higher vaccination coverage.

What are the implications for public health practice?

Comprehensive, work-site intervention strategies that include education, promotion, and easy access to vaccination at no cost can increase HCP vaccination coverage.

in hospitals and 58.9% among those working in LTCFs (Table, Figure 2).

Among HCP reporting that their employer required them to receive influenza vaccination, overall vaccination coverage was 96.5%, with coverage above 95% in all occupational settings, including LTCFs (95.8%). Vaccination coverage was 76.9% among HCP who worked in facilities where employers promoted but did not require vaccination (range: 67.0% [LTCFs] to 85.7% [other clinical settings]) and 50.4% among HCP who worked in facilities where employers neither had a vaccination requirement nor promoted vaccination (range: 45.0% [LTCFs] to 67.7% [hospitals]) (Table). Overall, 71.1% of vaccinated HCP reported receiving the vaccination in the workplace. Vaccination coverage among HCP working in facilities that made vaccination available at no cost for >1 day was 86.2% (range: 79.4% [LTCFs] to 88.8% [ambulatory care or physician offices]) compared with 75.7% in facilities that made vaccination available at no cost for 1 day (range: 63.0% [LTCFs] to 87.6% [other clinical settings]), and 55.3% in facilities that did not provide influenza vaccination at no cost to employees (range: 50.5% [LTCFs] to 71.7% [hospitals]).

Reported by

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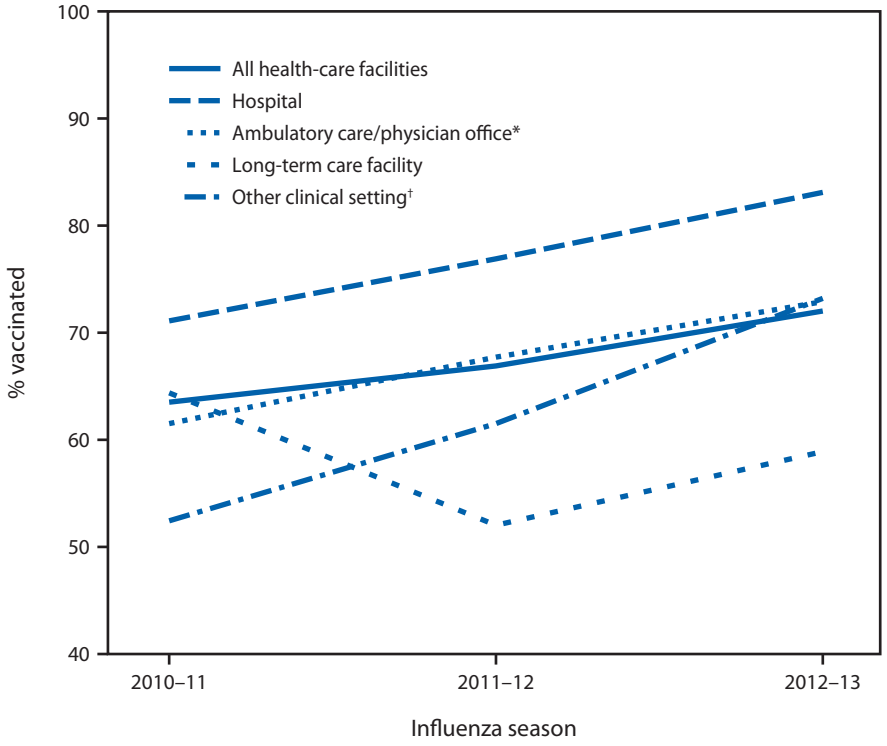
Editorial Note

The overall HCP influenza vaccination coverage estimate from this opt-in Internet panel survey for the 2012–13 season was 72.0%, an increase compared with the previous two influenza seasons (*6,9*). Increases in vaccination coverage were

FIGURE 2. Percentage of health-care personnel (HCP) who received influenza vaccination, by occupational setting — Internet panel survey, United States, 2010–11, 2011–12, and 2012–13 influenza seasons



* Ambulatory care (physician's office, medical clinic, and other ambulatory care setting).
† Including dental offices, pharmacies, nonhospital laboratories, medical-related schools, emergency medical technician sites, and home health-care sites.

observed across all occupation types and in all occupational settings and was highest for two categories of participants in this survey: HCP working in occupational settings with vaccination requirements and physicians (irrespective of the administrative policies of the setting in which they worked). Although increases in influenza vaccination coverage were observed in all occupational settings from the 2011–12 to 2012–13 seasons, coverage during these seasons was lowest among HCP working in LTCF. Among HCP work settings, overall vaccination was highest among HCP working in hospitals.

Ensuring high HCP vaccination coverage each season requires organized efforts by health-care facilities. Appropriate facility policies can help achieve continuing high vaccination coverage during each influenza season. The results of this survey showed that vaccination requirements, vaccination promotion, and access to vaccination at no cost to the HCP for ≥1 days were associated with higher vaccination coverage among HCP. Worksite vaccination, the most common place of vaccination reported by HCP in this survey, has been associated with higher seasonal vaccination coverage among HCP (*8*); however, this study found that 32% of HCP worked in health-care facilities that either did not offer vaccination on-site, or if offered, did not make vaccination available at no cost. These results indicate that a comprehensive intervention strategy that includes education and promotion to encourage vaccination along with easy access to vaccination at no cost on multiple days might increase HCP vaccination coverage.

Consistent with the prior season, coverage among HCP in LTCF was the lowest among examined occupational settings; coverage remained lower than the 2010–11 estimate, but increased from the 2011–12 estimate. Influenza vaccination of HCP in this setting is extremely important given that influenza vaccine effectiveness is generally lowest in the elderly, making vaccination of close contacts even more critical (*2,4*). In addition, multiple studies have demonstrated health benefit to patients, including reduced risk for death, with vaccination of HCP in LTCF (*1–4*). A total of 10.1% of LTCF HCP reported that their facility made vaccine available at no cost for >1 day and 30.5% reported that their facility neither required nor promoted vaccination. In contrast, 58.0% of hospital HCP reported that their facility made vaccine available at no cost for >1 day and 19.4% reported their facility neither promoted nor required vaccination. More efforts are needed to implement evidence-based strategies to increase influenza vaccination coverage among HCP working in LTCF, including promoting vaccination and providing vaccine at low or no cost.

The findings in this report are subject to at least six limitations. First, the findings in this study might differ from those based on the National Health Interview Survey (NHIS), a probability-based survey that might provide better representativeness of the general health-care provider population. Influenza vaccination among HCP from the opt-in Internet panel survey (63.4%) differed from the population-based sample in the NHIS (57.5%) in the 2009–10 season (*10*). A similar difference (63.5% in the opt-in Internet panel survey versus 55.8% in the NHIS) was observed in the 2010–11 season (*9*) (Assessment Branch, Immunization Services Division, National Center for Immunization and Respiratory Diseases, CDC, unpublished data, 2012). Additional comparisons with NHIS and other available data sources over multiple seasons are needed to determine whether the more timely opt-in Internet panel survey estimates, despite sampling differences, provide valid assessments of trends. Second, the sample was not randomly selected from the approximately 18 million HCP in the

United States. The sample consisted of a nonprobability sample of volunteer HCP members of the Medscape and SurveySpot Internet panels and did not include HCP without Internet access. Despite poststratification weighting, the results based on this nonprobability sample might not be representative of the HCP population in the United States. Third, all results were based on self-report and were not verified by employment or medical records. Self-report of vaccination might be subject to recall bias. Noncoverage and nonresponse bias might remain even after weighting adjustments. Fourth, the definition of vaccination promotion changed in the 2012–13 survey from previous surveys; therefore, the vaccination promotion trend is not comparable across survey years. Fifth, the 2012–13 and 2011–12 opt-in Internet panel survey data might not be directly comparable to the 2010–11 opt-in Internet panel survey data because different methods of recruitment were used in the earlier season. Finally, the definition of HCP, occupation type, and occupational setting used in this opt-in Internet panel survey vary from definitions used in other surveys of vaccination coverage, so that results might not be comparable.

The *Guide to Community Preventive Services* describes evidence-based strategies and recommends interventions with on-site, free, and actively promoted influenza vaccination services to increase vaccination coverage (*7*). The results of this opt-in Internet survey support expanding the number of health-care facilities offering vaccination on-site, over multiple days, and at no cost as strategies to improve vaccination. Implementing vaccination promotion policies and evidence-based strategies can help sustain and increase HCP influenza vaccination coverage over time.

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Influenza Vaccination Coverage Among Pregnant Women — United States, 2012–13 Influenza Season

Pregnant women and infants aged <6 months are at increased risk for influenza-related severe illness and hospitalization. Influenza vaccination of pregnant women has been shown to reduce the risk for illness in both mother and infant (*1*). To help protect pregnant women, the Advisory Committee on Immunization Practices (ACIP) and the American College of Obstetricians and Gynecologists recommend influenza vaccination for all women who are or will be pregnant during the influenza season, regardless of trimester (*1,2*). To estimate influenza vaccination coverage among pregnant women during the 2012–13 influenza season, CDC analyzed data from an Internet panel survey conducted April 1–12, 2013. Among 1,702 self-selected survey respondents pregnant at any time during the 4-month period of October 2012–January 2013, 50.5% reported they received influenza vaccination before or during their pregnancy. Influenza vaccination coverage was higher among women reporting both a health-care provider recommendation and offer of influenza vaccination (70.5%) compared with women who received a recommendation but no offer of vaccination (46.3%) and women who received no recommendation (16.1%). Vaccination coverage of women who will be or are pregnant during an influenza season might be improved by implementing a combination of community-based interventions, including enhanced access to low-cost vaccination services, provider recommendation and offer of influenza vaccination, and education of pregnant women about influenza vaccination safety and efficacy during pregnancy to increase demand (*3*).

To provide end-of-season estimates of influenza vaccination coverage, health-care provider recommendation and offer of vaccination, and information on knowledge, attitudes, and behaviors related to influenza vaccination among women pregnant during the 2012–13 influenza season, before the 2013–14 influenza season, CDC conducted an Internet panel survey during April 1–12, 2013.* Women aged 18–49 years who were pregnant at any time since August 2012 were recruited from a SurveySpot panel, a general population opt-in Internet panel operated by Survey Sampling International.† Of 6,633 women who entered the survey, 2,198 were determined to be eligible, and 2,047 (93.1%) completed the survey.§ Data were weighted to reflect the age groups, race/ethnicity, and geographic distribution of the total U.S. population of pregnant women during 1990–2008.¶ The methods and questions used in the April 2013 survey were similar to the April 2011 and April 2012 surveys (*4,5*). However, for this analysis, vaccination status was defined differently from the analyses of the 2010–11 and 2011–12 influenza seasons: 1) the vaccination time frame changed to July through April, compared with the previous timeframe of August through April; and 2) a woman was considered vaccinated only if she was vaccinated before or during pregnancy, whereas previously women vaccinated after pregnancy had also been counted (*4,5*). In this analysis, the study population was limited to women reporting being pregnant any time during the usual peak influenza vaccination period of October–January (n = 1,702).

Survey respondents were asked questions about 1) their vaccination status before and during pregnancy, 2) whether their health-care provider recommended and offered influenza vaccination, 3) their attitudes regarding influenza and influenza vaccination, and 4) their reasons for receiving or

* Comparable National Health Interview Survey data for this population will not be available until July 2014.

† Additional information available at http://www.surveysampling.com. The SurveySpot panelists were recruited from Internet sites that host a large number of frequent visitors and diverse Internet traffic. Multiple methods of recruitment were used, including banner ads, direct invitations, pop-ups, and web intercepts. The panel represents approximately 1 million households, and new panelists are continually being recruited; existing panelists are removed from the panel if they have opted-out or have not responded to an invitation within a specified period. A minimal incentive is routinely used to maintain the panel but not for an inducement to participate in a particular survey. Pregnant women panelists in this report were recruited from the SurveySpot panel using two methods: 1) an email invitation from SurveySpot sent to panel members aged 18–49 years, female, and living in the United States; and 2) a pop-up message inviting panel members visiting the SurveySpot website (http://www.surveyspot.com) to answer a series of screening questions and, if eligible, to take the survey.

§ A survey response rate requires specification of the denominator at each stage of sampling. During recruitment of an online opt-in survey sample, such as the Internet panel described in this report, these numbers are not available; therefore, the response rate cannot be calculated. Instead, the survey completion rate is provided.

¶ The sample of pregnant women was weighted to reflect the age group, race/ethnicity, and geographic region of all pregnant women in the United States during 1990–2008. The total population of pregnant women in the United States in 2012 and the distribution of pregnant women by age and race/ethnicity groups was determined based on data for the number of pregnant women in the United States during 1990–2008 (available at http://www.cdc.gov/nchs/data/nvsr/nvsr60/nvsr60_07.pdf). The distribution of U.S. pregnant women age 18–44 years by census region in 2008 was determined based on estimates provided for each state in the Guttmacher Institute's state data center (available at http://www.guttmacher.org/datacenter).

not receiving influenza vaccination. To simplify the analysis, responses to five individual questions on attitudes were used to develop two composite scores defining attitudes toward influenza vaccination efficacy and the safety of influenza vaccination. A response to a sixth question was used as a measure of concern about influenza infection.** Because the study sample was based on pregnant women from an opt-in Internet panel rather than a probability sample, no statistical tests were performed. Differences were noted when there was a difference of ≥5 percentage points between any values being compared.

Of the 1,702 women pregnant at any time during October 2012–January 2013, 50.5% reported influenza vaccination since July 1, 2012; 14.6% were vaccinated before pregnancy and 35.9% during pregnancy (15.7% first trimester, 10.6% second trimester, 8.1% third trimester, and 1.5% unknown trimester) (Table 1). Among the 1,620 women with at least one health-care provider visit since July 2012 who provided information on a provider recommendation and offer, 54.6% reported receiving a provider recommendation and offer of vaccination, 16.7% reported receiving a provider recommendation but no offer of vaccination, and 28.7% reported receiving no recommendation. Women who reported receiving both a provider recommendation and offer of influenza vaccination had higher vaccination coverage (70.5%) compared with women who reported receiving a provider recommendation but no offer (46.3%) and women who reported receiving no recommendation (16.1%) (Table 1, Figure). Women with the following reported characteristics had lower influenza vaccination coverage than other women within each comparison stratum: aged 18–24 years, non-Hispanic black, having an education less than a college degree, not married, reporting no health insurance, not working for

** Three composite variables were created. First, the influenza vaccination efficacy attitude composite variable was created based on responses to two questions regarding attitudes toward influenza vaccination: 1) "Flu vaccine is somewhat/very effective in preventing flu" and 2) "Agree/Strongly agree that if a pregnant woman receives the flu vaccination, it will protect the baby from getting the flu after it is born." One point was given for each "yes" answer for either of the two questions. Respondents who had a summary score of 1 or 2 were defined as having a "positive" attitude, and those with a summary score of 0 were defined as having a "negative" attitude. Second, the safety of influenza vaccination attitude composite variable was created based on responses to three questions regarding attitudes toward influenza vaccination: 1) "Flu vaccination is somewhat/very/completely safe for most adult women," 2) "Flu vaccination is somewhat/very/completely safe for pregnant women," and 3) Flu vaccination that a pregnant women receives is somewhat/very/completely safe for her baby." One point was given for each "yes" answer to any of the three questions. Respondents who had a summary score of 2 or 3 were defined as having a "positive" attitude, and those with a summary score of 1 or 0 were defined as having a "negative" attitude. Third, the influenza infection variable was created based on response to a question regarding attitude toward influenza infection: "If a pregnant woman gets the flu, it is somewhat/very likely to harm the baby." Respondents with a "yes" answer were defined as "concerned," and respondents with a "no" answer were defined as "not concerned."

TABLE 1. Influenza vaccination coverage among women who were pregnant at any time during October 2012–January 2013, by selected characteristics — Internet panel survey, United States, 2012–13 influenza season

Characteristic	Unweighted no.	Weighted %	Weighted % vaccinated*
Total	**1,702**	**100.0**	**50.5**
Vaccinated before pregnancy	239	—	14.6
Vaccinated during pregnancy	638	—	35.9
1st trimester	273	—	15.7
2nd trimester	200	—	10.6
3rd trimester	138	—	8.1
Unvaccinated	776	—	49.5
Age group (yrs)			
18–24	477	33.1	48.7
25–34	970	50.5	50.5
35–49	255	16.3	54.1
Race/Ethnicity			
White, non-Hispanic	1,093	50.3	52.2
Black, non-Hispanic	175	18.8	45.4
Hispanic	278	23.8	50.1
Other, non-Hispanic	156	7.2	53.1
Education			
Less than college degree	844	51.8	43.9
College degree	656	36.8	57.3
More than college degree	202	11.4	58.5
Married			
Yes	1,120	62.2	54.8
No	582	37.8	43.5
Health insurance coverage			
Any public	659	41.8	50.0
Private/Military only	939	51.7	53.0
No insurance	104	6.5	33.7
Working status†			
No	860	50.4	44.7
Yes	842	49.6	56.4
Poverty status§			
Below poverty level	404	26.0	41.6
At or above poverty level	1,289	74.0	53.8
High-risk conditions¶			
Yes	613	36.3	57.8
No	1,089	63.7	46.4
No. of provider visits since July 2012			
0	27	1.5	—**
1–5	682	41.6	48.0
6–10	598	34.9	53.1
>10	395	21.9	53.1
Reported provider recommendation and/or offer††			
Recommendation and offer	895	54.6	70.5
Recommendation but no offer	270	16.7	46.3
No recommendation	455	28.7	16.1
Attitude toward efficacy of influenza vaccination§§			
Negative	430	25.2	9.8
Positive	1,272	74.8	64.2
Attitude toward safety of influenza vaccination¶¶			
Negative	475	28.7	13.0
Positive	1,227	71.3	65.6
Attitude toward influenza infection***			
Not concerned	686	39.5	47.1
Concerned	1,016	60.5	52.8

See table footnotes on page 789.

TABLE 1. (*Continued*) Influenza vaccination coverage among women who were pregnant at any time during October 2012–January 2013, by selected characteristics — Internet panel survey, United States, 2012–13 influenza season

* Women who reported being vaccinated since July 2012 and being vaccinated either before or during pregnancy were defined as vaccinated. Overall, 2.9% of women reported vaccination after pregnancy and were categorized as unvaccinated during pregnancy. The revised estimates for the 2010–11 and 2011–12 influenza seasons using the 2012–13 definition were 44.0% and 47.6%, respectively (CDC, unpublished data, 2013).

† Those who were employed for wages or self-employed were categorized as working. Those who were out of work, homemakers, students, retired, or unable to work were grouped as not working.

§ Below poverty were defined as a total of annual family income of <$23,283 for a family of four with two minors as of 2012, as determined by the U.S. Census Bureau (information available at http://www.census.gov/hhes/www/poverty/data/threshld).

¶ Conditions associated with increased risk for serious medical complication from influenza, including chronic asthma, a lung condition other than asthma, a heart condition, diabetes, a kidney condition, a liver condition, obesity, or a weakened immune system caused by a chronic illness or by medications taken for a chronic illness.

** Sample size was <30; vaccination coverage estimates were not reliable.

†† Excluded women who did not visit a provider since July 2012 (n = 27) and women who did not respond or did not know whether they received a provider offer (n = 55).

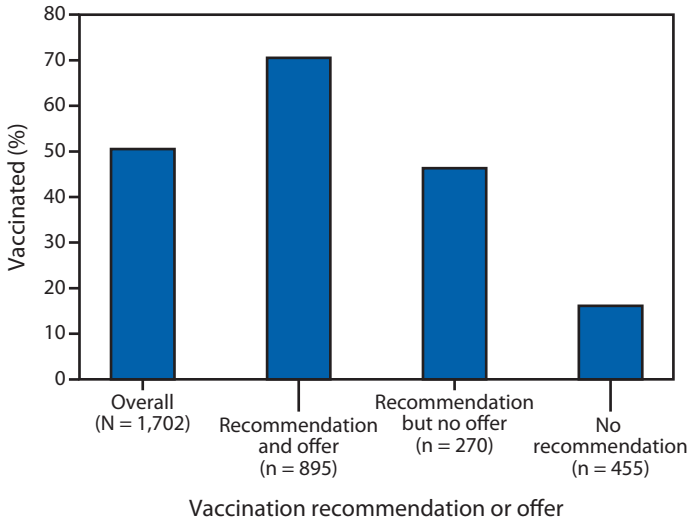
§§ Composite variable created based on responses to two questions regarding attitudes toward influenza vaccination: 1) "Flu vaccine is somewhat/very effective in preventing flu" and 2) "Agree/Strongly agree that if a pregnant woman receives the flu vaccination, it will protect the baby from getting the flu after it is born." One point was given for each "yes" answer for either of the two questions. Respondents who had a summary score of 1 or 2 were defined as having a "positive" attitude, and those with a summary score of 0 were defined as having a "negative" attitude.

¶¶ Composite variable created based on responses to three questions regarding attitudes toward influenza vaccination: 1) "Flu vaccination is somewhat/very/completely safe for most adult women," 2) "Flu vaccination is somewhat/very/completely safe for pregnant women," and 3) "Flu vaccination that a pregnant women receives is somewhat/very/completely safe for her baby." One point was given for each "yes" answer to any of the three questions. Respondents who had a summary score of 2 or 3 were defined as having a "positive" attitude, and those with a summary score of 0 or 1 were defined as having a "negative" attitude.

*** Variable created based on response to a question regarding attitude toward influenza infection: "If a pregnant woman gets the flu, it is somewhat/very likely to harm the baby." Respondents with a "yes" answer were defined as "concerned," and respondents with a "no" answer were defined as "not concerned."

wages, living below the poverty level, having no high-risk conditions associated with increased complications for influenza, and having fewer than six health-care provider visits since July 2012 (Table 1). Vaccination coverage among women with a negative attitude toward the efficacy of influenza vaccination was 9.8%, compared with 64.2% among those with a positive attitude. Women with a negative attitude towards the safety of vaccination had lower coverage than those with a positive attitude (13.0% versus 65.6%), and those with no concern about influenza infection had lower coverage than those with concern about influenza infection (47.1% versus 52.8%) (Table 1). The outcomes regarding attitudes were similar whether using responses to the composite scores or the individual questions.

FIGURE. Influenza vaccination before and during pregnancy, overall and by health-care provider recommendation and offer* of influenza vaccination, among women pregnant at any time during October 2012–January 2013 — Internet panel survey, United States, 2012–13 influenza season



* Excluded women who did not visit a health-care provider since July 2012 (n = 27) and/or did not respond or did not know whether they received an offer of vaccination (n = 55).

Overall, 72.3% of women reported receiving a health-care provider recommendation for vaccination, with or without reporting an offer of vaccination (Table 2). Women with both a provider recommendation and offer of influenza vaccination had higher vaccination coverage compared with women who received only a recommendation or who received no recommendation across all socio-demographic subgroups and attitude categories (Table 2). Among women who received a provider recommendation and offer of vaccination, coverage was 19.4% for those who reported a negative attitude toward influenza vaccination efficacy, 19.4% for those who reported a negative attitude towards the safety of influenza vaccination, and 68.8% for those who reported no concern about influenza infection; vaccination coverage was lower among women who did not receive a provider recommendation and also reported a negative attitude toward vaccination efficacy (2.5%) or the safety of influenza vaccination (7.7%) or no concern about influenza infection (15.6%).

The top three reasons women reported for vaccination were to protect their infant from influenza (33.2%), to protect themselves from influenza (20.0%), and because their health-care provider recommended vaccination (15.7%). The top three reasons reported for nonvaccination were concern about safety risk to the infant (20.5%), that the vaccination would give pregnant women influenza (13.6%), and that vaccination was not effective in preventing influenza (10.6%).

TABLE 2. Percentage of pregnant women receiving a health-care provider recommendation for influenza vaccination and influenza vaccination coverage, by provider recommendation and offer and selected characteristics, among women who visited a provider at least once since July 2012 and were pregnant at any time during October 2012–January 2013 — Internet panel survey, United States, 2012–13 influenza season

			Vaccination recommendation or offer					
	Reported a provider recommendation		Recommendation and offer		Recommendation but no offer		No recommendation	
Characteristic	No.	Weighted %	No.	Weighted %	No.	Weighted %	No.	Weighted %
Total	**1,675**	**72.3**	**895***	**70.5**	**270***	**46.3**	**455***	**16.1**
Age group (yrs)								
18–24	466	72.2	236	67.5	76	45.3	129	21.0
25–34	956	72.2	519	70.6	154	46.2	261	12.8
35–49	253	72.9	140	75.6	40	49.0	65	16.8
Race/Ethnicity								
White, non-Hispanic	1,075	73.3	583	70.8	178	49.5	286	16.6
Black, non-Hispanic	171	69.5	87	66.5	—†	—†	52	20.0
Hispanic	276	71.9	146	72.3	42	39.9	76	12.6
Other, non-Hispanic	153	73.9	79	72.8	—†	—†	41	14.2
Education								
Less than college degree	824	69.0	406	65.5	129	41.1	255	13.9
College degree	650	76.9	370	75.9	106	47.2	157	19.9
More than college degree	201	76.9	119	72.2	35	65.2	43	16.9
Married								
Yes	1,109	75.4	639	73.5	175	47.0	270	15.7
No	566	67.1	256	64.0	95	45.3	185	16.7
Health insurance coverage								
Any public	645	72.1	335	71.7	104	43.3	179	17.4
Private/Military only	930	74.1	522	71.6	151	49.8	236	15.5
No insurance	100	58.9	38	46.4	—†	—†	40	14.2
Working status§								
No	840	70.2	420	65.9	142	41.3	245	13.7
Yes	835	74.4	475	74.5	128	51.8	210	18.9
Poverty status¶								
Below poverty level	398	68.7	196	63.1	62	37.7	121	13.2
At or above poverty level	1,268	73.7	696	72.9	206	49.1	330	17.4
High-risk conditions**								
Yes	607	78.8	358	73.9	96	54.4	130	19.6
No	1,068	68.5	537	68.1	174	41.5	325	14.8
No. of provider visits since July 2012								
1–5	682	67.8	323	69.0	110	49.1	221	16.2
6–10	598	74.2	327	72.6	99	43.8	152	18.1
>10	395	77.7	45	69.7	61	45.1	82	12.3
Attitude toward efficacy of influenza vaccination††								
Negative	422	51.7	147	19.4	57	8.6	206	2.5
Positive	1,253	79.2	748	80.6	213	57.5	249	26.8
Attitude toward safety of influenza vaccination§§								
Negative	462	50.6	137	19.4	76	13.7	234	7.7
Positive	1,213	80.9	758	80.1	194	61.2	221	24.8
Attitude toward influenza infection¶¶								
Not concerned	678	70.8	331	68.8	125	44.3	202	15.6
Concerned	997	73.3	564	71.5	145	47.9	253	16.5

See table footnotes on page 791.

Reported by

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TABLE 2. (*Continued*) Percentage of pregnant women receiving a health-care provider recommendation for influenza vaccination and influenza vaccination coverage, by provider recommendation and offer and selected characteristics, among women who visited a provider at least once since July 2012 and were pregnant at any time during October 2012–January 2013 — Internet panel survey, United States, 2012–13 influenza season

* Excluded women who did not respond or did not know whether they received a provider offer of vaccination (n = 55).
† Sample size was <30; vaccination coverage estimates were not reliable.
§ Those who were employed for wages or self-employed were categorized as working. Those who were out of work, homemakers, students, retired, or unable to work were grouped as not working.
¶ Below poverty were defined as a total of annual family income of <$23,283 for a family of four with two minors as of 2012, as determined by the U.S. Census Bureau (information available at http://www.census.gov/hhes/www/poverty/data/threshld).
** Conditions associated with increased risk for serious medical complication from influenza, including chronic asthma, a lung condition other than asthma, a heart condition, diabetes, a kidney condition, a liver condition, obesity, or a weakened immune system caused by a chronic illness or by medications taken for a chronic illness.
†† Composite variable created based on responses to two questions regarding attitudes toward influenza vaccination: 1) "Flu vaccine is somewhat/very effective in preventing flu"; 2) "Agree/Strongly agree that if a pregnant woman receives the flu vaccination, it will protect the baby from getting the flu after it is born." One point was given for each "yes" answer for either of the two questions. Respondents who had a summary score of 1 or 2 were defined as having a "positive" attitude, and those with a summary score of 0 were defined as having a "negative" attitude.
§§ Composite variable created based on responses to three questions regarding attitudes toward influenza vaccination: 1) "Flu vaccination is somewhat/very/completely safe for most adult women," and 2) "Flu vaccination is somewhat/very/completely safe for pregnant women," and 3) "Flu vaccination that a pregnant women receives is somewhat/very/completely safe for her baby." One point was given for each "yes" answer to any of the three questions. Respondents who had a summary score of 2 or 3 were defined as having a "positive" attitude, and those with a summary score of 0 or 1 were defined as having a "negative" attitude.
¶¶ Variable created based on response to a question regarding attitude toward influenza infection: "If a pregnant woman gets the flu, it is somewhat/very likely to harm the baby." Respondents with a "yes" answer were defined as "concerned," and respondents with a "no" answer were defined as "not concerned."

Editorial Note

Overall influenza vaccination coverage among pregnant women during the 2012–13 influenza season was 50.5%. Vaccination coverage among pregnant women was 47.0%–49.0% for the 2010–11 and 2011–12 influenza seasons (*4*,*5*); however, these estimates are not directly comparable because the change in the definition of vaccination status for this most recent season (including changing the measurement of influenza vaccination for pregnant women to July through April and restricting vaccination to receipt before or during pregnancy). Women reporting no health insurance, not working for wages, having fewer than six health-care provider visits since July 2012, or lower socioeconomic status indicators (less education and living below the poverty level) had lower vaccination coverage than other women in the survey. Negative attitudes toward the efficacy or safety of influenza vaccination and having no concern about influenza infection were also associated with lower vaccination coverage. Provider recommendation and offer of influenza vaccination was associated with higher levels of vaccination coverage, even when women reported no health insurance, not working for wages, lower socioeconomic status indicators, a negative attitude toward the efficacy or safety of influenza vaccination, or a lack of concern about influenza infection.

Among women with at least one health-care provider visit, 54.6% reported receiving a provider recommendation and offer of vaccination. In any practice, barriers to providers recommending and offering vaccination might include physician's concern about time spent discussing the vaccination; administrative and financial issues, such as concern about the up-front cost of ordering vaccines; high costs of storing and maintaining vaccines; not having electronic health records; and organizational challenges of vaccine administration (*6*–*8*). Systems supporting provider recommendation and offer, such as standing orders and provider reminder systems, can reduce missed opportunities for vaccination and improve vaccination coverage when implemented with strategies to improve access to vaccination services, such as strategies that reduce patient cost and increase demand (e.g., patient education) (*3*). Full implementation of the Affordable Care Act might allow access to ACIP-recommended vaccinations, such as influenza vaccination, for pregnant women with no cost sharing when provided by an in-network provider, and thus minimize concerns about vaccination cost. Providers who do not provide vaccinations in their office can recommend vaccination and refer pregnant women to another in-network provider that administers influenza vaccinations.

Pregnant women who were not vaccinated reported concern about the safety risk to their infants and the misconceptions that the vaccination would give them influenza or that vaccination was ineffective as the top reasons for nonvaccination. However, health-care provider recommendation and offer was associated with increased vaccination coverage in all demographic groups. Education messages for pregnant women need to emphasize that vaccination during pregnancy can protect not only pregnant women themselves but also their infants during the first 6 months of life (*9*). Such messages can be delivered through multiple means, including routine provider education, prenatal consultation, social media, and text messaging (e.g., https://text4baby.org). These efforts might help providers address negative attitudes and misconceptions about vaccination.

What is already known on this topic?

Influenza vaccination coverage among pregnant women increased substantially to approximately 50% during the 2009–10 influenza season, and the increased coverage was sustained during the 2010–11 and 2011–12 influenza seasons.

What is added by this report?

Based on the responses of 1,702 self-selected participants in an Internet panel survey, for the 2012–13 influenza season, 50.5% of pregnant women were vaccinated against influenza, and 72.3% of pregnant women reported receiving a health-care provider recommendation of vaccination. Women who received a provider recommendation and offer of vaccination had higher vaccination coverage than women who received a provider recommendation alone or received no recommendation, even when they had a negative attitude toward vaccination efficacy or the safety of vaccination.

What are the implications for public health practice?

Continued efforts are needed to increase knowledge among pregnant women about the risk for influenza and the safety and efficacy of influenza vaccination for themselves and their infants. Efforts are also needed to increase opportunities for providers to recommend and offer influenza vaccination to pregnant women to protect both them and their infants.

The findings in this report are subject to at least five limitations. First, estimates might be biased if the selection processes for entry into the Internet panel and a woman's decision to participate in this particular survey were related to receipt of vaccination. Comparing 2010–11 influenza season vaccination estimates from 18 states in both the Internet panel survey and the Pregnancy Risk Assessment Monitoring System (PRAMS), a probability sampling survey, the Internet panel survey estimate for women pregnant at any time during October 2010–January 2011 (50.2%) was similar to the estimate from PRAMS for women who were pregnant in the same period (49.2%) (*10*). Additional comparisons with PRAMS and other available data sources over multiple seasons are needed to determine whether the more timely Internet panel survey estimates, despite sampling differences, provide valid assessments of trends. Second, the survey was self-administered and not validated by medical record review. Third, the results were weighted to the distribution of pregnant women in the U.S. population, but the study sample did not include women without Internet access. Therefore, it might not be a representative sample of pregnant women, and findings might not be generalizable to all pregnant women in the United States. Fourth, this was a cross-sectional survey. Self-reported vaccination status, attitudes, and provider recommendation and offer were measured at the time of the survey. Interactions that happened before the survey (e.g., choosing a provider with similar attitudes or a change in attitudes because of a provider recommendation or offer) could not be captured by this survey. Finally, the 2012–13 influenza season coverage estimates are not directly comparable with estimates from the 2011–12 and 2010–11 seasons reported previously (*4,5*) because of the change in measuring vaccination coverage in this season.

Health-care provider recommendation and offer of influenza vaccination were associated with higher vaccination levels among pregnant women. Vaccination programs that include reducing patient cost of vaccination, reducing missed opportunities for vaccination by ensuring vaccination recommendations are provided at each visit, and increasing demand are needed (*3*). Tailored educational messages should emphasize that vaccination during pregnancy will not only decrease the risk for influenza-related illness and complications in pregnant women themselves, but can also decrease the risk for illness in infants for up to 6 months, while they are too young to be vaccinated (*9*).

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Updated Information on the Epidemiology of Middle East Respiratory Syndrome Coronavirus (MERS-CoV) Infection and Guidance for the Public, Clinicians, and Public Health Authorities, 2012–2013

The Middle East respiratory syndrome coronavirus (MERS-CoV) was first reported to cause human infection in September 2012 (*1*). In July 2013, the World Health Organization (WHO) International Health Regulations Emergency Committee determined that MERS-CoV did not meet criteria for a "public health emergency of international concern," but was nevertheless of "serious and great concern" (*2*). This report summarizes epidemiologic information and provides updates to CDC guidance about patient evaluation, case definitions, travel, and infection control as of September 20, 2013.

As of September 20, 2013, a total of 130 cases from eight countries have been reported to WHO; 58 (45%) of these cases have been fatal (Figure 1). All cases have been directly or indirectly linked through travel to or residence in four countries: Saudi Arabia, Qatar, Jordan, and the United Arab Emirates (UAE) (Figure 2). The median age of persons with confirmed MERS-CoV infection is 50 years (range: 2–94 years). The male-to-female ratio is 1.6 to 1.0. Twenty-three (18%) of the cases occurred in persons who were identified as health-care workers. Although most reported cases involved severe respiratory illness requiring hospitalization, at least 27 (21%) involved mild or no symptoms. Despite evidence of person-to-person transmission, the number of contacts infected by persons with confirmed infections appears to be limited. No cases have been reported in the United States, although 82 persons from 29 states have been tested for MERS-CoV infection.

Potential animal reservoirs and mechanism(s) of transmission of MERS-CoV to humans remain unclear. A zoonotic origin for MERS-CoV was initially suggested by high genetic similarity to bat coronaviruses (*3*), and some recent reports have described serologic data from camels and the identification of related viruses in bats (*4–6*). However, more epidemiologic data linking cases to infected animals are needed to determine if a particular species is a host, a source of human infection, or both.

To date, the largest, most complete clinical case series published included 47 patients; most had fever (98%), cough (83%), and shortness of breath (72%). Many also had gastrointestinal symptoms (26% had diarrhea, and 21% had vomiting). All but two patients (96%) had one or more chronic medical conditions, including diabetes (68%), hypertension (34%), heart disease (28%), and kidney disease (49%). Thirty-four (72%) had more than one chronic condition (*7*). Nearly half the patients in this series were part of a health-care–associated outbreak in Al-Ahsa, Saudi Arabia (i.e., a population that would be expected to have high rates of underlying conditions) (*8*). Also, the prevalence of diabetes in persons aged ≥50 years in Saudi Arabia has been reported to be nearly 63% (*9*). It remains unclear whether persons with specific conditions are disproportionately infected with MERS-CoV or have more severe disease.

CDC Guidance

Evaluating patients. CDC has changed its guidance to indicate that testing for MERS-CoV and other respiratory pathogens* can be conducted simultaneously and that positive results for another respiratory pathogen should not necessarily preclude testing for MERS-CoV. Health-care providers in the United States should continue to evaluate patients for MERS-CoV infection if they develop fever and pneumonia or acute respiratory distress syndrome (ARDS) within 14 days after traveling from countries in or near the Arabian Peninsula.† Providers also should evaluate patients for MERS-CoV infection if they have ARDS or fever and pneumonia, and have had close contact§ with a recent traveler from this area who has fever and acute respiratory illness.

CDC continues to recommend that clusters¶ of patients with severe acute respiratory illness (e.g., fever and pneumonia requiring hospitalization) be evaluated for common respiratory pathogens and reported to local and state public health departments. If the illnesses remain unexplained, particularly if the cluster includes health-care providers, testing for MERS-CoV should be considered, in consultation with state and local health departments. In this situation, testing should

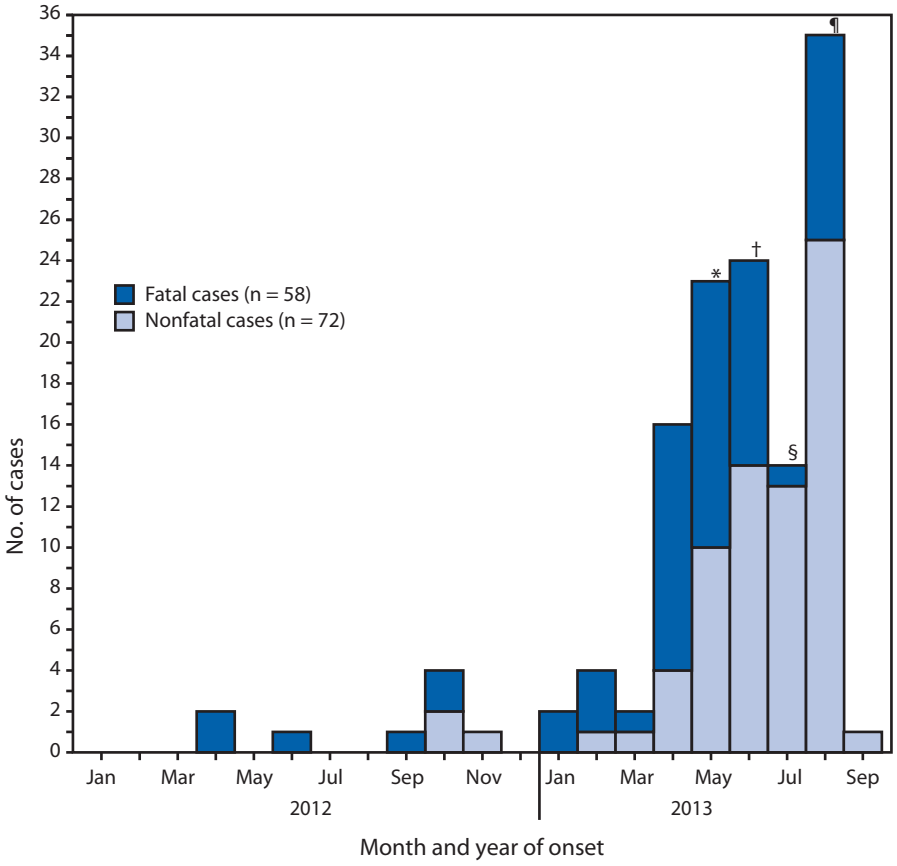
* Examples of respiratory pathogens causing community-acquired pneumonia include influenza A and B, respiratory syncytial virus, *Streptococcus pneumoniae*, and *Legionella pneumophila*.

† Countries considered in or near the Arabian Peninsula include Bahrain, Iraq, Iran, Israel, Jordan, Kuwait, Lebanon, Oman, Palestinian Territories, Qatar, Saudi Arabia, Syria, UAE, and Yemen.

§ Close contact is defined as 1) any person who provided care for the patient, including a health-care worker or family member, or had similarly close physical contact; or 2) any person who stayed at the same place (e.g., lived with or visited) as the patient while the patient was ill.

¶ In accordance with WHO guidance for MERS-CoV, a cluster is defined as "two or more persons with onset of symptoms within the same 14-day period who are associated with a specific setting, such as a classroom, workplace, household, extended family, hospital, other residential institution, military barracks, or recreational camp." Information available at http://www.who.int/csr/disease/coronavirus_infections/InterimRevisedSurveillanceRecommendations_nCoVinfection_27Jun13.pdf.

FIGURE 1. Number of cases of Middle East respiratory syndrome coronavirus infection (58 fatal and 72 nonfatal) reported to the World Health Organization (WHO) as of September 20, 2013, by month of illness onset — worldwide, 2012–2013



* Case count for May assumes that three cases included in WHO announcements on May 22 , May 23, and June 2, 2013, had symptom onset during May 2013.
† Case count for June assumes that 22 cases included in WHO announcements on June 14 , June 17, June 22, June 23, June 26, July 5, July 7, and July 11, 2013, had symptom onset during June 2013.
§ Case count for July assumes that 10 cases included in WHO announcements on July 18, July 21, and August 1, 2013, had symptom onset during July 2013.
¶ Case count for August assumes that 25 cases (two on August 28, one on August 29, two on August 30, and 16 on September 16) had symptom onset during August 2013.

be considered even for patients without travel-related exposure. Additional information about CDC's interim guidance regarding who should be evaluated for MERS-CoV infection is available at http://www.cdc.gov/coronavirus/mers/interim-guidance.html.

Case definitions. Although CDC has not changed the case definition of a confirmed case, confirmatory laboratory testing now requires a positive polymerase chain reaction of at least two, instead of one, specific genomic targets or a single positive target with sequencing of a second. CDC's definition of a probable case has been changed so that identification of another etiology does not exclude a person with an illness meeting this definition from being classified as having a probable case. Additional information about CDC's case definitions is available at http://www.cdc.gov/coronavirus/mers/case-def.html.

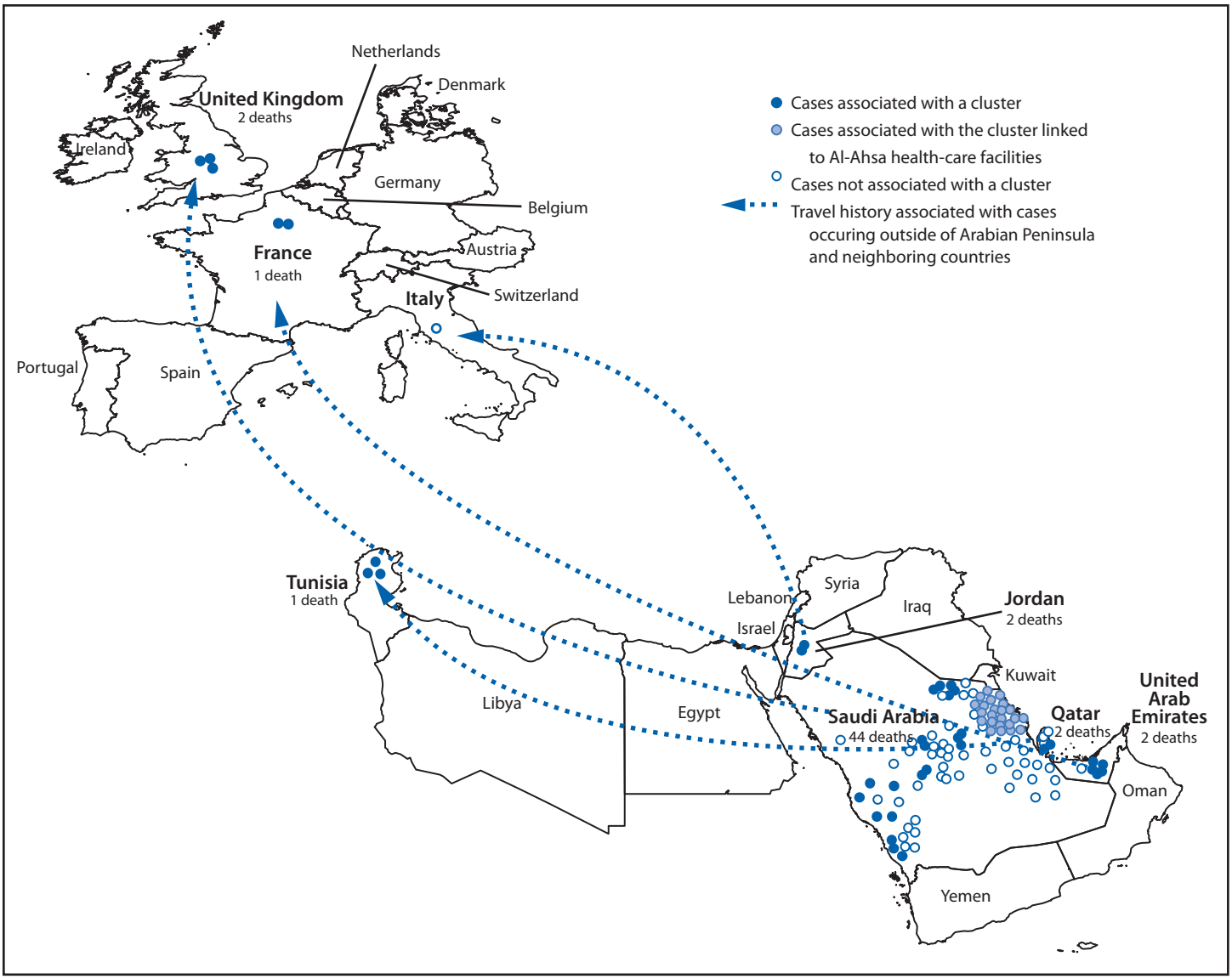
Travel guidance. The peak travel season to Saudi Arabia is July through November, coinciding with the religious pilgrimages of Hajj and Umrah. CDC encourages pilgrims to consider recommendations from the Saudi Arabia Ministry of Health regarding persons who should postpone their pilgrimages this year, including persons aged ≥65 years, children, pregnant women, and persons with chronic diseases, weakened immune systems, or cancer (http://www.moh.gov.sa/en/coronanew/news/pages/news-2013-7-14-001.aspx). WHO advises that persons with preexisting medical conditions consult a health-care provider before deciding whether to make a pilgrimage (http://www.who.int/ith/updates/20130725/en).

CDC continues to recommend that U.S. travelers to countries in or near the Arabian Peninsula protect themselves from respiratory diseases, including MERS-CoV, by washing their hands often and avoiding contact with persons who are ill. If travelers to the region have onset of fever with cough or shortness of breath during their trip or within 14 days of returning to the United States, they should seek medical care. They should tell their health-care provider about their recent travel. More detailed travel recommendations related to MERS-CoV are available at http://wwwnc.cdc.gov/travel/notices/watch/coronavirus-arabian-peninsula.

Infection control. With multiple health-care–associated clusters identified (*8,10*), infection control remains a primary means of preventing and controlling MERS-CoV transmission. CDC has recently made checklists available that highlight key actions that health-care providers and facilities can take to prepare for MERS-CoV patients (http://www.cdc.gov/coronavirus/mers/preparedness/index.html). CDC's infection control guidance has not changed. Standard, contact, and airborne precautions are recommended for management of hospitalized patients with known or suspected MERS-CoV infection.

CDC has determined that federal isolation and quarantine are authorized for MERS-CoV under Executive Order 13295

FIGURE 2. Confirmed cases of Middle East respiratory syndrome coronavirus infection (N = 130) reported to the World Health Organization as of September 20, 2013, and history of travel from in or near the Arabian Peninsula* within 14 days of illness onset — worldwide, 2012–2013



* Dots are not geographically representative of exact location of residences of persons with infection.

(http://www.cdc.gov/quarantine/aboutlawsregulationsquarantineisolation.html).** At this time, CDC is not restricting the movement of travelers with respiratory illness (that is not confirmed or probable MERS-CoV infection) arriving from the Arabian Peninsula. However, persons with illness meeting CDC's definition of a confirmed or probable case of MERS-CoV infection should remain in isolation until they are no longer considered to be contagious according to current guidance. Those who do not adhere to isolation requirements, or who intend to travel, may be subject to additional public health measures. CDC does not recommend quarantine of asymptomatic persons who were exposed to confirmed or probable cases. CDC generally recommends that persons with febrile respiratory illness delay travel until their symptoms resolve.

CDC has issued new guidance for care and management of MERS-CoV patients in the home and guidance for close

** Severe acute respiratory syndrome (SARS) was added to Executive Order 13295 (http://www.gpo.gov/fdsys/pkg/WCPD-2003-04-07/pdf/WCPD-2003-04-07-Pg408.pdf) in response to the 2003 outbreak. SARS is defined under the executive order as a disease associated with fevers and signs and symptoms of pneumonia or other respiratory illness, transmitted from person-to-person predominantly by the aerosolized or droplet route, and, if spread in the population, would have severe public health consequences. MERS-CoV infection meets these syndromic criteria and therefore meets the criteria for a quarantinable communicable disease. SARS and MERS-CoV infections are caused by different but related coronaviruses.

contacts of these patients (http://www.cdc.gov/coronavirus/mers/hcp/home-care.html). Persons who are confirmed, or being evaluated for MERS-CoV infection, and do not require hospitalization for medical reasons should be isolated in their homes as long as the home is deemed suitable for isolation. CDC currently recommends MERS-CoV patients should be isolated at home until public health authorities or a health-care provider determine that they are no longer contagious. Persons who might have been exposed[††] to MERS-CoV should be monitored for fever and respiratory symptoms for 14 days after the most recent exposure. Asymptomatic exposed persons do not need to limit their activities outside the home. If persons exposed to MERS-CoV have onset of symptoms, they should contact a health-care provider as soon as possible and follow the precautions for limiting possible exposure of other persons to MERS-CoV.

More detailed MERS-CoV–related interim guidance about patient evaluation, case definitions, travel, and infection control is available at http://www.cdc.gov/coronavirus/mers/index.html. This guidance might change as CDC learns more about the epidemiology of MERS-CoV. CDC will continue to post the most current information and guidance on its MERS-CoV website. State and local health departments with questions should contact the CDC Emergency Operations Center at 770-488-7100.

[††] Persons who might have been exposed to MERS-CoV include persons who care for or have close contact with someone who has MERS-CoV infection, persons who recently traveled to countries in or near the Arabian Peninsula, and persons who were identified as a result of a public health investigation of MERS-CoV infection cases.

Reported by

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What is already known on this topic?

The Middle East respiratory syndrome coronavirus (MERS-CoV) was first reported to cause human infection in September 2012 and is associated with high death rates. All cases have been linked through travel to or residence in Saudi Arabia, Qatar, Jordan, and United Arab Emirates. No cases have been reported in the United States.

What is added by this report?

This report summarizes epidemiologic information about MERS-CoV, provides updates to CDC guidance about patient evaluation, case definitions, travel, and infection control as of September 20, 2013, and describes new guidance for home care and management of patients with MERS-CoV infection.

What are the implications for public health practice?

Cases of MERS-CoV infection continue to be reported by countries in and near the Arabian Peninsula. This updated CDC guidance will help health-care providers and state and local health departments prepare for and respond to a possible case in the United States.

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Progress in Increasing Electronic Reporting of Laboratory Results to Public Health Agencies — United States, 2013

Electronic reporting of laboratory results to public health agencies can improve public health surveillance for reportable diseases and conditions by making reporting more timely and complete (*1*). Since 2010, CDC has provided funding to 57 state, local, and territorial health departments through the Epidemiology and Laboratory Capacity for Infectious Diseases cooperative agreement to assist with improving electronic laboratory reporting (ELR)* from clinical and public health laboratories to public health agencies. As part of this agreement, CDC and state and large local health departments are collaborating to monitor ELR implementation in the United States by developing data from each jurisdiction regarding total reporting laboratories, laboratories sending ELR by disease category and message format, and the number of ELR laboratory reports compared with the total number of laboratory reports. At the end of July 2013, 54 of the 57 jurisdictions were receiving at least some laboratory reports through ELR, and approximately 62% of 20 million laboratory reports were being received electronically, compared with 54% in 2012. Continued progress will require collaboration between clinical laboratories, laboratory information management system (LIMS) vendors, and public health agencies.

Monitoring of ELR progress began in 2012 with creation of a list of laboratories for each jurisdiction based on 2010 data from the Clinical Laboratory Improvement Amendments database of certified laboratories and the American Hospital Association directory of laboratory facilities. To date, these lists, which have been further refined by public health agencies, identify approximately 10,400 laboratories that send reportable results to public health agencies nationwide. Of these, approximately 5,320 (51%) are hospital laboratories, 420 (4%) are facilities owned by one of four large commercial laboratories,† 400 (4%) are public health laboratories, and 4,260 (41%) are other laboratories, including small or regional commercial, specialty, and federal (including CDC and the Veterans Administration) laboratories. Of the 10,400 reporting laboratories, approximately 5,400 (52%) are considered priority targets§ for ELR by health departments. Through quarterly telephone calls and e-mails, CDC and public health agency staff members compile information about laboratory results reporting, including an annual estimate of the volume of reports.

As of July 31, 2013, a total of 54 of the 57 jurisdictions (48 state and six large local health departments) were receiving at least some laboratory reports through ELR. Almost 2,900 (28%) laboratories (52% of targeted laboratories) reported to at least one public health agency through ELR.¶ Based on 12-month estimates provided by 54 jurisdictions, approximately 62% of total laboratory reports are being received electronically. The proportion of laboratory reports received electronically varied by jurisdiction; 14 jurisdictions received >75% of laboratory reports electronically, and nine received <25% of reports electronically (Figure). Of all reports received electronically, 40% come from one of the four large commercial laboratories, 14% from the approximately 5,300 hospital laboratories, and 30% from public health laboratories. The proportion of reports received electronically also varied by disease category. For example, approximately 76% of reportable laboratory results for general communicable diseases were received through ELR. In contrast, a lower proportion of human immunodeficiency virus (HIV) and sexually transmitted disease (STD) reports (54% and 63%, respectively) were sent electronically, even though overall reporting volumes for these conditions were higher.

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Editorial Note

State and local public health departments have made substantial progress in ELR in recent years; 54 state and local public health departments now receive laboratory reports electronically, compared with 26 in 2005 (*2*). In the last year alone, the percentage of laboratory reports received electronically

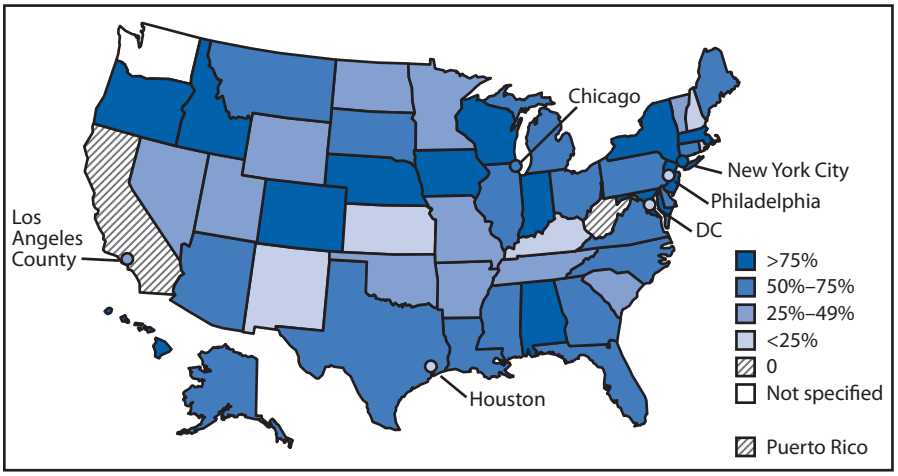
* ELR generally refers to the automated messaging of laboratory reports, using HL7 or other formats and one or more electronic communication protocols. Direct web entry (i.e., manual entering of reports over the Internet by laboratories but not through electronic messaging) is included in this report as ELR because it does not require manual data entry by public health agencies into a disease surveillance information system or into an ELR repository.

† LabCorp, Quest Diagnostics, ARUP Laboratories, and Mayo Clinic.

§ Generally defined by jurisdictions as laboratories that send enough reportable results to a jurisdiction to make establishing automated transmission of an ELR file worthwhile.

¶ In 22 jurisdictions, 1,038 laboratories reported using direct web entry for at least some reports.

FIGURE. Percentage of laboratory reports received by public health agencies through electronic laboratory reporting — United States, 2013*



* N = 57 jurisdictions, including 50 states, one territory, and six cities (for this report, Los Angeles County and the District of Columbia are categorized as cities). Data for Los Angeles County, which has a separate health jurisdiction, are not included in the data for California, which is expecting its first electronic laboratory report in October.

has increased 8 percentage points, from approximately 54% to 62%, and three states have begun receiving their first ELR transmissions.

The inclusion of electronic reportable laboratory results in the Centers for Medicare & Medicaid Services Electronic Health Record Incentive Program's "meaningful use" requirements is advancing ELR implementation by providing incentives to hospitals that receive Medicare and Medicaid reimbursements and creating additional funding sources for activities related to ELR implementation. CDC has provided support to public health agencies and hospital laboratories for establishing meaningful use–compliant ELR transmissions through the Health Information Technology for Economic and Clinical Health component of the American Recovery and Reinvestment Act (*3*). This support includes outreach provided to hospitals, particularly critical access and rural hospitals, by the Laboratory Interoperability Cooperative (a consortium of Surescripts, the College of American Pathologists, and the American Hospital Association). A doubling in the number of hospitals sending finalized ELR transmissions using meaningful use standards during March 2012–July 2013 (Division of Preparedness and Emerging Infections, National Center for Emerging and Zoonotic Infectious Diseases, CDC, unpublished data, 2013) suggests that meaningful use might already be having an impact on ELR implementation. ELR implementation by hospitals is likely to accelerate as meaningful use moves into its next stage, in October 2013, when ELR changes from "menu," or optional, to "core," or required, for eligible hospitals to receive their incentives.

Various other efforts are contributing to implementation of ELR in the United States. During 2010–2012, a CDC and Council of State and Territorial Epidemiologists ELR task force developed products and tools (*4*) to help inform ELR implementation, including a table for associating reportable conditions with standard codes for test names and results (i.e., reportable conditions mapping tables) (*5*), a process checklist for ELR implementation (*6*), a report of legal considerations for states implementing ELR (*7*), and white papers on working with large laboratories (*8*) and LIMS vendors (*9*) to improve ELR. At CDC, enhanced communication and collaboration among CDC programs that provide funds to public health departments are helping to reinforce standards-based ELR implementation and ensure that ELR efforts are not duplicative. In addition, CDC is working with the Association of Public Health Laboratories to offer technical assistance to advance ELR through targeted, short-term implementation projects. Since January 2012, CDC has received 70 requests for ELR technical assistance from 30 jurisdictions; of 56 approved projects, 43 are either under way or completed. Examples include establishing ELR feeds to health departments from the four large laboratories, smaller regional laboratories, and public health laboratories and improving the processing and increasing the use of ELR for all conditions.

Substantial work remains, however, to achieve full and effective ELR implementation. Nearly three fourths of reporting laboratories, including half of those that are priority targets, still are not reporting electronically, so increasing the number of laboratories sending reports electronically is a key objective. In addition, effective ELR implementation will require that many public health agency disease surveillance information systems develop capacity to incorporate electronic reports efficiently. This is especially true for those systems used for conditions with high laboratory report volume, such as HIV and STDs. Moreover, public health agencies, laboratories, and LIMS vendors should work together to achieve consistent and accurate use of standardized vocabulary, to ensure that all reports are sent and that they are complete, and to reduce inessential state-to-state variability in electronic disease reporting requirements.

Longer term, public health agencies, clinical laboratories, and CDC should collaborate to devise strategies to stimulate and facilitate more rapid, complete, and effective ELR implementation. Such strategies could include improving coordination of ELR delivery from the large laboratories to public health agencies (e.g., exploring the use of single, multijurisdiction transmissions through a shared services environment), incorporating ELR capability in the products of LIMS vendors,

What is already known on this topic?

Electronic reporting of laboratory results to public health agencies can improve public health surveillance for reportable diseases and conditions.

What is added by this report?

As of July 2013, a total of 54 state and large local public health agencies in the United States were receiving reports electronically for infectious diseases, compared with 26 in 2005. Approximately 62% of total laboratory reports in the United States were being sent electronically.

What are the implications for public health practice?

Progress in electonic laboratory reporting has resulted from a new emphasis and improved capacity and preparedness in health departments to address technical and policy issues. Continued progress will require collaboration between clinical laboratories, laboratory information management system vendors, and public health agencies, including improving the ability of disease surveillance information systems to effectively manage electronic reports.

developing information exchange with electronic health records, and capitalizing on the development of health information exchanges where possible.

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Notes from the Field

Department of Defense Response to a Multistate Outbreak of Fungal Meningitis — United States, October 2012

On October 1, 2012, the Department of Defense (DoD) learned of a multistate outbreak of fungal meningitis in persons who received injections of methylprednisolone acetate (MPA) from a single compounding pharmacy. Ten patients with fungal meningitis after epidural steroid injection (ESI) were initially identified in Tennessee and North Carolina (*1,2*). No military treatment facilities had received MPA from this pharmacy. However, clinics receiving implicated MPA lots were located throughout the United States, and active duty military service members and other DoD health-care beneficiaries could have been exposed through health-care services purchased outside of the DoD health-care system. Therefore, a timely method was needed to determine whether exposure to implicated MPA had occurred among DoD personnel who used purchased care.*

Although the majority of medical record data from outpatient treatment at military facilities are available in the Defense Medical Surveillance System (DMSS) within 7–10 days, data from procedures obtained through purchased care typically are not available for 4–6 months, and sometimes for as much as 1 year. Patient notification and reporting of cases to CDC is handled through state health departments. However, cases among highly mobile military members (who are commonly deployed and relocated) might not have been detected through standard local and state public health channels. Additionally, fungal infections can have a long incubation period (*3,4*) requiring a prolonged investigation to determine whether infection occurred. In response, the Armed Forces Health Surveillance Center (AFHSC), working with Tricare Management Activity, which manages medical and dental programs for DoD health-care beneficiaries, initiated an investigation to 1) identify service members and other beneficiaries who had received an injection of MPA from clinics named in the investigation, 2) determine whether any recently deployed service members had been exposed to implicated MPA, and 3) identify cases of infection among those who had been exposed.

Exposure was defined as a steroid injection into sterile epidural or joint space at clinics that received implicated MPA during the CDC-defined risk period (*5*). A case was defined as development of fungal infection in a joint injection site in persons meeting the exposure criteria. Tricare regional offices compiled a line-list of exposed military members by combining submitted claims data with a request for unsubmitted claims data for the defined procedures from clinics that received lots of the implicated MPA. AFHSC developed an ongoing, prospective search within DMSS to track exposed beneficiaries for possible fungal infection outcomes (*6*).

The results of the investigation determined that 471 military members and other beneficiaries had received potentially contaminated epidural or sterile joint injections; 43.9% were male. Of 469 persons with military status reported, 64 (13.6%) were active duty, and 58 (90%) of those were men. Among active duty service members receiving an injection with MPA, three (5%) deployed within a period in which they were at risk for a fungal infection; one deployed service member developed a fungal infection after the injection and was medically evacuated. Overall, four cases were detected in military members; three of these persons developed meningitis, including two who were active duty service members. As of November 2, 2012, no new cases had been detected through ongoing surveillance.

This investigation used a unique approach to identify cases of fungal meningitis, combining 1) claims data used to identify exposed persons and track them during relocations that included deployments and 2) ongoing outcome surveillance for additional cases within DMSS. Within DoD, universal access to care and centralized electronic medical records along with a unified system for purchased care allowed for a different approach to health surveillance in the military population, which consists of service members (active duty, Reserve, and National Guard), their dependents, and retirees. Although this approach might not apply to the entire U.S. population, it could be used by practitioners performing disease investigations and surveillance within specific groups such as managed-care programs and other large, linked databases, public and private.

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Acknowledgments

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* "Purchased care" refers to health care received by DoD military members and other beneficiaries from civilian providers outside of military treatment facilities. Health care received at military facilities is referred to as "direct care."

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Announcement

Final National and State-Level 2012–13 Influenza Vaccination Coverage Estimates Available Online

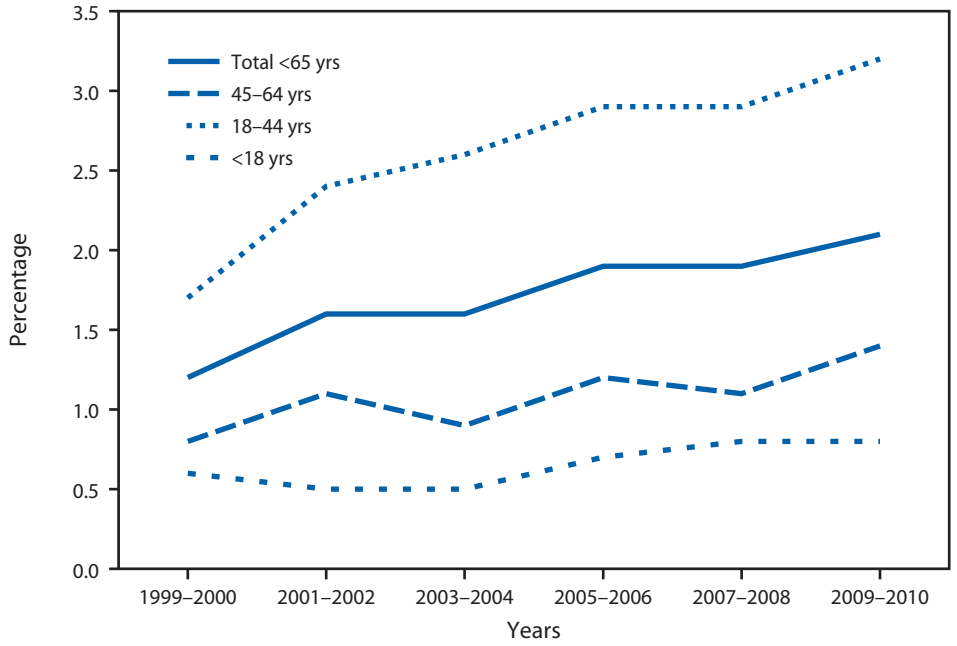
Final state-specific influenza vaccination coverage estimates for the 2012–13 season are now available online at FluVaxView (http://www.cdc.gov/flu/fluvaxview). The online information includes estimates of the percentage of persons vaccinated during July 2012–May 2013, for each state, for each U.S. Department of Health and Human Services region, and for the United States overall.

Analyses were conducted using National Immunization Survey data for children aged 6 months–17 years and Behavioral Risk Factor Surveillance System data for adults aged ≥18 years. Estimates are provided by age group and race/ethnicity. These estimates are presented in an interactive report (http://www.cdc.gov/flu/fluvaxview/interactive.htm) with state-specific estimates and are complemented by an online summary report (http://www.cdc.gov/flu/fluvaxview/coverage-1213estimates.htm) with national estimates.

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage of Emergency Department (ED) Visits That Were Dental-Related* Among Persons Aged <65 Years, by Age Group — National Hospital Ambulatory Care Survey, 1999–2000 to 2009–2010



* Defined as having a first-listed diagnosis code of 520.00–528.00 in the *International Classification of Diseases, Ninth Revision, Clinical Modification*.

During 1999–2000, 1.0 million visits to the ED for dental-related problems were made by persons aged <65 years. Dental-related ED visits increased to 2.3 million during 2009–2010, representing 2.1% of all ED visits among those aged <65 years, compared with 1.2% during 1999–2000. Over the same period, the percentage of ED visits for dental-related problems among adults aged 18–44 years increased from 1.7% to 3.2%. Although the percentage of ED visits that were dental-related increased among all age groups aged <65 years during this period, the percentage was higher among adults aged 18–44 years for all years.

Source: National Hospital Ambulatory Care Survey. Available at http://www.cdc.gov/nchs/ahcd.htm.

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